# Undergraduate

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Breadth of Knowledge (BOK)

Students are required to fulfill the following Breadth of Knowledge requirements from courses outside of their major department, with no more than two courses from a single discipline applied to the same criterion. Students may use up to two courses from their minor to also satisfy the Breadth of Knowledge. The Breadth of Knowledge requirement is designed to familiarize the student with different perspectives on knowledge. Students satisfy this requirement with a minimum of 36 credits in total, distributed as follows:

- **3 Social Sciences Perspective (SS)** - 9 credits
- **3 Arts and Humanities Perspective (AH)** - 9 credits
- **2 Sciences with Lab Perspective (SCL)** - 6 credits minimum
- **1 STEM Perspective (STEM)** - 3 credits
- **College Writing I and II (CW)** - 6 credits
- **Math Perspective (MATH)** - 3 credits minimum

To find upcoming courses that meet any of these requirements, scroll to the bottom of the Course Finder (https://www.uml.edu/student-dashboard/#my-academics/class-schedule/filters) to search Core Curriculum options.

Breadth of Knowledge Designations and Perspective Statements

Courses offered to the general university population by the appropriate departments automatically receive the designations listed below. Departments may request exceptions (https://www.uml.edu/docs/student_exception_form_tcm18-3512.pdf) for offered courses that are cross-disciplinary. The perspective statements provided are intended to be shared with students to help them develop a coherent sense of the methods and approaches of the disciplines across the courses they will take.

**SS** - The Social Sciences perspective draws upon empirical study of behavior, society and social relationships. All courses offered by Economics, Political Science, Psychology, Criminal Justice and Sociology, by definition, carry this perspective.

**AH** - The Arts and Humanities perspective is characterized by the interpretive analysis, critique, and creative and aesthetic expression of ideas and values. All courses offered by Art, English, History, Music, Philosophy, and World Languages and Cultures (including language courses), by definition, carry this perspective.

**SCL** - The Science with Lab Perspective represents the systematic, organized, and evidence-based empirical study of the natural and physical world. All courses in the natural and physical sciences with accompanying laboratory work offered by Biology; Chemistry; Earth, Environmental and Atmospheric Sciences; and Physics, by definition, carry this perspective.

**STEM** - The STEM Perspective removes traditional disciplinary boundaries to integrate approaches to analysis and problem solving, drawing from all fields of the sciences, technology, engineering and math. Science courses without labs, math courses, courses offered by Computer Science and Biomedical and Nutritional Sciences, and courses offered by engineering departments, by definition, carry this perspective.

**CW** - The College Writing requirement helps students integrate their learning across the BOK areas and prepares them to write and research in their major discipline. College Writing I and II and their equivalent courses fulfill this Breadth of Knowledge area.

**MATH** - The Mathematics Perspective is characterized by the logical analysis of quantity, structure, space, and change in applied and theoretical contexts. All courses offered by the Mathematical Sciences department, by definition, carry this perspective.

Interdisciplinary and Cross-Disciplinary Courses Seeking Breadth of Knowledge Designations

Interdisciplinary or cross-disciplinary courses which do not fall neatly into the disciplines specified above may apply to the Core Curriculum Committee of the Faculty Senate for the SS, AH, SCL, STEM, or MATH designation. An interdisciplinary or cross-disciplinary course may carry more than one BOK Designation, but can be used by students to fulfill only one BOK requirement.

Essential Learning Outcomes (ELOs)

Under UMass Lowell’s Core Curriculum, students must have the opportunity to master each of seven Essential Learning Outcomes (ELOs). These ELOs may be met within the major or through other courses, including courses that fulfill Breadth of Knowledge requirements. Consequently, all departments may identify courses within their majors that allow students to demonstrate particular ELOs, and submit these courses for ELO designation approval. Approved courses will be tagged in the catalog in course listings and on Degree Pathways and on Advisement Reports in SiS.

The seven ELOs are:

- Applied and Integrative Learning (AIL) (https://www.uml.edu/resources/catalog-
Students can synthesize their learning experiences across the curriculum.

- **Critical Thinking and Problem Solving (CTPS)**: Students can approach problems and evaluate evidence to draw informed conclusions.
- **Diversity and Cultural Awareness (DCA)**: Students can address complex questions about diverse cultural and social groups.
- **Information Literacy (IL)**: Students can successfully locate, evaluate and use data to better operate in a complex global landscape.
- **Quantitative Literacy (QL)**: Students can understand and express arguments using numerical data.
- **Social Responsibility and Ethics (SRE)**: Students can assess moral beliefs and practices to make a positive difference and contribute to a more sustainable global and local environment.
- **Written and Oral Communication (Emphasizing Writing in the Discipline) (WOC)**: Students can mount arguments, marshal evidence, and deploy rhetorical devices, drawing on genres and styles appropriate to the discipline.

To find upcoming courses that meet any of these requirements, scroll to the bottom of the Course Finder to search Core Curriculum options.

### ELO Policies

- 1000-level courses may be designated with no more than 1 ELO; 2000- and 3000-level courses may be designated with no more than 2 ELOs; 4000-level courses may be designated with no more than 3 ELOs.
- Interdisciplinary courses may receive ELO designations as well as a Breadth of Knowledge designation.
- A single course may introduce, reinforce and assess an ELO. Alternatively, an ELO designation may be assigned to the most advanced course in a series of courses addressing a particular ELO.

### Majors

UMass Lowell is a comprehensive research university offering more than 100 undergraduate majors in a wide array of disciplines across our five colleges. Some programs allow students to earn both a bachelor’s and a master’s degree in as little as five years. **Minors** within academic departments, as well as interdisciplinary minors, allow students to pursue an additional area of interest.

- **American Studies**: B.A. General OptionThematic Option
- **Applied Biomedical Sciences**: B.S. Clinical Science OptionMedical Laboratory Science Option
- **Art**: B.F.A. Animation and Interactive Media ConcentrationStudio Art Concentration
- **Biology**: B.S. General OptionBiotechnology OptionBioinformatics OptionEcology, Evolution and Organismal Biology Option
- **Biomedical Engineering**
• Business Administration
  B.S.B.A. Accounting Concentration
  Analytics and Operations Management Concentration
  Entrepreneurship Concentration
  Finance Concentration
  International Business Concentration
  Management Concentration
  Management Information Systems Concentration
  Marketing Concentration
• Chemical Engineering
  B.S.E. General Option
  Biological Engineering Option
  Nanomaterials Engineering Option
  Nuclear Engineering Option
• Chemistry
  B.S. General Option
  Biochemistry Option
  Forensic Science Option
• Civil Engineering
  B.S.E.
• Composition for New Media
  B.M.
• Computer Engineering
  B.S.E.
• Computer Science
  B.S. General Option
  Bio-Cheminformatics Option
  Cybersecurity Option
  Data Science Option
• Criminal Justice
  B.S. General Option
  Corrections Option
  Crime and Mental Health Option
• Digital Media
  B.A.
• Economics
  B.A.
• Education
  B.A.Ed. Disability Studies for Educational and Community Organizations Option
  Elementary and Moderate Disabilities Option
• Electrical Engineering
  B.S.E.
• Electrical Engineering/Computer Science (double major)
  B.S.E.
• Electrical Engineering/Physics (double major)
  B.S.E.
• Engineering Physics
  B.S. Electrical and Computer Engineering Option
  Mechanical Engineering Option
• English
  B.A. Creative Writing Concentration
  Journalism and Professional Writing Concentration
  Literature Concentration
  Theatre Arts Concentration
• Environmental Engineering
  B.S.E. empty
• Environmental Science
  B.S. Environmental Science Option
  Geoscience Option
• Exercise Science
  B.S. Clinical Option
  Exercise and Fitness Management Option
• Graphic Design
• Mechanical Engineering (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf): B.S.E.
• Nursing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf): B.S.
• Peace &Conflict Studies1
• Physics: B.S. General OptionAstronomy and Astrophysics OptionRadiological Health Physics Option
• Plastics Engineering (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf): B.S.E.
• Political Science: B.A. American Politics ConcentrationInternational Relations and Comparative Politics ConcentrationLaw and Politics ConcentrationPolitical Communication and Public Opinion ConcentrationSustainability and Environmental Politics Concentration
• Public Health (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf): B.S. Community Health/Health Promotion ConcentrationHealth Sciences Concentration
• Quantitative Economics: B.S.
• Sound Recording Technology
Minors

UMass Lowell offers more than 50 different minors. Some minors are based in individual departments, and some are interdisciplinary, including courses from multiple departments or colleges. Some minors are specifically designed to pair with particular majors. For more information, review the catalog requirements for the specific minors below.

- Aerospace Studies
- American Studies
- Applied Biomedical Sciences
- Arabic Studies
- Architectural Studies
- Art
- Art History
- Asian Studies
- Biology
- Biomedical Technology
- Business
- Business Administration
- Chemical Engineering
- Civil & Environmental Engineering
- Chemical Engineering
- Computer Science
- Creative Writing
- Criminal Justice
- Digital Media
- Disability Studies
- Economics
- Education
- Energy Engineering
- English
- Interdisciplinary majors.
Entrepreneurship
Environment and Society
Exercise Science
Film Studies
Finance
French
Gender Studies
Geology
German Studies
Graphic Design
History
Italian Studies
Joint Military Studies
Journalism and Professional Writing
Labor Studies
Latin American Studies
Legal Studies
Management
Marketing
Mathematics
Medieval and Renaissance Studies
Music
Nuclear Science and Engineering
Nutrition
Operations and Information Systems
Peace and Conflict Studies
Pharmaceutical Sciences
Philosophy
Physics
Political Science
Portuguese Studies
Psychology
- Public Health (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Robotics1 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Sociology (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Spanish
- STEM Teaching (UTeach)1 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Technology, Society and Human Values1 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Theatre Arts1 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

1Interdisciplinary minors.
Policy Links

- Academic Calendar
  (https://www.uml.edu/Registrar/Calendars/default.aspx)
- Academic Credit Hour
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Academic Honors
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Academic Integrity
- Academic Standing
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Administrative Dismissal
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Athletic Academic Policy
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Attendance
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Bachelor’s Degrees
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Commencement
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Course Descriptions
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Course Equivalency Examinations
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Course Requirements
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Declaration or Change of Major
- Departmental Examinations
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- General Degree Requirements
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Grading
- Learning Outcomes Assessment
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Major Field Requirements
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Maximum Period of Bachelor’s Degree Study
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Minor Area Requirements
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Multiple Areas of Undergraduate Study
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Off-Campus Study
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Online &Professional Studies
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Programs of Study and Declaration of Intent to Graduate
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Registration and Course Enrollment Policies
- Repeated Coursework/Course Deletions
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Right of Access to Student Records
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
Academic Integrity

Statement of Principles

Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources, and for respect of others academic endeavors. Academic dishonesty is prohibited in all programs of the university.

Definitions

As used herein:

1. Office of the Provost refers to the Provost, Vice Provost or designee.
2. Days means academic calendar days and excludes Saturdays, Sundays, legal holidays and days upon which the university is closed.
3. Academic Dean means the Academic Dean, Associate Dean or designee for the college in which the subject course is taught.
4. Instructor refers to the Instructor of Record.
5. Chair or Department Chair refers to the chair of the department in which the course is offered.
6. Notice to the student shall be e-mailed to the students official student.uml.edu e-mail address or mailed to the student by regular first-class United States mail at his or her current address as maintained by the university.

Academic Dishonesty and Misconduct Subject to Disciplinary Action

Academic dishonesty is an act in which a student:

1. Seeks to claim credit for the work or efforts of another without authorization or citation (plagiarism, copying, etc.);
2. Uses unauthorized materials or fabricated data, including on-line sources, social media, etc. without instructors permission;
3. Forgives or falsifies academic documents or records;
4. Intentionally impedes or damages the academic work of others;
5. Submission of academic work for which credit has already been earned without instructor permissions (self-plagiarism);
6. Engages in conduct aimed at making false representation of a students academic performance;
7. Assists other students in any of these acts; or
8. Submits own work or consults the work of others through on-line sources, phones, or other technology without instructor permission.

Possible Disciplinary Sanctions

The following are the disciplinary sanctions that may be imposed by an instructor for academic misconduct:

1. An assignment to repeat the work, to be graded on its merits, or with a reduced grade as a sanction;
2. A lower or failing grade on the assignment or test;
3. A lower grade in the course;
4. A failing grade in the course

In rare cases of egregious or repeated incidences of Academic Dishonesty or Misconduct, the instructor, dean or provost may impose the following sanctions:
1. A non-deletable failing grade in the course (FX);
2. Suspension from the University for a designated period in which the student may not earn credits elsewhere to be transferred to the university;
3. Permanent expulsion from the university

Sanction Process

1. When possible, prior to imposing a sanction, the instructor shall notify the student that the instructor believes an act of academic misconduct has occurred, that a sanction may be imposed, and that a Notification of Academic Dishonesty Form will be filed with the Office of the Provost. Instructors are encouraged to engage students in a discussion of the importance of academic integrity and why the instructor considers a sanction appropriate.
2. Upon the imposition of a sanction under this section, the instructor shall notify the Office of the Provost. Notification to the Office of the Provost shall occur as soon as possible and no later than ten days after the infraction is discovered, using the Notification of Academic Dishonesty Form (https://www.uml.edu/Registrar/Faculty-Forms/default.aspx), and shall include identification of the student, a description of the misconduct and a recommendation of the sanction. The instructor may, but is not required to, attach copies of any evidence or supporting materials to this notification. All such material shall be held in the instructors possession until the period of student appeal has passed.
3. Within ten days following receipt of such notice, the Office of the Provost shall provide notice of the imposed sanction to the student, the instructor and the academic dean. Notification to the student shall include a statement of the misconduct, specification of the sanction, a statement indicating the students right to and process for an appeal.
4. A student who receives notice of a disciplinary sanction has the right to a hearing before the academic dean to contest that academic misconduct occurred, the appropriateness of the disciplinary sanction or both. Students who request an appeal must file a written request to the academic dean within 10 days of receipt of notice from the Office of the Provost.
5. In the event that the student does not file a written request for an appeal within 10 days, the sanction imposed by the faculty member and/or provosts office will be accepted and processed.

Appeal to the Academic Dean

The student has the right to appeal any sanction to the dean within 10 days of receiving notification of an academic integrity infraction from the provosts office. The dean or designee will then proceed with the following:

1. Conference with student: The purpose of this discussion is to permit the dean to review with the student the charges levied against him or her and to afford the student an opportunity to respond.
2. Conference with instructor: This discussion may occur either before or after the conference with the student. It should include consultation with the instructor on the facts underlying the alleged academic misconduct and on the appropriateness of the imposed or recommended sanction.
3. Review of any supporting materials presented by the student or faculty member in relation to the academic dishonesty claim.
4. A finding of misconduct must be based on a preponderance of the credible evidence.

Appeal Findings

1. If the dean determines that academic misconduct did not occur, or that the disciplinary sanction is not appropriate under the circumstances, the dean shall notify the instructor and the Office of the Provost. The provost shall thereafter notify the student and take appropriate action with respect to the student records. The dean will also notify the faculty member, who must proceed to grade the students work without the imposed sanction.
2. If the Academic dean determines that academic
misconduct did occur and that the imposed sanction applied is appropriate, the dean shall forward to the Office of the Provost, within 10 days, a written finding of misconduct, which shall include identification of the student, a description of the misconduct, a summary of the appeal process, findings of fact, and a specification that the appeal is affirmed or denied.

3. The dean may also conclude that academic misconduct did occur, but may recommend an alternate sanction. In such a case, the student shall be notified within ten days of that decision in a communication that includes identification of the student, a description of the misconduct, a summary of the appeal process, findings of fact, and a specification that the finding of academic misconduct is affirmed, but that the recommended sanction has been revised. The faculty member shall proceed to grade the students work according to the revised sanction.

Appeal to the Office of the Provost

The decision reached by the dean is final, and may only be appealed to the provosts office based on concerns regarding due process.

Grounds for Appeal of Due Process

1. An appeal to the Office of the Provost shall be limited to a review of the process and outcome of the deans review for one or more of the following grounds: Evidence that bias by the instructor or dean substantially influenced the outcome of the process to the detriment of the student. New, relevant information that has come to light which was not available at the time of the hearing by the deans office. Evidence that the faculty member and deans office did not follow the process outlined in the catalog. Students requesting a Due Process Appeal must file a written request with the Office of the Provost and the dean within 10 days of receipt of notice from the Office of the Provost. The request must be based upon the Grounds for Appeal listed above.

2. When an appeal based on due process is commenced, the provost shall review the matter with respect to the subject student and may, at his or her discretion, uphold, vacate or modify the discipline imposed.

3. The Provosts Office may also direct such appeal to be heard by an Academic Integrity Appeals Board.

Academic Integrity Appeals Board

1. The Academic Integrity Appeals Board is an ad hoc committee appointed by the provost and consists of a minimum of three faculty members chosen by of the provosts office, with no two members selected from the same college; the Board shall not include a faculty member from within the department initiating charges of academic dishonesty. At least one member of the Board shall be a representative of the Faculty Senate. The Board is chaired by the provosts designee who shall participate in the process, but who will only vote in the event of a tie.

When an appeal is directed to the Academic Integrity Appeals Board by the Provosts Office, the Board shall schedule a hearing, within a reasonable time period, at a time that is mutually agreed upon by the student, Provosts Office and members of the Academic Integrity Appeals Board.

In advance of the hearing, the Academic Integrity Appeals Board shall obtain from the Academic dean, in writing, a full explanation of the facts upon which the determination of misconduct was based and shall review any information provided by the student.

3. The hearing before the Academic Integrity Appeals Board shall be conducted in accordance with the following requirements: The Appeals Board shall consider relevant evidence including documentary evidence and testimony of the instructor, student, chair and/or dean where appropriate, and evidence of lack of due process. The student shall have the right to be heard and to present relevant evidence, including documentary evidence and the testimony of witnesses, and evidence of due process. The Appeals Board shall maintain a record of the hearing including any pleadings and documentary
evidence presented. The Academic Integrity Appeals Board shall prepare written findings of fact and a written statement of its decision based upon the record of the hearing. The Academic Integrity Appeals Board may impose a disciplinary sanction that differs from the recommendation of the dean.

4. Determination that No Academic Misconduct Occurred: If, after the hearing, the Academic Integrity Appeals Board determines that there is insufficient evidence that academic misconduct occurred or that no disciplinary sanction is appropriate under the circumstances, the Academic Integrity Appeals Board shall notify the instructor, the dean and the Office of the Provost. The provost shall promptly thereafter notify the student and take appropriate action with respect to the student records.

5. Determination by the Academic Integrity Appeals Board that Academic Misconduct Occurred: If the Academic Integrity Appeals Board determines that academic misconduct did occur and that one or more of the disciplinary sanctions is appropriate, the Academic Integrity Appeals Board shall prepare and forward to the Office of the Provost, within 10 days, a written Finding of Misconduct which shall include identification of the student, a description of the misconduct and a specification of the disciplinary sanction to be imposed. Within 10 days following receipt of the written Finding of Misconduct from the Academic Integrity Appeals Board, the Office of the Provost shall provide written notice of the imposed discipline to the instructor, the academic dean and the student.

Students admitted to the Nursing program are not permitted to defer admission but may defer an application for re-evaluation for a future fall term. We do not permit Nursing students to defer an application to the spring semester.

Students who defer their application and have a change in their educational history must be re-evaluated based on the new grades and coursework.

Students are responsible for communicating any updates to their application, including, but not limited to: educational history, disciplinary history, and biographical information, when requesting a deferral.

Request a deferment (https://go.uml.edu/register/ugdefer).

Grading Policies

Please review the following grading policies:

- Grading Policies
- Mid-term Grades
- Pass-No Credit Grading Scheme
- Spring 2020 Grading Scheme (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Fall 2020/Spring 2021 Grading Scheme (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Satisfactory- Unsatisfactory Course Registration
- Incomplete Courses
- Audited Courses
- Grade Changes
- Course Grade Appeal Policy

The following qualitative letter grades are employed by faculty members to characterize the quality of a student's work in a course:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Details</th>
<th>Numerical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Superior Work: Highest Quality</td>
<td>4.0</td>
</tr>
<tr>
<td>A-</td>
<td>High Honors Quality</td>
<td>3.7</td>
</tr>
<tr>
<td>B+</td>
<td>High Quality</td>
<td>3.3</td>
</tr>
<tr>
<td>B</td>
<td>Basic Honors Quality</td>
<td>3.0</td>
</tr>
<tr>
<td>B-</td>
<td>Below Honors Quality</td>
<td>2.7</td>
</tr>
<tr>
<td>C+</td>
<td>Above Satisfactory Quality</td>
<td>2.3</td>
</tr>
<tr>
<td>C</td>
<td>Satisfactory</td>
<td>2.0</td>
</tr>
<tr>
<td>C-</td>
<td>Below Satisfactory Quality</td>
<td>1.7</td>
</tr>
<tr>
<td>D+</td>
<td>Above Minimum Passing</td>
<td>1.3</td>
</tr>
<tr>
<td>D</td>
<td>Minimum Passing</td>
<td>1.0</td>
</tr>
<tr>
<td>F</td>
<td>Failed</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Undergraduate Deferral Policy

A student may request a deferment of enrollment up to one year beyond the date when he or she was scheduled to begin his or her undergraduate program. If the one-year time period is exceeded, the student must submit a new application and application fee. The deferral must be requested before the start of the semester for which the student was originally accepted.
Failed due to Academic Misconduct (may not be replaced or deleted)

In addition to the above qualitative letter grades, the following symbols are used to designate special enrollment provisions or course statuses and do not affect the students academic average:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU</td>
<td>Audit</td>
</tr>
<tr>
<td>W</td>
<td>Withdrawn</td>
</tr>
<tr>
<td>CR</td>
<td>Credit Only</td>
</tr>
<tr>
<td>INC</td>
<td>Incomplete</td>
</tr>
<tr>
<td>W</td>
<td>Voluntary Withdrawal (before deadline-to-withdraw indicated on academic calendar)</td>
</tr>
<tr>
<td>X</td>
<td>Administrative Withdrawal</td>
</tr>
<tr>
<td>NC</td>
<td>No Credit</td>
</tr>
<tr>
<td>P</td>
<td>Satisfactory Grade C- or Above</td>
</tr>
<tr>
<td>S</td>
<td>Satisfactory Grade C or Above</td>
</tr>
<tr>
<td>U</td>
<td>Unsatisfactory Failed</td>
</tr>
<tr>
<td>T</td>
<td>Transfer Credit</td>
</tr>
<tr>
<td>Y</td>
<td>University Withdrawal for Non-Academic Reasons</td>
</tr>
</tbody>
</table>

Pass-No Credit Grading Scheme

Students may elect to register on a pass-no credit basis for a maximum of four unrestricted elective courses. A student may not change grading scheme from letter grade to pass-no credit or from pass-no credit to letter grade after the established deadline for adding a course.

A pass-no credit course cannot be presented in fulfillment of University Core Curriculum requirements, major programs, minor programs, or specifically designated courses (collateral requirements) of an established curriculum. A grade of P indicates that a students performance merits an evaluation of C- or better. NC indicates that a course has been failed, but that such failure is without prejudice to the students cumulative average. Although appropriate credits are granted to students when grades of P have been assigned, these credits are not qualitatively weighted and hence do not affect a students academic average. The entry NC will not keep an otherwise qualified student from deans list recognition. Students must request pass-no credit grading scheme for each course by the last date to add/drop.

- Spring 2020 Grading Scheme (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Fall 2020/Spring 2021 Grading Scheme (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Satisfactory-Unsatisfactory Course Registration

Certain courses (e.g., practicum experiences, advanced seminars, and directed studies) may be graded as satisfactory or unsatisfactory. A grade of S indicates that a students performance merits an evaluation of C or better. A grade of U indicates a course evaluation of less than C. Although appropriate credits are granted to students when grades of S have been assigned, these credits are not qualitatively weighted and hence do not affect a students academic average. A grade of U indicates that attempted course credits have not been granted and is awarded without prejudice to a students cumulative average.

Incomplete Courses

The symbol INC (incomplete) is a temporary notation which is assigned for incomplete work in courses when the records of students justify the expectation that they will obtain a passing grade, but for emergency reasons they have missed a minor part of the course requirement. Any missed final examination or other final course evaluation requires a student explanation within 48 hours so the instructor can file the proper course notation with the Office of the Registrar.

A student who has evidenced an unsatisfactory course record, who has failed to complete a major portion of an instructors course requirements, or who fails to provide an instructor with a satisfactory reason for absence from a final examination or final course evaluation within the specified 48 hour period may not be assigned the letter symbol INC.

Responsibility for making arrangements with an instructor to complete all outstanding course work rests entirely with the student, who must complete all course work by the final week of classes for the succeeding semester.

At the end of the official make-up period (or, in the event of a substantiated student emergency, at the end of an extended make-up period), the Office of the Registrar will convert the temporary notation of INC to the appropriate permanent symbol. This permanent notation will be one of the following: 1) a letter grade which is filed by an instructor at the end of the make-up period to designate the final course standing of a student who has made up incomplete course requirements, 2) course work not completed by the final week of classes for the succeeding semester will convert to a grade of F, or 3) the letter symbol of X, which the dean of the college in which the student is enrolled as a degree candidate may authorize to designate that a student has withdrawn from the University after the end of the semester for documented personal emergency (cf. University Withdrawal After the End of the Semester), 4) Medical emergencies will need to complete the Request for Medical Withdrawal form (https://www.uml.edu/thesolutioncenter/Forms/Academic-
Limited extensions of the make-up period may be granted to students for serious medical reasons and for documented personal emergencies. Requests for such extensions are approved by the dean of the college in which students are enrolled as degree candidates and must be filed no later than one calendar week preceding the established deadline for instructors to submit final grades for incomplete courses.

Audited Courses

A student may enroll in credit courses as an auditor with appropriate approval. Forms and instructions for registration as an auditor may be obtained from the Office of the Registrar. No charge is levied on full-time students for audited courses. No credit or grade will be recorded for an audited course, but the symbol AU will be listed on the permanent record. A change from audit to credit status, or from credit status to audit, may not be made after the deadline for adding a course (10th class day).

Students who have audited a course subsequently may not earn credit in the same course through tests of the College Level Examination Program or through other authorized examination procedures for course challenge.

Grade Changes

At the end of each semester, grades are available to students via their self service account in SIS. All course grades become a part of the students official record upon instructor assignment and may not be changed except as specifically provided by University procedures. Corrections of grade-point averages automatically are authorized when grade reports are corrected by instructors and when specific courses are deleted from grade-point averages under provisions of University regulations governing repeated courses and course deletions.

Changes of grades other than the filing of grades for incomplete courses require the endorsement of the appropriate college dean. Grade changes may not be made on a students permanent record after the deadlines cited in the academic calendar unless such changes have been authorized by appropriate college deans.

Course Grade Appeal Policy

The instructor of the class is the primary authority with respect to a students proficiency and final grade in that course. A student who believes that his or her final grade reflects an erroneous, capricious, arbitrary, or prejudiced academic evaluation may appeal the grade. The academic judgment used in determining the merits of the grade to be awarded shall not be reviewable. This process does not apply to cases of academic dishonesty, which are adjudicated through the academic dishonesty process.

1. The student may file an appeal of his or her complaint, in writing, to the instructor within 30 days after a final grade is posted to the students record. The instructor must respond within 14 days of receiving the appeal.

2. If the student remains dissatisfied by the decision of the instructor under step (1), he or she may, within 14 days after formal receipt of the instructor’s final decision, appeal, in writing, to the chairperson of the program (or the Dean of the College if the instructor is the chairperson) in which the course or other exercise or activity is offered. The chairperson must respond within 14 days of receiving the appeal. The decision may be: (a) that the appeal be dismissed; (b) if there is demonstrable evidence of an erroneous, arbitrary, capricious, or prejudiced academic evaluation, then the chairperson will recommend appropriate remedies that a grade be changed or the student be allowed an opportunity to retake an examination or other exercise; or (c) that another appropriate remedy be administered.

3. If no satisfactory resolution is reached in step (2) then the student or the instructor may appeal, in writing, to the Dean of the College within 14 days after formal receipt of the chairperson’s final decision.

4. The Dean, after discussion with the appropriate parties, may resolve the grievance by agreement or render a decision within 21 days of receipt of the written appeal. The decision may be: (a) that the appeal be dismissed; (b) if the student provides demonstrable evidence of an erroneous, arbitrary, capricious, or prejudiced academic evaluation, then the Dean will recommend appropriate remedies that a grade be changed or the student be allowed an opportunity to retake an examination or other exercise; or (c) that another appropriate remedy be administered.

5. The decision of the Dean is final and not subject to
additional appeal by either student or instructor. The appeals process ends at this step.

6. Department chairs are responsible for keeping a record of the appeal on file in the department until the student is no longer a student.

Registration and Course Enrollment Policies

Students are required to register for courses during periods which are officially designated for registration unless they have been authorized to make other arrangements by the dean of the college in which they are matriculated. Non-matriculated students are permitted to enroll for course loads only as specified by their conditions of admission and must comply with the policies (below) concerning semester course loads and reduced load status.

- Semester Registration
- Semester Course Loads
- Deadline for Changes of Course Enrollment Status

Semester Registration

First time students are strongly encouraged to register in person. Returning students are required to register during the designated registration periods. They have satisfied the registration requirement when they have paid the required tuition and fees and have complied with the course drop and add process.

Students who pre-register for courses for which they subsequently fail to satisfy prerequisites must initiate changes of registration during the add-drop period. Students are not enrolled in classes for which they are not properly registered.

Student schedules are available through the university's self-service (https://www.uml.edu/Enrollment/SiS/default.aspx) website. Students who believe that errors have been made in their registrations should consult with the Office of the Registrar prior to the deadline for adding courses. Students who do not check their schedule and, accordingly, fail to correct scheduling errors by established deadlines may not expect to have University regulations waived for their benefit.

Course Additions

Students who wish to add a course during the first five days of classes may do so in person at the Office of the Registrar or through self-service.

Dropped Courses

A student who wishes to drop a course may do so in person at the Office of the Registrar or through student self-service during the first ten days of classes.9

There are only two cases for which a drop is not necessary:
1. if the course is cancelled by the University; or
2. if courses (or sections) carry no credit and will not appear on their transcript

*Courses dropped during the first ten days of classes will not show on the permanent record. Courses dropped from the eleventh to the fiftieth day of class will be assigned a grade of W and will appear on the permanent record.

Courses Cancelled by the University

Students are not required to drop courses or sections that are cancelled by the University. If students wish to replace a cancelled course with another, they must follow the procedures above for course additions.

Semester Course Loads

The typical course load expectation for full-time students is 15 credits. Professional curricula may specify credits in excess of this number, in which case such specifications are regarded as regular course loads.

Maximum Credit Loads

Students may enroll for course loads in excess of 15 credits but are advised that course loads in excess of the number of credits specified by recommended courses of study may not be in their academic interests when their grade-point averages are less than 3.000.

Unless specified as part of an established course of study, course loads in excess of 15 credits are recommended for enrichment purposes only and should be taken as no-credit courses. In any event, a student is prohibited from registering for course loads in excess of 20 credits unless such loads are required by established University curricula or unless special permission has been granted by the dean of the college in which the student has established matriculation.

Students who are enrolled in curricula which do not require a semester course load in excess of 20 credits and who wish to obtain permission to carry such an overload must file an academic petition with the dean of the college in which they have established matriculation. Students who register for course loads in excess of 20 credits (including continuing studies courses) without the prior authorization of the dean of the college in which they have established matriculation will not receive credit for more than 20 credits per semester, and the college dean will determine which course(s) shall receive the administrative symbol of Y. Permission to carry course loads in excess of stated maxima will be denied when resources of a college or program render it necessary to establish limitations.
Minimum Credit Loads

Matriculating students are classified as full-time when they carry the course credit load in University day programs that is specified by their curricula. Full-time students are required to register for a minimum of 12 credits of day courses each semester. Please note that students who are approved through Disability Services for a reduced course load in accordance with the American Disabilities Act (ADA) will be exempt from the 12 credit minimum to be considered full time.

UMass Lowell instruction is scheduled during standard 15-week fall and spring semester terms. During the summer/winter terms varying shorter length special programs are available and may be considered as the equivalent to full-time status for the specific time period within a session. This is for enrollment purposes only.

The credit-hour policy, a statement of what students will learn is necessary if credit is based on a demonstration by the student of learning equivalent to that established by a period of study corresponding to a time-based credit-hour assignment. The credit-hour standard for the course, and the way that the credit-hour standard is achieved, are communicated to students as part of the course syllabus or equivalent documentation.

Please note: Financial aid, veterans benefits or other types of aid define 12 credits for full-time study during the fall/spring terms. The grid below displays how the credit hour is met with shorter time sessions over the summer/winter.

<table>
<thead>
<tr>
<th># of Week(s)</th>
<th># Credit Hour(s)</th>
<th># Calculated Credit Hour Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 credit</td>
<td>45</td>
</tr>
<tr>
<td>2</td>
<td>2 credits</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>3 credits</td>
<td>135</td>
</tr>
<tr>
<td>4</td>
<td>4 credits</td>
<td>180</td>
</tr>
<tr>
<td>5</td>
<td>5 credits</td>
<td>225</td>
</tr>
<tr>
<td>6</td>
<td>6 credits</td>
<td>270</td>
</tr>
</tbody>
</table>

Summer Pathway Programs

International students in a Pathway program will be considered to be in full-time status for the summer at nine credits, for a 10-12 week summer session. This refers to pathway programs without any English Language instruction.

International students in a Pathway program which consists of mixed content of English Language Instruction and Coursework - Number of credit hours per term will depend on how many English as a Second Language (ESL) clock hours are assigned due to students level of English proficiency. The program will always be full-time between credit and clock hours until student graduates out of the ESL Pathways program. Typically, students undertake six credit hours in combination with a minimum of a nine clock-hour program. Approximately 15 instructional hours per week are required in total.

International students in a English as a Second Language (ESL) Instruction program - These students are required to be enrolled in a minimum of 18 clock hours of language instruction. They may take additional Non-Credit related courses, above the 18 clock hours of language instruction. They cannot take Language and credit bearing courses, whether it be a pre-requisite or otherwise. Instructor is required to maintain regular attendance records and be able to provide them upon request.

Part-time Enrollment

A student enrolled on a part-time basis is charged by the credit hour for tuition and all applicable fees.

Students enrolled on a part-time basis should understand that part-time enrollment may have an impact on financial aid and on eligibility for insurance through non-University agencies. Students who enroll for fewer than six credits may be required to begin repayment of student loans. Varsity athletes and international students on I-20 permits must enroll for a minimum of 12 credits per semester and may not be part-time students. See summer session exception for students who are registered in a minimum of 6 credits during an accelerated term (summer I or summer II).

Deadline for Changes of Course Enrollment Status

The last day for students to add a course is the fifth day of class of the semester. To change sections within a course, and to change enrollment status from audit to credit or from credit to audit and from pass-no credit to letter grade or from letter grade to pass-no credit is the tenth class day of the semester.

The last day for dropping a course with a course notation of W is the fiftieth class day of the semester. Students dropping a course during this time are charged full tuition and fees.

Withdrawal from University

All students who desire to withdraw from the university are required to:

1. discharge all financial obligations to the university,
2. return all university property, and
3. fill out and file the electronic withdrawal form (https://na2.docusign.net/Member/PowerFormSigning.aspx?PowerFormId=af7294bd-3d17-476f-8edf-ae38f435d1c). The date of official withdrawal determines tuition refund and legal or student insurance
Students who stop attending classes without officially withdrawing from the university will remain on class rosters until they officially withdraw from the university or until the end of the semester. Students who remain on class rosters after the fiftieth class day will be assigned final course grades. Instructors are required to submit a last known date of attendance or academic activity for students who receive a grade of F or other non-passing grades. Students who cease attending without officially withdrawing may affect their Financial Aid. Please see: Withdrawal may affect Title IV Financial Aid awarded to you (https://www.uml.edu/thesolutioncenter/financial-aid/Maintaining-Aid/withdrawal.aspx).

In most cases, the date on which a withdrawal request is filed with the Office of the Registrar is the date on which withdrawal is effective.

Students who are recipients of benefits from the Veterans Administration may not process withdrawals from the university that violate their declarations of classroom attendance. Recipients of veterans benefits are advised that they must receive course grades when their requests to withdraw from the university have been filed after deadlines of the Veterans Administration for processing changes of declared benefit status or when their dates of withdrawal will conflict with declarations of classroom attendance.

University Withdrawal after the Deadline-to-Withdraw specified on Academic Calendar

A student who withdraws from the university after the deadline-to-withdraw specified on the academic calendar and prior to the end of the term will be graded with a greater penalty grade (F grade). The university withdrawal effective date will be the date the Withdrawal from University Form is received.

A student who wishes to withdraw from the university after the deadline-to-withdraw specified on the academic calendar must file an academic petition, together with appropriate documentation specifying the cause for the withdraw, with the Office of the Provost. Following a review of the academic petition and verification of attached documentation, the Office of the Provost may permit the student to withdraw from all courses with course notations of X.

Withdrawal from courses may have implications for degree progress, veterans benefits, health insurance, financial aid, and immigration status. Students are advised to consult their academic advisor as well as officials in appropriate offices prior to withdrawing from class. Instructors are required to submit a last known date of attendance or academic activity for students who receive a grade of F or other non-passing grades. Students who cease attending without officially withdrawing may affect their Financial Aid.

University Withdrawal After the End of the Semester

A student who has unofficially withdrawn from the university (i.e., has ceased attending classes) for reasons of extended illness or critical personal emergency and was unable to officially withdraw from the university before the end of the semester may petition to withdraw from all courses with course notations of X. Such a student must file an academic petition, together with supporting documentation, no later than one calendar month from the beginning of the following semester. This petition must be filed with the Office of the Provost. Following a review of the academic petition and verification of attached documentation, the Office of the Provost will notify the student and the Office of the Registrar of the decision. Faculty are notified when the grade of X is retroactively applied to a course for which a grade was entered.

Readmission

Students who have withdrawn from the university may apply for re-admission through the Office of the Registrar. The form for re-admission may be found on The Solution Center website (https://www.uml.edu/thesolutioncenter/Forms/Academic-Forms.aspx).

Undergraduate Certificates and Post-Baccalaureate Certificates

The requirements and policies for undergraduate certificates and post-baccalaureate undergraduate certificates are established by the Undergraduate Policy Committee (UPC) with approval by the University Faculty Senate. In addition to the policies and requirements below, students in undergraduate certificate and post-baccalaureate certificates are governed by UML undergraduate policies.

Policies Governing Post-Baccalaureate Certificates

1. Students may enroll either full or part-time in post-baccalaureate undergraduate certificate programs. Tuition for students enrolled full-time in post-baccalaureate
1. Certificate programs is based on an enrollment in 12
credits per semester (courses taken through GPS would
incur additional charges).

2. A conferred bachelor’s degree is required for admission to
a post-baccalaureate certificate program. No credits
earned as part of an undergraduate degree may be applied
to the post-baccalaureate certificate.

3. Applications to the post-baccalaureate certificate
program are made through the appropriate University
Admissions Office.

4. Financial aid is not available for post-baccalaureate
certificates.

5. Post-baccalaureate certificate programs consist of no
fewer than 18 and no more than 32 credits; all courses in
the certificate must be at the undergraduate level.

6. Courses to complete a post-baccalaureate certificate
must be completed within a five-year period.

7. All certificate classes must be taken at UML. No transfer
credits will be accepted.

8. UMass Lowell minimum GPA requirements apply to
students enrolled in post-baccalaureate certificate
programs. Higher GPA requirements may be set by
individual post-baccalaureate certificate programs.

9. Courses taken toward a post-baccalaureate certificate
may not be applied to a graduate certificate or graduate
degree.

10. Completion of the post-baccalaureate certificate in no
way guarantees admission to any undergraduate or
graduate degree program.

Policies Governing Undergraduate Certificates

Undergraduate certificates may be offered only through
the Division of Graduate, Online & Professional Studies
(http://gps.uml.edu/) (GPS). Students admitted to a degree
program through the UMass Lowell Office of Undergraduate
Admissions are not eligible to enroll in an undergraduate
certificate program.

1. Undergraduate certificates are governed by Academic and
Federal Financial Aid policies. Some certificate programs
are not eligible for financial aid. Proposers must work with
GPS to seek eligibility for the financial aid through the
Program Participation Agreement (PPA) process.

2. Undergraduate certificates will consist of no less than 12
credits and no more than 18 credits in a combination of
required and elective courses. Only existing certificates,
established before this policy, may exceed this credit limit.

If faculty believe that additional credits (beyond 18) are
required for the viability of the certificate, they may
present this case at the UPC meeting and ask for an
exception.

3. The total number of credits needed to complete two or
more certificates must equal the sum of the credits
required for each. Therefore, if a course completed for one
certificate is required in another certificate, then its
credits must be replaced with another course at an equal
or higher level approved by the program advisor.

4. With the program coordinators approval, one course may
be transferred from another accredited institution to
satisfy undergraduate certificate program requirements.

5. If a certificate student is able to demonstrate proficiency
comparable to one of the required courses through an
established departmental examination, then faculty have
the discretion to waive the required course and replace
the credits with a course at an equal or higher level.

6. All certificate courses must be completed within a five-
year period with a minimum 2.0 grade point average.

7. Certificate policies specific to students not admitted to an
undergraduate degree program: Completion of the
certificate in no way guarantees admission to any
undergraduate degree program. Students may complete
multiple certificates, but should be aware that if admitted
to a degree program, courses from only one certificate
may be applied to the degrees major
requirements. Students who have completed multiple
certificates and are later admitted to an undergraduate
degree, must still fulfill all degree requirements, including
the residency requirement.

8. Certificate policies specific to students who have been
admitted to an undergraduate degree through GPS
admissions: Students who have been admitted to an GPS degree program should only enroll in a certificate program after working with an advisor to ascertain whether courses may be applied to his/her degree pathway. Courses from only one certificate may be applied toward the degrees major requirements with approval of an advisor. Courses taken as part of additional certificates may be used as free electives. GPS undergraduate degree students may not delay their time to degree completion through enrollment in any certificate program.

**Note on Graduate Certificates**

Students admitted to a degree program through the UMass Lowell Office of Undergraduate Admissions are not eligible to enroll in a graduate certificate program. Please refer to UMass Lowell’s [graduate catalog](https://www.uml.edu/resources/catalog-archive/current/Graduate.pdf) for additional policies governing graduate certificates.
Degree Pathways are a semester-by-semester sequence of courses recommended for successful completion of a degree, diploma, credential or certificate from the University. Students should follow the degree pathway appropriate to their catalog year. A student’s catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

**Biomedical Engineering**
- fall 2019 and beyond
- fall 2017 - spring 2019
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- fall 2016 - spring 2017
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

**Chemical Engineering**
- General Option fall 2020 and beyond fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Biological Engineering Option fall 2020 and beyond fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Nanomaterials Engineering Option fall 2020 and beyond fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Nuclear Engineering Option fall 2020 and beyond fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

**Civil Engineering**
- fall 2018 and beyond
- fall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

**Computer Engineering**
- fall 2015 and beyond

**Electrical Engineering**
- fall 2015 and beyond

**Environmental Engineering**
- fall 2018 and beyond

**Double Major in Electrical Engineering/Computer Science**
- fall 2017 and beyond
- prior to fall 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

**Double Major in Electrical Engineering/Physics**
- fall 2017 and beyond
- fall 2014 - spring 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

**Industrial Engineering**
- fall 2020 and beyond

**Mechanical Engineering**
- fall 2022 and beyond
- fall 2015 - spring 2022

**Plastics Engineering**
- fall 2022 and beyond
- fall 2018 - spring 2022
- fall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
Suggested Degree Pathway for Biomedical Engineering

For students who entered fall 2019 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMEN.1070</td>
<td>Intro to Biomedical Engineering</td>
<td>2</td>
</tr>
<tr>
<td>BMEN.1200</td>
<td>BME Application Programming</td>
<td>3</td>
</tr>
<tr>
<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
<td>3</td>
</tr>
<tr>
<td>CHEM.1230L</td>
<td>Chemistry I Lab</td>
<td>1</td>
</tr>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
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</tr>
<tr>
<td>MATH.1310</td>
<td>Calculus I (MATH)</td>
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</table>

Spring Semester

<table>
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<tr>
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<tbody>
<tr>
<td>BMEN.1020</td>
<td>BME Seminar</td>
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<tr>
<td>CHEM.1220</td>
<td>Chemistry II (SCL)</td>
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<tr>
<td>CHEM.1240L</td>
<td>Chemistry II Lab</td>
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<tr>
<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
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</tr>
<tr>
<td>MATH.1320</td>
<td>Calculus II</td>
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</tr>
<tr>
<td>PHYS.1410</td>
<td>Physics I (STEM)</td>
<td>3</td>
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<tr>
<td>Total</td>
<td></td>
<td>16</td>
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</tbody>
</table>

Sophomore Year

Fall Semester

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<tr>
<th>Course #</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>BMEN.2100</td>
<td>Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>CHEM.2210</td>
<td>Organic Chemistry</td>
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<tr>
<td>CHEM.2290L</td>
<td>Organic Chemistry Lab</td>
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<tr>
<td>MATH.2310</td>
<td>Calculus III</td>
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<td>PHYS.1440</td>
<td>Physics II</td>
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<td>PHYS.1440L</td>
<td>Physics II Lab</td>
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Spring Semester

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<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>BIOL.2100</td>
<td>Biology for Engineers</td>
<td>3</td>
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<tr>
<td>BIOL.2120L</td>
<td>Biology for Engineers Lab</td>
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</tr>
<tr>
<td>BMEN.2200</td>
<td>Bioinstrumentation</td>
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<tr>
<td>BMEN.2205L</td>
<td>Bioinstrumentation Lab</td>
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</tr>
<tr>
<td>ECON.2010</td>
<td>Principles of Microeconomics</td>
<td>3</td>
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<tr>
<td>MATH.2360</td>
<td>Engineering Differential Equations</td>
<td>3</td>
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<tr>
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### Junior Year

#### Fall Semester

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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>BMEN.3100</td>
<td>Transport Phenomena</td>
<td>3</td>
</tr>
<tr>
<td>BMEN.3200</td>
<td>Quantitative Physiology</td>
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<tr>
<td>BMEN.3205L</td>
<td>Quantitative Physiology Lab</td>
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<tr>
<td>BMEN.4310</td>
<td>Biomechanics</td>
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<tr>
<td>ENTR.3000</td>
<td>Entrepreneurship</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
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#### Spring Semester

<table>
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<tr>
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<th>Course Name</th>
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<tbody>
<tr>
<td>BMEN.xxxx</td>
<td>Track Course 1</td>
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<tr>
<td>BMEN.xxxx</td>
<td>Track Course 5</td>
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<td>BMEN.xxxx</td>
<td>Technical Elective</td>
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<td>BMEN.4920</td>
<td>Biomedical Capstone II</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
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</tr>
</tbody>
</table>

### Senior Year

#### Fall Semester

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<th>Cr.</th>
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<tbody>
<tr>
<td>BMEN.xxxx</td>
<td>Track Course 2</td>
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<tr>
<td>BMEN.xxxx</td>
<td>Track Course 3</td>
<td>3</td>
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</table>

### Total Minimum Credits = 124

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS. If you need assistance, please contact your advisor.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be

formally approved prior to enrollment. See the

**catalog policy**
for details.

Last Updated: 7/19/2019
BMBT.4000 Introduction to Biomedical Engineering (Formerly IB 400) - Credits: 3
Provides exposure to cutting-edge biomedical technologies in a number of different areas with a balance between biomedical engineering and biotechnology areas.

BMEN.1020 Biomedical Engineering Seminar - Credits: 1
This course provides undergraduate students in Biomedical Engineering the opportunity to expand their knowledge of Biomedical Engineering career opportunities and develop required skills. Content includes the development of professional skills (career opportunities, resume writing, etc) and an exploration of current research areas through presentations by faculty (and/or off-campus subject matter experts) and through literature review.

BMEN.1200 BME Application Programming - Credits: 3
Introduces programming logic for engineers. Covers fundamentals of procedural programming with applications in Biomedical Engineering and embedded systems. Topics include variables, expressions and statements, console input/output, modularization and functions, arrays, pointers and strings algorithms, structures, and file input/output. Introduces working with Matlab. Laboratories include designing and programming engineering applications.

BMEN.2200 Bioinstrumentation - Credits: 3
This course introduces fundamental of instrumentation for biological applications. In this course we will explore sources of signals, detection of these signals, signals to noise, and data processing. We will learn how to analyze circuits including energy storage elements, op-amps, and filters.

BMEN.2205L Bioinstrumentation Lab - Credits: 2
This course is the laboratory section associate with Bioinstrumentation (BMEN.2200). The lab will learn how to build basic circuits to collect physiologically-relevant data and analyze the data using concepts from signal processing.

BMEN.3200 Quantitative Physiology - Credits: 3
This course provides an introduction to human physiology using a quantitative, systems oriented approach. Systems examined include: musculoskeletal; cardiovascular; respiratory; renal; gastrointestinal; and endocrine. Mathematical models, MATLAB simulation and engineering analyses are used to describe system performance where applicable.

BMEN.3205L Quantitative Physiology Lab - Credits: 2
Experiments involving the modeling and measurement of human physiology systems. Use of computer simulations to provide mathematical descriptions of physiological behavior. Calibration and validation of models through hands-on experiments. Focus on quantitative measurement of neural, cardiovascular, respiratory, muscular, and endocrine system functions.

BMEN.4035 Medical Device Design II - Credits: 3
This course builds on the work done in BMEN.4030, Medical Device Design I. The course focuses on moving one or more potential solutions to a medical need forward into technical development and preparing for commercialization. Students will learn the fundamentals of medical device prototyping; developing patent strategies; planning for reimbursement and regulatory approval; choosing a commercialization route (licensing, partnering, start - up); anticipating marketing, sales, and distribution needs; understanding financial modeling and cash requirement; fundraising; and identifying and managing risks.

BMEN.4040 Fundamentals of Medical Device Regulation - Credits: 3
A comprehensive and in-depth analysis of US medical device diagnostics development and approval requirements. Detailed analysis of quality assurance issues and regulatory reforms implemented under the Food and Drug Administration. Provides a step-by-step guide through the Center for Devices and Radiological Health (CDRH) investigation device exemptions, premarket approval, 510(k) application process and product development protocol and review process.

BMEN.4090 Biomedical Properties of Polymers - Credits: 3
The biomedical properties and structures of polymers determine their utilization in various biomedical applications such as medical devices, implants, drug delivery, and medical packaging. These biomedical properties include mechanical properties, physical properties, chemical properties, optical properties, electrical properties, melt flow properties, failure and fracture properties, viscoelastic properties, and chemical composition.

BMEN.4100 Biological Principles for Cellular and Tissue Engineering - Credits: 3
The course will introduce principles of cell biology and design underlying cell and tissue engineering decision-making. Students will learn how mechanical and chemical aspects of the extracellular environment influence cell functions including
viability, proliferation, differentiation, and protein expression, and how these aspects may be integrated and/or manipulated in vitro and in vivo using various material and chemical approaches. Additionally, students will be introduced to contemporary techniques used to assess engineered tissue response and integration via immunocyto-/histo-chemistry, secretomics, imaging, immunoassays, and sequencing modalities.

**BMEN.4115 Advanced Tissue Engineering - Credits: 3**

Tissue engineering research continues to attract the interest of researchers and the general public. Popular media outlets like the New York Times, Time, and Wired continue to engage a wide audience and foster excitement for the field as regenerative medicine inches toward becoming a clinical reality. This course will cover enabling technologies, and current applications of the tissue engineering field. The enabling technologies section will focus upon those strategies typically incorporated into tissue-engineered devices or utilized in their development, including advanced scaffolding techniques, bioreactors, and micro physiological systems. Finally, the applications section presents engineered tissues and organs that are currently under development for regenerative medicine applications.

**BMEN.4130 Neural Engineering - Credits: 3**

Neural Engineering represents the intersection between neuroscience and the technologies designed to measure and modulate the nervous system. This course will review the fundamental principles of cellular and systems neuroscience in the peripheral and central nervous systems, followed by surveys of cutting edge optical/electrical neural interfaces, in vivo/vitro synthetic model systems, prostheses, as well as ethical considerations in neuroscience/neural engineering.

**BMEN.4300 Occupational Ergonomics - Credits: 3**

Occupational ergonomics provides us with a scientific basis for designing the work environment to optimize the physical and mental interaction of workers with their work systems: machines, tools, co-workers, work methods, etc. This is a survey of the field, so we will cover a wide variety of topics: relevant principles of anatomy, physiology, and musculoskeletal function; design of the physical and psychosocial work environment to enhance worker health and safety, work scheduling to reduce fatigue, and mental workload (e.g., display of information) to reduce worker error. Wherever relevant we will incorporate basic approaches to hazard assessment, exposure limits or guidelines, and approaches to workplace design.

**BMEN.4310 Biomechanics - Credits: 3**

The course provides an overview of musculoskeletal anatomy, the mechanical properties and structural behavior of biological tissues, and biodynamics. Specific course topics will include structure and function relationships in tissues and organs; application of stress and strain analysis to biological tissues; analysis of forces in human function and movement; energy and power in human activity; introduction to modeling viscoelasticity of tissues.

**BMEN.4315 Biomechanics II - Credits: 3**

This course prepares students with the mathematical preliminaries and theoretical framework to analyze the mechanics of biological materials and human movement. The course will focus on methods to model biological tissues as non-linear, elastic, homogeneous, anisotropic, incompressible materials, and analyze human movement, including the impulse-momentum and work-energy principles, as well as gait analysis.

**BMEN.4320 Biofluid Mechanics - Credits: 3**

This course will introduce fundamental principles and mathematical/physical models for air and blood flow in the physiological systems. Their practical applications will be discussed, with an emphasis on modeling and the potential of flow studies for clinical research applications.

**BMEN.4350 Respiratory Dynamics and Devices - Credits: 3**

An aerosol is an assembly of particles suspended in a gaseous medium. They are omnipresent in our workplaces and outdoor environments. They include a wide range of phenomena such as dust, fume, smoke, mist, fog, haze, clouds, and smog. Certain aerosols pose significant health threats, while others improve the quality of our lives. It is necessary to understand how airborne particles behave to control against their undesirable effects and to harness their beneficial potential. This course will explore the mechanics of aerosol behavior, including their generation, transformation, and fate in occupational and environmental settings.

**BMEN.4380 Computational Biomechanics - Credits: 3**

Computational biomechanics is a powerful engineering method to model fluid-structure interaction in biological systems. While its traditional roots are in the realm of engineering, the techniques have found wide use in the biomedical engineering domain to simulate the biomechanical response and hemodynamics of the human body and medical devices. This course will prepare students with hands-on and practical skills using computational packages and software to solve biomechanical problems.

**BMEN.4390 Computer Aided Engineering Design & Analysis - Credits: 3**
This course introduces the student to the use of CAD for construction of basic shapes and multi-view drawings. It is a project-oriented course introducing the student to graphic design using SolidWorks. Design, analysis and visualization of engineering components and systems using interactive computer programs with an emphasis on computer simulation.

BMEN.4410 Biomedical Optics - Credits: 3

This course will introduce fundamental principles of the interactions between light and biological tissue, including their applications in biology and medicine for detection, imaging, and treatment.

BMEN.4810 Data Analytics & Biostatistics - Credits: 3

Data analysis is a major skill that is required to solve problems as well as to design and develop biotechnology solutions and medical devices. A bioengineer must not only apply the long standard general statistical methods in order to analyze data but also master some of the unique aspects involved in the analysis of biomedical datasets. This course will require the student to become proficient in MATLAB and the Statistics and Machine Learning Toolbox in order to achieve course learning objectives. The student will also be required to demonstrate their bioanalytical proficiency through the implementation of an individual project.

BMEN.4850 Applied Project Management and Mentorship in BME - Credits: 3

This course will cover successful strategies in project management and mentorship. Students in the course will serve as project managers (PM) and mentors to the students enrolled in BMEN.1070: Introduction to Biomedical Engineering. PMs will facilitate one to two groups in the completion of their semester long project in BMEM.1070. They will set deadlines, assess work, manage the project, and participate in weekly professional development meetings. We will discuss how to run successful meetings, to set achievable goals, and to optimize time and budget constraints in order to ensure successful completion of a BME related project. We will also explore career options as a project manager, learn about their job responsibilities, and learn essential tools commonly used by PMs in industry.

BMEN.4910 Biomedical Capstone I - Credits: 3

This is the first of a two course capstone sequence. This course provides an integrative design experience in engineering. Students work in teams and apply their engineering problem solving skills on open-ended, real-world biomedical projects. This course has an emphasis on team work, communication, report writing, oral presentations, design, analysis, test and fabrication.

BMEN.4950 BME Selected Topics - Credits: 3

This course will provide an in-depth examination of a specific area of biomedical engineering. Specific topics will vary with the expertise of the instructor.

BMEN.4980 BME Research Experience I - Credits: 1-3

BME Research Experience I will provide biomedical engineering students with a mentored experience with a hands-on research project. Appropriate research experiences are those within biomedical engineering that allow the student opportunities to increase their skills, knowledge, and experiences in their academic/career goal areas. Student will work approximately 3 hours a week per credit on the designated research project. Regular meetings with the research mentor will also occur. Students are required to submit a significant status update or final project report to their mentor.

BMEN.4981 BME Research Experience II - Credits: 1-3

BME Research Experience II will provide biomedical engineering students with a mentored experience in a hands-on research project. The project is expected to be a continuation of the work begun in BME Research Experience I. Appropriate research experiences are those within biomedical engineering that allow the student opportunities to increase their skills, knowledge, and experiences in their academic/career goal areas. Student will work approximately 3 hours a week per credit on the designated research project. Regular meetings with the research mentor will also occur. Students are required to give a departmental seminar on their research project.
Degree Pathways

Degree Pathways are a semester-by-semester sequence of courses recommended for successful completion of a degree, diploma, credential or certificate from the university.

Chemical Engineering


Suggested Degree Pathway for Chemical Engineering - General Option

For students who entered fall 2020 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
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<tr>
<td>ENGL.1010</td>
<td>College Writing I5 / FYSH (CW)</td>
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<tr>
<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
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Spring Semester

<table>
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<tr>
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<td>Chemistry II3</td>
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Sophomore Year

Fall Semester

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Total 15
### Spring Semester

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<td>CHEN.3030</td>
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<td>Differential Equations / Engineering Differential Equations</td>
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### Junior Year

**Fall Semester**

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<td>CHEN.3060</td>
<td>Transport Phenomena</td>
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### Senior Year

**Fall Semester**

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<td>CHEN.4130</td>
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### Spring Semester

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<tr>
<td>CHEN.3150</td>
<td>Unit Operations Lab (WOC), (QL)</td>
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<td>CHEM.3440</td>
<td>Physical Chemistry I2</td>
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Spring Semester

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</table>

Total Minimum Credits = 128

1The listed co-requisite, CHEM.2290L (https://www.uml.edu/catalog/courses/CHEM/2290L) or CHEM.2300L (https://www.uml.edu/catalog/courses/CHEM/2300L), Organic Chemistry Lab, is not required for Chemical Engineering majors. CHEM.2050L (https://www.uml.edu/catalog/courses/CHEM/2050L) is the required lab.

2The listed co-requisite, CHEM.3460L (https://www.uml.edu/catalog/courses/CHEM/3460L), Physical Chemistry Lab, is not required for Chemical Engineering majors. CHEM.3470L (https://www.uml.edu/catalog/courses/CHEM/3470L) is the required lab.

3All Technical Electives should be chosen from an approved list. Consult with your advisor.

4Calculus IA, and Calculus IB instead of Calculus I, will be required for students that do not pass the Calculus Readiness Test.

5Honors level courses may be taken instead.

6Chemical Engineering majors meet the Diversity and Cultural Awareness (DCA) ELO with an approved course outside the major requirements.

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Last Updated: 4/17/2020

Suggested Degree Pathway for Chemical Engineering - Biological Engineering Option

For students who entered fall 2020 and beyond.

Freshman Year

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<tr>
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<tr>
<td>CHEN.1070</td>
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Fall Semester
### Sophomore Year

#### Fall Semester

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<tbody>
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#### Spring Semester

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### Junior Year

#### Fall Semester

<table>
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<th>Course #</th>
<th>Course Name</th>
<th>C r.</th>
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<tbody>
<tr>
<td>CHEN.2010</td>
<td>Principles of Chemical Engineering</td>
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<td>CHEN.2050</td>
<td>Fundamentals of Electricity</td>
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#### Spring Semester

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<tr>
<td>ENGL.1020</td>
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<td>CHEM.2210</td>
<td>Organic Chemistry</td>
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### Senior Year

#### Fall Semester

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<tr>
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<td>Heat Transfer and Unit Operations</td>
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### Phase and Chemical Equilibria

**CHEN.3110**  
Phase and Chemical Equilibria  

**CHEN.3150**  
Unit Operations Lab (WOC), (QL)  

**CHEN.3060**  
Transport Phenomena  

**BIOL.4190**  
Biochemistry  

**CHEM.3440**  
Physical Chemistry  

Total  

### Spring Semester

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<td>CHEN.3080</td>
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<td>CHEN.3100</td>
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<td>CHEN.4030</td>
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### Total Minimum Credits = 128

1. The listed co-requisite, CHEM.2290L or CHEM.2300L, Organic Chemistry Lab, is not required for Chemical Engineering majors. CHEM.2050 is the required lab.

2. The listed co-requisite, CHEM.3460L, Physical Chemistry Lab, is not required for Chemical Engineering majors. CHEM.3470L is the required lab.

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**Last Updated: 3/23/2020**

### Suggested Degree Pathway for Chemical Engineering - Nanomaterials Engineering Option

**For students who entered fall 2020 and beyond.**

#### Freshman Year

**Fall Semester**

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**Spring Semester**

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#### Sophomore Year

**Fall Semester**
### Spring Semester

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<td>CHEN.2010 (<a href="https://www.uml.edu/catalog/courses/CHE/N/2010">https://www.uml.edu/catalog/courses/CHE/N/2010</a>)</td>
<td>Principles of Chemical Engineering</td>
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<td>CHEN.2050 (<a href="https://www.uml.edu/catalog/courses/CHE/N/2050">https://www.uml.edu/catalog/courses/CHE/N/2050</a>)</td>
<td>Fundamentals of Electricity</td>
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<td>CHEM.2210 (<a href="https://www.uml.edu/catalog/courses/CHEM/2210">https://www.uml.edu/catalog/courses/CHEM/2210</a>)</td>
<td>Organic Chemistry 1I/5</td>
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### Junior Year

### Fall Semester

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<td>CHEN.3060 (<a href="https://www.uml.edu/catalog/courses/CHEN/3060">https://www.uml.edu/catalog/courses/CHEN/3060</a>)</td>
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<td>CHEN.3110 (<a href="https://www.uml.edu/catalog/courses/CHEN/3110">https://www.uml.edu/catalog/courses/CHEN/3110</a>)</td>
<td>Phase and Chemical Equilibria</td>
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<td>CHEN.3150 (<a href="https://www.uml.edu/catalog/courses/CHEN/3150">https://www.uml.edu/catalog/courses/CHEN/3150</a>)</td>
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### Spring Semester

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<td>CHEN.3100 (<a href="https://www.uml.edu/catalog/courses/CHEN/3100">https://www.uml.edu/catalog/courses/CHEN/3100</a>)</td>
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<td>CHEN.3170 (<a href="https://www.uml.edu/catalog/courses/CHEN/3170">https://www.uml.edu/catalog/courses/CHEN/3170</a>)</td>
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### Senior Year

### Fall Semester

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<td>Engineering Economics &amp; Process Analysis (IL), (CTPS), (AIL)</td>
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Spring Semester

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<tr>
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<th>Course Name</th>
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<tbody>
<tr>
<td>CHEN.4100</td>
<td>Plant Design (IL), (CTPS), (AIL)</td>
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Total Minimum Credits = 128

1. The listed co-requisite, CHEM.2290L or CHEM.2300L, Organic Chemistry Lab, is not required for Chemical Engineering majors. CHEM.2050L is the required lab.

2. The listed co-requisite, CHEM.3460L, Physical Chemistry Lab, is not required for Chemical Engineering majors. CHEM.3470L is the required lab.

3. All Technical Electives should be chosen from an approved list for this option. Consult with your advisor.

4. Calculus IA and Calculus IB instead of Calculus I will be required for students who do not pass the Calculus Readiness Test.

5. Honors level courses may be taken instead.

6. Chemical Engineering majors meet the Diversity and Cultural Awareness (DCA) ELO with an approved course outside the major requirements.

The university Core Curriculum requirements must be satisfied. Either ECON.2010 or ECON.2020 Principles of Microeconomics or ECON.2030 Principles of Macroeconomics must be used to satisfy one of the Social Sciences Perspective (SS) requirements. Either PHIL.2030 Intro. to Ethics or PHIL.3340 Engineering and Ethics must be used to satisfy one of the Arts & Humanities Perspective (AH) requirements.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SiS. If you need assistance, please contact your advisor.

Restriction on off-campus study:
Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

Last Updated: 4/17/2020

Suggested Degree Pathway for Chemical Engineering - Nuclear Engineering Option

For students who entered fall 2020 and beyond.

Freshman Year
# Academic Catalog 2021 - 2022 / Chemical Engineering - General Information

## Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
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## Spring Semester

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## Sophomore Year

### Fall Semester

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### Spring Semester

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### Junior Year

#### Fall Semester

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<tr>
<td>CHEN.3040</td>
<td>Heat Transfer and Unit Operations</td>
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<td>CHEN.3060</td>
<td>Transport Phenomena</td>
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<td>CHEN.3110</td>
<td>Phase and Chemical Equilibria</td>
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<td>CHEM.3440</td>
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<td>ENGY.4340</td>
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<td>ENGY.4350</td>
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### Senior Year

#### Fall Semester

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<td>CHEN.4130</td>
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#### Spring Semester

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**Total Minimum Credits = 134**

1The listed co-requisite, CHEM.2290L (https://www.uml.edu/catalog/courses/CHEM/2290L) or CHEM.2300L
(https://www.uml.edu/catalog/courses/CHEM/2300L), Organic Chemistry Lab, is not required for Chemical Engineering majors. CHEM.2050L (https://www.uml.edu/catalog/courses/CHEM/2050L) is the required lab.

2 The listed co-requisite, CHEM.3460L (https://www.uml.edu/catalog/courses/CHEM/3460L), Physical Chemistry Lab, is not required for Chemical Engineering majors. CHEM.3470L (https://www.uml.edu/catalog/courses/CHEM/3470L) is the required lab.

3 All Technical Electives should be chosen from an approved list. Consult with your advisor.

4 Calculus IA and Calculus IB instead of Calculus I will be required for students who do not pass the Calculus Readiness Test.

5 Honors level courses may be taken instead.

6 Chemical Engineering majors meet the Diversity and Cultural Awareness (DCA) ELO with an approved course outside the major requirements.

The university Core Curriculum requirements must be satisfied. Either ECON.2010 (https://www.uml.edu/catalog/courses/ECON/2010) Principles of Microeconomics or ECON.2020 (https://www.uml.edu/catalog/courses/ECON/2020) Principles of Macroeconomics must be used to satisfy one of the Social Sciences Perspective (SS) requirements. Either PHIL.2030 (https://www.uml.edu/catalog/courses/PHEL/2030) Intro. to Ethics or PHIL.3340 (https://www.uml.edu/catalog/courses/PHEL/3340) Engineering and Ethics must be used to satisfy one of the Arts & Humanities Perspective (AH) requirements.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS (http://www.uml.edu/enrollment/isis/default.aspx). If you need assistance, please contact your advisor.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_
CHEN.1010 Technology and Human Built World
(Formerly 10.101) - Credits: 3
This course provides a hands-on introduction to chemical engineering and the skills, both technical and non-technical, that will be required to complete the undergraduate degree program. Through both assignments and projects, students learn to: identify a problem, develop alternative solutions, make critical decisions, and work as a member of a team. Technical skills that are introduced in this course include a basic introduction to linear algebra and descriptive statistics, basic technical communication through report writing, and computer programming basics using EXCEL/VBA.

CHEN.1070 Introduction to Chemical Engineering
(Formerly 10.107) - Credits: 2
This course provides a hands-on introduction to chemical engineering and the skills, both technical and non-technical, that will be required to complete the undergraduate degree program. Through both assignments and projects, students learn to: identify a problem, develop alternative solutions, make critical decisions, and work as a member of a team. Technical skills that are introduced in this course include a basic introduction to linear algebra and descriptive statistics, basic technical communication through report writing, and computer programming basics using EXCEL/VBA.

CHEN.2010 Basic Principles of Chemical Engineering
(Formerly 10.201) - Credits: 3
An introductory course that prepares students to solve material and energy balances on chemical process systems and lays the foundation for subsequent courses in thermodynamics, unit operations transport phenomena, reaction engineering and process dynamics and control.

CHEN.2020 Chemical Engineering Thermodynamics
(Formerly 10.202) - Credits: 3
The course introduces fundamental thermodynamic principles presented from a chemical engineering perspective. The first and second law of thermodynamics, PV relationships for real and ideal fluids and methods for calculating enthalpy and entropy data, ad heat and work requirements for industrial chemical processes will be determined using mass, energy and entropy balances. Fundamental thermodynamic principles are used to examine applications involving processes with and without chemical reaction, common heat engines, flow processes and refrigeration cycles.

CHEN.2050 Fundamentals of Electricity (Formerly 10.205) - Credits: 3
An introduction to direct current and alternating current of electric circuits with emphasis on practical application.

CHEN.3030 Fluid Mechanics (Formerly 10.303) - Credits: 3
This course introduces the student to several fundamental concepts and applications of fluid mechanics. It overviews the basic properties of fluids, the study of fluid statics and fluid flow systems, and the development and application of the appropriate mass, momentum, and energy balance relationships needed to solve a variety of practical problems, with a particular focus on the macroscopic view. Emphasis is on the ability to apply the basic principles to the design and analysis of engineering systems involving applications in hydrostatics, internal, open-channel, and external flows, pump selection, flow measurement, etc. The course also focuses on proper problem solving strategy and on the correct use of units in engineering analysis.

CHEN.3040 Heat Transfer and Unit Operations
(Formerly 10.304) - Credits: 3
The course provides an understanding of essential unit operations in chemical engineering practice. The design and operation of equipment for fluid flow (pumps, compressors) and heat transfer (heat exchanges, cooling towers, evaporators, boilers, condensers) as well as other fundamental operations and phase separation equipment (mixers/agitators, filters, settling tanks, and others) and discussed. The fundamental connections to heat transfer principles as well as fluid flow and mass transfer are considered. The analysis, design and operating characteristics of unit operations are illustrated through the solution of homework problems.

CHEN.3060 Transport Phenomena (Formerly 10.306) - Credits: 3
Introduction to the theory of the transport processes. Integral and differential approaches are used to develop the macroscopic and microscopic forms of the conservation laws. The conservation laws are used to solve practical problems in the chemical and nuclear industry.

CHEN.3080 Introduction to Material Science and Engineering (Formerly 10.308) - Credits: 3
A general overview of solid materials which are likely to be considered for engineering applications in, or be produced by the chemical process industries. They will be discussed from the viewpoints of their units structures, appropriate phase diagrams, their chemical and physical attributes, and the association of these to end use applications. Discussion of metals, ceramics, polymers, and to a limited degree, composites.

CHEN.3100 Separation Processes (Formerly 10.310) - Credits: 3
This course is an introduction to separation processes based on mass transfer principles and equilibrium staging. Separation processes including distillation, absorption, liquid-liquid extraction, membrane/filtration, adsorption and settling base separations are introduced and examined. Unifying fundamental relations and concepts are emphasized along with
practical applications for industrial processes.

**CHEN.3110 Phase and Chemical Reaction Equilibria**  
(Formerly 10.311) - Credits: 3

This course is a continuation of CHEN.2020 Chemical Engineering Thermodynamics and develops capacity to apply thermodynamic principles towards the solution of practical problems while maintaining the rigorous characteristics of thermodynamics analysis. The course extends the treatment of thermodynamic properties of pure fluids to the application of problems unique to chemical engineering involving vapor-liquid equilibrium, liquid-liquid and multiphase equilibrium, as well as the theory and application of solution thermodynamics and chemical reaction equilibria.

**CHEN.3150 Unit Operations Laboratory**  
(Formerly 10.315) - Credits: 3

Students perform laboratory base experimental analyses in fluid flow and heat transfer and fluid flow and heat transfer unit operations processes common in Chemical Engineering practice. The course is team based and students are expected to develop and improve in their ability to work and interact in a group environment. Written and oral reports are required. Safety in both lab and industrial practice are emphasized. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL) and Written &Oral Communication (WOC).

**CHEN.3160 Unit Operations Laboratory II**  
(Formerly 10.316) - Credits: 2

Experimental projects treat heat and mass transfer, including staged operations, in a unit operations format. Process measurement and calibration emphasised. Written reports required.

**CHEN.3170 Applied Engineering Problem Solving**  
(Formerly 10.317) - Credits: 3

This course introduces a variety of applied numerical methods as a means for solving a wide range of engineering problems. Methods to address linear and nonlinear equations, curve fitting, numerical integration, ordinary differential equations, etc are studied, with emphasis on how to implement and apply these methods within standard computational environments (such as Matlab, Excel, etc.) to solve typical engineering problems, Good communication skills, effective application of the selected software tools, and proper problem-solving technique are stressed.

**CHEN.3470 Elements of Thermodynamics and Heat Transfer**  
(Formerly 10.347) - Credits: 3


**CHEN.4030 Chemical Reaction Engineering**  
(Formerly 10.403) - Credits: 3

Review of principles underlying rates of transformation of matter and energy; effect of temperature and catalysis on chemical reactions. Introduction to the basic ideas underlying chemical reaction engineering. May be taken for graduate credit.

**CHEN.4090 Engineering Economics and Process Analysis**  
(Formerly 10.409) - Credits: 3

This course brings together all the Chemical Engineering core principles applied to the development of economic process designs. Economic evaluations of manufacturing operations and projects including essential concepts in accounting, depreciation, time value of money, and the evaluation of investment alternatives are applied for process analysis and design objectives. The impact of management and production costs, product markets, regulatory, environmental and safe production practices, the analysis of corporate annual reports including balance sheets and income statements, and capital and operating costs are all considered in regard to efficient and economic processes. In addition to lecture materials students are required to complete comprehensive projects. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL), Critical Thinking &Problem Solving (CTPS) and Information Literacy (IL).

**CHEN.4100 Chemical Plant Design**  
(Formerly 10.410) - Credits: 3

This course is the logical continuation of CHEN.4090 (Formerly 10.409) The principles of technical and economic evaluation are applied to a chemical engineering problem. A group of students is given a statement of the problem. They are required to find information on raw materials, products, thermodynamic parameters and plant practices in order to develop the assumptions required to carry out an examination of technical and economic feasibility. Each group generates a final report for the problem. In addition to oral presentations, students are required to complete a comprehensive group design project. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL), Critical Thinking &Problem Solving (CTPS) and Information Literacy (IL).
CHEN.4130 Process Dynamics & Control (Formerly 10.413) - Credits: 3
An introduction to chemical process control. Description of processes and equipment by differential equations and the Laplace transform. Development of block diagrams. System stability is studied by both root locus and frequency response methods. May be taken for graduate credit.

CHEN.4150 Process Operations and Controls Laboratory (Formerly 10.415) - Credits: 3
Experimental projects dealing with heat transfer, mass transfer, separations processes, chemical reaction engineering, process dynamics, and process control. Written and oral reports required.

CHEN.4190 Special Senior Projects (Formerly 10.419) - Credits: 3
Original research projects primarily in the chemical engineering field and supervised by a staff member of the department. Written reports required.

CHEN.4200 Special Senior Projects (Formerly 10.420) - Credits: 3
Original research projects primarily in the chemical engineering field and supervised by a staff member of the department. Written reports required.

CHEN.4500 Nanoscale Trans. Phenomena for Manuf. Nanodevices (Formerly 10/22/26.450) - Credits: 3
An interdisciplinary course taught by faculty from the Chemical, Mechanical and Plastics Engineering Departments, who have special knowledge in nanoscale fluid mechanics and heat transfer. The course on nanoscale transport phenomena constitutes a bridge between existing fluid and heat transfer courses in multiple disciplines and emerging nanoscale science and engineering concepts to reflect the forefront of nanomanufacturing. The course is designed to incorporate recent advances in manufacturing polymer based nanodevices. Key issues of the implementation and maintenance costs for fabrication will be addressed. Hands-on laboratory experiments will be performed to complement the lectures with the ultimate goal of designing and building a complete nanodevice at the end of the course. The course will prepare graduates for employment focused on designing and manufacturing nano/microfluidic systems, lab on ship devices, electronic devices, medical devices and other emerging technologies.

CHEN.4910 Industrial Experience I (Formerly 10.491) - Credits: 0-12
Projects performed by students in the Cooperative Education Program at their place of employment and supervised by the employer and advisor from the department. Reports required upon completion of the project. “Variable credit course, student chooses appropriate amount of credits when registering.”

CHEN.4920 Industrial Experience II (Formerly 10.492) - Credits: 1-9
Projects performed by students in the Cooperative Education Program at their place of employment and supervised by the employer and advisor from the department. Reports required upon completion of the project.

CHEN.4930 Industrial Experience III (Formerly 10.493) - Credits: 1-9
Projects performed by students in the Cooperative Education Program at their place of employment and supervised by the employer and advisor from the department. Reports required upon completion of the project.

CHEN.4960 Selected Topics:Paper Engineering (Formerly 10.496) - Credits: 3
Topics in paper engineering. Content may vary from year to year to reflect contemporary applications of paper engineering.

ENGY.3310 Fundamentals of Nuclear Science and Engineering (Formerly 24/10.331) - Credits: 3
Overviews a variety of fundamental nuclear science and engineering concepts that form the basis for most contemporary nuclear technology applications. Course topics include concepts from basic atomic and nuclear physics, modern physics, nuclear models and nuclear stability considerations, basic nuclear reactions and the conservation laws that govern these interactions, various radioactive decay processes, and the interaction of neutrons and gamma rays with matter. The energy dependence of neutron and gamma cross sections, the slowing down process, the computation of microscopic and macroscopic reactions rates, and the characterization of different materials used in a variety of nuclear applications are also addressed. A variety of practical applications are highlighted.

ENGY.4190 Nuclear Reactor Operator Training (Formerly 24.419) - Credits: 3
This course provides an introductory overview of nuclear physics and related theory and the various systems associated with the operation of the UMASS Lowell Nuclear Research Reactor (UMLRR). The course is intended for students who want to learn about the operations of the UMLRR and who are interested in a career in nuclear engineering and science. The course provides a multidisciplinary systems approach to education and training, which emphasizes “learning by doing”. In a practical setting, students study and learn basic nuclear theory and design aspects of real-world systems associated with nuclear reactor operations. Knowledge is gained by working closely with experienced reactor operators and staff, and through independent study.

ENGY.4200 Nuclear Reactor Operator Training II
(Formerly 24.420) - Credits: 3

Continuation of 24.419. Upon completion of this course, the student will be given a simulated Reactor Operator examination, including a written test, an oral test about reactor systems, and a controls manipulation test.

ENGY.4340 Nuclear Reactor Theory (Formerly 10/24/434) - Credits: 3

Emphasis is placed on neutron interactions in various nuclear core and shield configurations along with the development, solution, and analysis of the neutron balance equation for various situations. Several aspects of nuclear reactor core physics including neutron diffusion, criticality, power production, reactor kinetics, reactivity feedback and control, fuel depletion, fission product poisoning, and some energy removal considerations are treated. General reactor core design and safety considerations are also discussed.

ENGY.4350 Nuclear Reactor Engineering - Credits: 3

This course provides an overview of pertinent topics in basic nuclear heat generation and removal in a nuclear reactor, power conversion, and overall system integration and safety.

ENGY.4390 Nuclear Systems Design & Analysis (Formerly 24.432 & ENGY.4320) - Credits: 3

A design course that focuses on the use of modern computer analysis tools for the design and analysis of nuclear systems. Reactor physics and shielding codes and thermal and transient analysis of nuclear systems are completed by small design teams with individual responsibility for a particular aspect of the design. Oral and written communication skills are emphasized. (10.432 and 24.432 are the same)

ENGY.4910 Industrial Experience (Formerly 24.491) - Credits: 0-12

"Variable credit course, student chooses appropriate amount of credits when registering."

ENGY.4950 Directed Studies (Formerly 24.495) - Credits: 3

Special problems in nuclear science and engineering assigned to the individual student, with emphasis on modern research methods and preparation of results for publication.
Educational Objectives and Learning Outcomes

The Program Goal of the Civil and Environmental Engineering (CEE) Department is to provide its students with a well-balanced, high quality education in four areas of Civil Engineering practice: environmental, geotechnical, structural and transportation engineering that will:

- permit them to practice civil engineering at a professional level
- prepare them for graduate study
- promote life-long learning and continuing professional development
- provide them with the skills and knowledge necessary to develop into active contributors to the economic and social vitality of the region

To accomplish this Program Goal, the CEE Departments Program Educational Objectives (PEOs) are as follows:

- Graduates, who wish to pursue professional employment, will obtain a position in Civil Engineering or related engineering field, and will be successful in that position.
- Graduates will pursue lifelong learning, professional development, and registration as appropriate for their employers.
- Graduates will engage in service activities related to their profession.

The student outcomes for the BSE degree in electrical or civil engineering at UMass Lowell are as follows: At graduation students should possess:

- An ability to apply knowledge of mathematics, science, and engineering
- An ability to design and conduct experiments, as well as to analyze and interpret data
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- An ability to function on multidisciplinary teams
- An ability to identify, formulate, and solve engineering problems
- An understanding of professional and ethical responsibility
- An ability to communicate effectively
- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- A recognition of the need for, and an ability to engage in life-long learning
- A knowledge of contemporary issues
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Degree Pathways

Degree Pathways are a semester-by-semester sequence of courses recommended for successful completion of a degree, diploma, credential or certificate from the university.

Environmental Engineering

- fall 2018 and beyond

Civil Engineering

- fall 2018 and beyond
- fall 2015 - spring 2018

Suggested Degree Pathway for Environmental Engineering

For students who entered fall 2018 and beyond.

Freshman Year

Fall Semester

<table>
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<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Crs.</th>
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<tr>
<td>CIVE.1070</td>
<td>Intro to Civil &amp; Environ. Engin.</td>
<td>2</td>
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<tr>
<td>ENGL.1010</td>
<td>College Writing I</td>
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### Spring Semester

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<th>Course Name</th>
<th>Cr.</th>
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<tr>
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<tr>
<td>CHEM.1220</td>
<td>Chemistry II (SCL)</td>
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<tr>
<td>CHEM.1240L</td>
<td>Chemistry II Lab (SCL)</td>
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<td>MATH.1320</td>
<td>Calculus II (MATH)</td>
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<td>PHYS.1410</td>
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**Total** 16

### Junior Year

#### Fall Semester

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<td>CIVE.3010</td>
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<td>ENVE.3020</td>
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<td>Material Science for Envir. Engin.</td>
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<td>ENVE.3630</td>
<td>Envir. Engineering II</td>
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<td>Energy and the Sustain. Envir.</td>
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<td>GEOL.3250</td>
<td>Geology for Engineers</td>
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**Total** 15

### Sophomore Year

#### Fall Semester

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<td>CIVE.2860</td>
<td>Prob. &amp; Statistics for Engineers</td>
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<td>BIOL.2100</td>
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<td>BIOL.2120L</td>
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**Total** 15

### Senior Year

#### Spring Semester

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<tr>
<td>ENGN.2070</td>
<td>Dynamics</td>
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<td>ENVE.2010</td>
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<td>CIVE.3320</td>
<td>Environmental Engin. Lab</td>
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<td>CIVE.3620</td>
<td>Engineering Differential Equations</td>
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<td>MATH.2360</td>
<td>Principles of Microeconomics (SS)</td>
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**Total** 16
### Spring Semester

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<td>CIVE.3720</td>
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<td>ENVE.3650</td>
<td>Groundwater Hydrogeology and Remediation</td>
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<td>Biological Processes in Envir. Engin.</td>
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<td>Arts and Human. Persp. (AH)1</td>
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**Total Minimum Credits = 121**

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS. If you need assistance, please contact your advisor.

#### Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

**Last Updated: 5/10/2018**

### Senior Year

#### Fall Semester

<table>
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<tr>
<th>Course #</th>
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<tbody>
<tr>
<td>CIVE.4600</td>
<td>Water Resources Engin.</td>
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<tr>
<td>ENVE.4610</td>
<td>Chemical Fate and Transport in the Environment</td>
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<td>ENVE.4620</td>
<td>Air Quality</td>
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<tr>
<td>ENVE.4630</td>
<td>Envir. Engin. Ethics and Professional Practice</td>
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### Spring Semester

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<tr>
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<td>ENVE.4640</td>
<td>Solid Waste Engin. and Management</td>
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<td>xxxx.xxxx</td>
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<td>Social Sciences Persp. (SS)1</td>
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<td>College Writing I / FYSH (CW)</td>
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### Chem. 1210
Chemistry I (SCL) 3

### Chem. 1230L
Chemistry I Lab (SCL) 1

### Math. 1310
Calculus I (MATH) 4

### xxxx.xxxx
Arts and Humanities Persp. (AH) 1

**Total** 1

### Spring Semester

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**Total** 1

### Junior Year

### Fall Semester

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<tr>
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<td>Fluid Mechanics</td>
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<td>CIVE.3100</td>
<td>Engineering Materials</td>
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<td>Transportation Engineering</td>
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<td>CIVE.3500</td>
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### Spring Semester

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### Senior Year

#### Fall Semester

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#### Spring Semester

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#### Total Minimum Credits = 125

-Civil Engineering students meet the Core Curriculum Essential Learning Outcomes of Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) outside the major. Students must select at least one Breadth of Knowledge course in either Arts and Humanities or Social Sciences that has been approved each of these two outcomes. Please see the DCA course listing [https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf] and the SRE course listing [https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf] for complete lists of classes that fulfill these requirements.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum [https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf] policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS [http://www.uml.edu/enrollment/isis/default.aspx]. If you need assistance, please contact your advisor.

**Restriction on off-campus study:**

- Be advised that any course taken at another institution must be formally approved [https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf] prior to enrollment. See the catalog policy [https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf] for details.

**Last Updated: 5/10/2018**

### Learning Outcomes
The current ABET Criterion 3 a-k Outcomes for CEE are as follows:

(a) an ability to apply knowledge of mathematics, science, and engineering;

(b) an ability to design and conduct experiments, as well as to analyze and interpret data;

(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;

(d) an ability to function on multidisciplinary teams;

(e) an ability to identify, formulate, and solve engineering problems;

(f) an understanding of professional and ethical responsibility;

(g) an ability to communicate effectively;

(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;

(i) a recognition of the need for, and an ability to engage in lifelong learning;

(j) a knowledge of contemporary issues;

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
CIVE.1070 Introduction to Engineering for Civil and Environmental (Formerly 25.107/14.107) - Credits: 2

This course provides an introduction to the elements of computer aided design using AutoCAD. Through assignments and projects, students learn various AutoCAD principles, i.e., graphic entities, hatch patterns, layering, and dimensioning, with special emphasis on completing a design project. Two-dimensional drafting and three-dimensional modeling and surface revolution are also discussed. This course is intended for freshmen in civil and environmental engineering majors.

CIVE.2250 Surveying I (Formerly 14.225) - Credits: 3

A presentation of the basic instruments used in survey processes including distance, angle and level measurements. Analysis and adjustment of random errors. Principles of closed and open traverses. Fieldwork practice in instrument use and office-type projects in contour mapping and the application of contoured topography to highway and water-control projects.

CIVE.2260 Geomatics (Formerly 14.226) - Credits: 3

Principles and practice of route surveys and designs. Topics include simple and compound circular curves, intersections of straight and curved baselines, vertical alignment principles including parabolic easement curves, earthwork operations and determination of volumes. Includes office-type projects illustrative of the application of surveying information to Civil Engineering projects such as water resources, sanitary sewers and property subdivision. Fieldwork instruction in basic traverse surveys, gathering of topographic information, and the staking-out of buildings and circular curves.

CIVE.2860 Probability and Statistics for Engineers (Formerly 14.286) - Credits: 3

Probability, statistics, reliability and decision with applications in engineering. Probability of events, discrete and continuous random variables, probability density functions and distributions, estimation, regression and correlation techniques, risk and reliability concepts.

CIVE.3010 Fluid Mechanics (Formerly 14.301) - Credits: 3

Fluid properties, fluid statics, fluid dynamics including continuity, impulse-momentum and energy equations. Pipe flow, turbomachinery, similitude and modeling, laminar and turbulent flow, boundary layer and closed conduit design.

A treatment of the properties of engineering materials that influence the design, construction and maintenance of Civil Engineering works. Included are such materials as ferrous and non-ferrous metals, timber, asphalt, and cementitious materials. Supplemented by laboratory testing of various engineering materials.

CIVE.3110 Engineering Materials Laboratory (Formerly 14.311) - Credits: 1

Experiments and written reports. Testing and measurement techniques and material standards illustrating behavior of materials, including metals, wood, and Portland cement concrete.

CIVE.3300 Soil Mechanics (Formerly 14.330) - Credits: 3

Development of the fundamental principles of soil mechanics as utilized in soil and foundation engineering. Topics include: classification, index properties, strength and stress-strain behavior, effective stress principle, permeability, flow and consolidation. Introduction to basic soil mechanics laboratory practice.

CIVE.3320 Environmental Engineering Laboratory (Formerly 14.332) - Credits: 1

Laboratory experiments to illustrate analysis of environmental samples and experimental techniques, normally used in support of water and wastewater treatment facilities. Course emphasizes data acquisition and analysis, and engineering report writing.

CIVE.3330 Geotechnical Laboratory (Formerly 14.333) - Credits: 1

Laboratory experience that illustrates soil mechanics and fluid flow theory. Experiments are conducted in the soils and hydraulics laboratories. Course emphasizes data acquisition and analysis and writing engineering reports.

CIVE.3400 Transportation Engineering (Formerly 14.340) - Credits: 3

Development of the basic principles pertaining to the movement of people and goods by modern transportation systems. Techno-economic characteristics of the various transportation modes. Aspects of planning, design and operation of land, air and water transportation facilities. Development, structure and function of the U.S. transportation system.
CIVE.3410 Transportation Engineering Laboratory (Formerly 14.341) - Credits: 1

Practice techniques of data collection, analysis and presentation that are commonly used in the planning, design and operation of transportation facilities with primary emphasis on highway systems.

CIVE.3500 Structural Analysis I (Formerly 14.350) - Credits: 3

Principles of structural analysis applied to typical civil engineering structures as the initial step in the total design concept. Emphasis on classical methods of analysis of statically determinate and indeterminate structures. The personal computer as an analytical tool.

CIVE.3520 Reinforced Concrete (Formerly 14.352) - Credits: 3

Ultimate strength and elastic behavior of reinforced concrete structural members, continuity in building frames, deflections, shear reinforcement, development length and bar cutoffs, columns and footings.

CIVE.3620 Environmental Engineering (Formerly 14.362) - Credits: 3

Physical, chemical and biological principles of the treatment of water and wastewater are considered along with their application to treatment systems. The system components of wastewater and water treatment plants are studied to provide a basic design capability. Hazardous waste site remediation is also discussed.

CIVE.3720 Civil Engineering Systems (Formerly 14.372) - Credits: 3

Introduction to methods of operations research, management science and economic analysis used in the design, planning and managing of engineering systems. Main topics covered: systems modeling, optimization concepts, network analysis, mathematical programming, critical path analysis, decision analysis, economic consideration.

CIVE.4310 Foundation and Soil Engineering (Formerly 14.431) - Credits: 3

The application of soil mechanics to the design and analysis of foundations and soil structures. Topics include: soil origin and deposition, subsurface exploration, bearing capacity and settlement analyses, design of shallow foundations, earth pressures, retaining structures, and slope stability.

CIVE.4520 Steel Design (Formerly 14.452) - Credits: 3

An introduction to structural steel design with emphasis on use and interpretation of the AISC Manual and LRFD Specifications. Subjects include design of tension, compression, beams, and beam-column members, plus bolted and welded connections. Other topics may include composite beams, plate girders, building connections and plastic analysis and design.

CIVE.4600 Water Resources Engineering (Formerly 14.460) - Credits: 3

This course is a continuation and extension of Fluid Mechanics, with a focus on engineering applications of hydraulic and hydrologic engineering. This course covers fundamental concepts of open-channel flow, hydraulic structures, design of open channels, surface-water hydrology, and groundwater hydrology.

CIVE.4660 Introduction to LEED (Formerly 14.466) - Credits: 3

This course examines the principles of sustainability and how they are applied to engineering and the built environment. Areas covered include energy, water, materials, transportation, and green building principles. Issues of evaluation of sustainability, including life cycle analysis and rating systems, are also discussed. This course fulfills the educational requirements for eligibility to take the LEED (Leadership in Energy and Environmental Design) Green Associate exam.

CIVE.4700 Engineering Economics (Formerly 14.470) - Credits: 3

Presentation of mathematical principles of economic analysis, with emphasis on defining alternatives and predicting consequences of proposed investments. Emphasis is placed on the economic, social and environmental impacts of proposed Civil Engineering projects. The attractiveness of investments is judged by present worth, annual worth, rate of return, and benefit-cost ratio techniques. Sensitivity analysis, depreciation and tax impacts in economic studies are also discussed.

CIVE.4750 Construction Management I (Formerly 14.475) - Credits: 3

Development of management skills and techniques to plan, schedule, supervise, and control construction projects. Project estimating; labor costs and productivity; construction plans, specifications and contracts; labor relations; time, cost and quality control; construction equipment and project decision making and financing.
CIVE.4800 Special Topics in Civil Engineering  
(Formerly 14.480) - Credits: 3

Contemporary topics in selected areas of study within civil engineering. Course content is chosen by the instructor to meet the interests of the students.

CIVE.4810 Special Topics (Formerly 14.481) - Credits: 3

Contemporary topics in selected areas of study within civil engineering. Course content is chosen by the instructor to meet the interests of the students.

CIVE.4830 Spec Topics: Civil Engineering (Formerly 14.483) - Credits: 3

Contemporary topics in selected areas of study within civil engineering. Course content is chosen by the instructor to meet the interests of the students.

CIVE.4850 Capstone Design (Formerly 14.485) - Credits: 3

Introduction to the essentials of engineering design and a forum for practicing the design process. Integrates many elements of the curriculum through a comprehensive design project to professional standards. Projects include the use of open-ended problems, feasibility analysis, design process, consideration of alternative solutions, and cost estimation. Students practice team effort, development of a system perspective, communication skills, reporting, and presentations.

CIVE.4910 Industrial Experience I (Formerly 14.491) - Credits: 0-12

The new Cooperative Education program for undergraduates combines academic studies with work experience in appropriate positions in the public or private sectors. It permits students to participate in the flexible schedule of study and work that is related to their academic fields of study and to receive academic credit for the work experience. Requires 500 hours of cooperative education engineering experiences, on a full-time or part-time basis, during any academic semester or summer. All co-op work must be pre-approved by the Co-op Coordinator. (Effective with Class of 2001-02, students in CEE are able to earn three credits after the successful completion of both Industrial Experience I and II).

CIVE.4930 Industrial Experience III (Formerly 14.493) - Credits: 3

ENVE.2010 Environmental Engineering Chemistry - Credits: 3

Overview of fundamental chemistry related to the source, fate and reactivity of compounds in the atmosphere, hydrosphere, and lithosphere. Topics include reaction kinetics, chemical equilibrium, redox reactions, chemical thermodynamics, carbonate systems, environmental fate of chemicals in natural and polluted environments, anthropogenic and natural pollution.

ENVE.3020 Fluid Mechanics Laboratory - Credits: 1

Laboratory and field experiments on fluid mechanics including measurement of fluid properties, analysis of fluid flow patterns, and fluid flow in closed conduits, and flow measurements. Course emphasizes data acquisition and analysis, and report writing.

ENVE.3105 Material Science for Environmental Engineering - Credits: 2

A treatment of the properties of engineering materials that influence the design, construction and maintenance of Civil Engineering works. Included are such materials as ferrous and non-ferrous metals.

ENVE.3630 Environmental Engineering II - Credits: 3

This course emphasizes the ecology and physical-chemical processes used in water and wastewater treatment. Topics covered include Streeter-Phelps model, coagulation, flocculation, water softening, precipitation, filtration, activated carbon adsorption, and disinfection.

ENVE.3640 Energy and the Sustainable Environment -
Credits: 3

Thermodynamic laws, energy balance, conservation of energy, heat transfer, energy conversion and efficiency, ideal and non-ideal gas and gas mixtures, design and evaluation of renewable energy systems.

ENVE.3650 Groundwater Hydrogeology and Remediation - Credits: 3

Groundwater flow and aquifer behavior in response to pumping will be addressed. Analysis of contaminant transport and the formation of multi-dimensional contaminant plume formation will be conducted. Physical, chemical and biological based technologies for contaminated aquifer remediation are covered.

ENVE.3660 Biological Processes in Environmental Engineering - Credits: 3

This course focuses on the fundamental aspects of biological processes that are commonly used in water and wastewater treatment. Topics covered include: the mechanisms and kinetics of biological reactions, mass balances of biological reactors, biological reactor design and diagnosis, and aeration and gas transfer.

ENVE.4610 Chemical Fate and Transport in the Environment - Credits: 3

The properties of organic chemicals and equilibrium chemistry controlling the distribution of these chemicals between air, water and soil will be studied. Transport processes and the lifetime of chemicals in the environment will be investigated. Risk assessment for the exposure to chemical contaminants will be addressed.

ENVE.4620 Air Quality - Credits: 3

Review of gaseous pollutants, their chemistry and properties. Emissions of air pollutants (mass balances) and atmospheric sciences related to air pollution. Gas and particulate handling and treatment technologies are addressed.

ENVE.4630 Environmental Eng. Ethics and Professional Practice - Credits: 3

This course introduces students to the American Society of Civil Engineers (ASCE) code of ethics and standards of practice for environmental professionals. Topics include codes of ethics, agreements and contracts, ethical and legal considerations, professional liability, public protection issues, environmental regulations, and environmental sustainability considerations. It prepares students to think critically while working with complex environmental issues.

ENVE.4640 Solid Waste Engineering and Management - Credits: 3

Generation, storage, collection, transfer and transport, processing and disposal of municipal solid wastes; treatment and disposal of water and wastewater treatment sludge; landfill design; alternative waste management and disposal strategies.

ENVE.4855 Capstone Design - Credits: 3

Introduction to the essentials of engineering design and a forum for practicing the design process. Integrates many elements of the curriculum through a comprehensive design project to professional standards. Project includes the use of open-ended design problems, feasibility and impact analysis, complete design process, consideration of alternative solutions, and cost estimation and scheduling. Students practice team effort, development of a system perspective, communication skills, reporting, and presentations. The course is fast paced and covers new design elements in each module.
ENGN.0010 Undeclared Engineering Seminar
(Formerly 25.001) - Credits: 0
The seminar course is designed to introduce undeclared engineering students to the various engineering disciplines so that undeclared engineering students can make a more informed decision when declaring their engineering major.

ENGN.1030 Environmental Biotechnology (Formerly 25.103) - Credits: 3
This UML TEAMS Academy course will investigate the chemical and biological impact of human activity on aquatic environments. A specific focus of this course will be to observe the behavior of microorganisms impacted by pollutants introduced into the environment by humans. Students will explore possible engineering solutions to alleviate the problems caused by pollutants. This course can be described as "inquiry based discovery" and will rely heavily on laboratory investigations and laboratory based projects analyzing environmental samples collected in the field. This course is open only to high school students accepted to the UML-TEAMS Academy. Instructor permission required.

ENGN.1070 Introduction To Engineering I (Formerly 25.107) - Credits: 2
This course provides a hands-on introduction to engineering and the engineering design process. Through assignments and projects, students learn how to: identify a problem, develop alternative solutions, select the best alternative, make critical decisions, and work as a team. The course is intended for freshmen in all engineering majors and provides an overview of the different engineering disciplines. Lecture and lab component.

ENGN.1080 Introduction To Engineering II (Formerly 25.108) - Credits: 2
This course is intended for first-year engineering students and provides an introduction to technical communications, teamwork and other skills. Topics vary depending on the department and include data analysis, computer-aided drafting/design/modeling program usage, report-writing and/or oral presentation. Depending on the department, software introduced may include Excel, PowerPoint, AutoCad, Matlab and/or MathCad. Team-based labs and projects may be employed. Students should enroll in the sections corresponding to their major or intended department to develop relevant skills.

ENGN.1300 Introduction to Nano-Engineering (Formerly 25.130) - Credits: 3
The multi-billion dollar investment in nanoscience and nanotechnology is beginning to yield new products, including better sunscreens and wear-resistance materials. "Introduction to Nano-Engineering" is as overview of engineering at the nanoscale, including measurement techniques, nanoelectronics, nanomaterials, design of nanodevices, nanomanufacturing, and the societal impact of nanotechnology. "Lecture" material is accompanied by open-ended questions for chat-room discussion and five virtual laboratories. Targeted for the general public. This is an interdisciplinary course.

ENGN.1510 Assistive Technology & Electronics (Formerly 25.151) - Credits: 3
UML-TEAMS Academy students will explore basic electronics physics in a hands-on laboratory environment. Students will apply their knowledge as they learn how to breadboard, test, and troubleshoot a series of lab projects. Students will use CAD tools as they learn how to fabricate printed circuit boards. The course culminates with groups projects that apply the engineering design process and electronics to design and build a product for disabled clients in our community. This course is open only to high school students accepted to the UML-TEAMS Academy. Instructor permission required.

ENGN.2000 Community-based Engineering Project I (Formerly 25.200) - Credits: 1
Students work on multi-disciplinary teams and apply their engineering problem-solving skills on community-based design projects.

ENGN.2050 Statics (Formerly 14.203/22.211/26.211/25.205) - Credits: 3
The application of Newton's Laws to engineering problems in statics. The free-body diagram method is emphasized. Topics include vector algebra, force, moment of force, couples, static equilibrium of rigid bodies, trusses, friction, properties of areas, shear and moment diagrams, flexible cables, screws, bearings, and belts.

ENGN.2060 Strength of Materials (Formerly 14.204/22.212/25.206) - Credits: 3
Stress and deformation analysis of bodies subjected to uniaxial loading, thermal strain, torsion of circular cross-sections, shear flow in thin-walled sections, bending of beams, and combined loading. Application of equilibrium, compatibility and load-deformation relations to solve statically determinate and indeterminate systems.

ENGN.2070 Dynamics (Formerly 14.205/22.213/25.207) - Credits: 3
Calculus based vector development of the dynamics of points, particles, systems of particles, and rigid bodies in planar motion; kinematics of points in rotating and non-rotating frames of reference in one, two, and three dimensions; conservation of momentum, and angular momentum; principle of work and energy.

**ENGN.2100 Professional Development Seminar**  
(Formerly 25.210) - Credits: 1

The Professional Development Seminar is designed to provide students with the necessary structure, resources, and support to successfully secure and engage in their first cooperative education experience. Through a variety of teaching methodologies and assignments, students will prepare to engage in the job search process through resume writing, strategic interviewing, professional networking and through learning professional behavior and presentation skills. Course open to undergraduates who have previously applied and been accepted to participate in the Professional Co-op Program. Enrollment is by Instructor permission only. For more information on applying to the Professional Co-op Program, see https://www.uml.edu/student-services/Career-Services/Cooperative-Education/Forms-Handbooks.aspx. Prereq: Permission of Instructor.

**ENGN.2180 Introduction to Aerospace** (Formerly MECH.2080) - Credits: 2

This survey course introduces and discusses: basic lightweight structures, aerospace materials, aerodynamics, air-breathing/rocket propulsion, space environment, energy systems, thermal analysis, aerospace systems design, and the aerospace industry (economics, jobs, opportunities, etc.). The hands-on laboratory component of this course requires students perform an aerospace system design in one of the following disciplinary areas (1) Aircraft design, manufacture and testing (2) Space system design, modeling and testing. The course has 2 hours of lecture and 2 hours of laboratory per week.

**ENGN.2180L Introduction to Aerospace Lab**  
(Formerly MECH.2080L) - Credits: 1

The introduction to Aerospace Laboratory is a hands-on exploration of the topics covered in the Introduction to Aerospace course. This laboratory course examines topics in: basic lightweight structures, aerospace materials, aerodynamics, air-breathing/rocket propulsion, space environment, energy systems, thermal analysis, aircraft design and space mission analysis and design. The laboratory course culminates in a required aerospace system design in one of the following disciplinary areas (1) Aircraft design, manufacture and testing (2) Space system design, modeling and testing.

**ENGN.3000 Community-based Engineering Project II**  
(Formerly 25.300) - Credits: 1

Students work on multi-disciplinary teams and apply their engineering problem-solving skills on community-based design projects.

**ENGN.3100 Co-op assessment 1**  
(Formerly 25.310) - Credits: 1

The primary goal of this seminar is to assist students in the overall assessment of their overall cooperative education experience. Through facilitated small group discussion, individual consultation and hands on practice, students will have an opportunity to identify and articulate their technical and professional skills, and explore how these skills and their co-op employment might be translated and leveraged into future work environments and their academic program at UML.

**ENGN.3200 Co-op Assessment I (6 months)** - Credits: 2

This seminar is designed to support and assist students in the assessment of their 6 month cooperative education experience. Students will reflect on their extended time in a work environment, the impact of their experience on their planning, and how organizational culture, personal interests and values can inform their subsequent decisions for career development. Through facilitated small group discussions, individual consultation and hands on practice, students will have the opportunity to identify and articulate their technical and professional skills.

**ENGN.4000 Community-based Engineering Project III**  
(Formerly 25.400) - Credits: 1

Students work on multi-disciplinary teams and apply their engineering problem-solving skills on community based design projects. Completion of 25.400, 25.300, and 25.200 can count as a mechanical engineering technical elective (academic petition required).

**ENGN.4010 Engineering Capstone Design Project**  
(Formerly 25.401) - Credits: 3

Integrative design experience in engineering. Students work on multi-disciplinary teams and apply their engineering problem-solving skills on open-ended, real-world projects Projects may be service-oriented in concept and teams may include members from other Departments and Colleges. Emphasis on communication, team-work, report-writing, oral presentations, This course may be used as a Technical elective for all Engineering Departments. Alternatively, this course may be used as a substitute for the culminating Capstone course in
Communications in Engineering - Credits: 1

ENGN.4030 American Culture, Ethics and Communications in Engineering (PLAS.4160) and Mechanical Engineering (MECH.4230).

This course offers a substitute for the culminating capstone course in Electrical and Computer Engineering (EECE.3991) and Plastics Engineering (PLAS.4150). Students will then take their department’s culminating capstone course to complete their capstone course requirements.

Overview of American culture and how it has been shaped by immigrants from the colonial era to the present and cultural influences from immigrants and their role in contributing to accomplishments in engineering, technology, science and the arts will be explored. Students will learn about the history of Lowell, MA in the context of key events. The concepts and practice of engineering ethics and the ethical principles and responsibilities that students should exercise in academia and professional careers will be introduced. The impact of engineering on society and the environment will be discussed through case studies. The course will promote communication skills through reading, listening and viewing assignments and responding with written reports and presentations to the class.

ENGN.4100 Co-op Assessment 2 (Formerly 25.410) - Credits: 1

This seminar is designed to support and assist students in the continued assessment of their cooperative education experience. Through a deepening of their work in Co-op Assessment 1, students will review their overall performance in the cooperative education program, while continuing to demonstrate their technical and professional skills through written work and public presentations to multiple audiences. It is expected that students will clearly define their future academic and career goals, enhance their professional networks, and develop a future plan to support aspirations related to their major.

ENGN.4200 Co-op Assessment 2 (6 months) - Credits: 2

This seminar is designed to support and assist students in the assessment of their second cooperative education work experience that was for a 6 month cycle. Students will reflect on their extended time in this second work environment, and how their two different co-op work experiences impacts their subsequent decisions for career development. Students will review their overall performance in the cooperative education program, and demonstrate their technical and professional skills through written work and public presentations to multiple audiences.

ENGN.4500 Gas Turbine Engine Theory and Design - Credits: 3

This introductory course discusses the basics of open Brayton cycles for Gas Turbine Engines (GTEs) followed by a comprehensive review of the various GTE architectures (e.g., turbojet, turbofan, turboshaft, turboprop, ramjets, etc.) for applications in both civil and military platforms. Detailed analyses of individual engine components (fan, LP/IP/HP compressors combustors, HP/IP/LP turbines, nozzles, etc.) as well as overall engine system interaction and integration. GTE design conceptualization, testing, validation & verification,
performance, emissions, and other parameters are examined with respect to overall design goal and intended operability and durability. Concluded by a broad review of popular airframe-engine models and their brief history of conceptualization and development.

ENGN.4900 Industrial Experience (Formerly 25.490)
- Credits: 0

ENGN.4910 Industrial Experience I (Formerly 25.491)
- Credits: 0-12

"Variable credit course, student chooses appropriate amount of credits when registering."
Educational Objectives and Learning Outcomes

Program Educational Objectives
are defined as the expected accomplishments of graduates of the program in first few years after graduation. Graduates of the BSE Computer or Electrical Engineering program at the University of Massachusetts at Lowell will be able to:

- Be established and recognized as a valued professional and effective communicator in industries related to electrical, computer and electronic technologies.
- Practice their profession in a collaborative, team-oriented manner that embraces the multidisciplinary and multicultural environment of today's business world.
- Engage in lifelong learning and professional development via post graduate education and participation in professional organizations.
- Function as a responsible member of society with willingness to mentor fellow employees and an understanding of the ethical, social and economic impact of their work in a global context.

The student outcomes for the BSE degree in electrical or computer engineering at UMass Lowell are as follows. At graduation students should:

- A strong grounding in the fundamentals including the ability to formulate and solve engineering problems by applying the principles of mathematics, science and electrical & computer engineering.
- Ability to analyze and synthesize engineering problems including design and conduct experiments, use standard test equipment and interpret experimental data.
- Ability to design reliable systems, devices or processes from initial specifications to a deliverable system.
- Ability to work in a multidisciplinary team environment. Ability to communicate effectively in both verbal and written forms.
- Ability to appreciate the complexities of professional environments, including taking responsibility for oneself, working effectively and professionally as a team member, and being mindful of ethical, economic, and contemporary concerns.
- Competence in taking the initiative for one's own professional development and recognition of the need and ability in engaging in post graduate education and lifelong continual learning.
- Ability to independently accomplish engineering tasks.
- Ability to enter industry with the engineering techniques, skills, and tools required to be able to solve real-world problems in electrical and computer engineering.

Degree Pathways

Degree Pathways are a semester-by-semester sequence of courses recommended for successful completion of a degree, diploma, credential or certificate from the university.

Electrical Engineering
- fall 2015 and beyond

Computer Engineering
- fall 2015 and beyond

Double Major in Electrical Engineering/Computer Science
- fall 2017 and beyond
- prior to fall 2015
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Double Major in Electrical Engineering/Physics
- fall 2017 and beyond
- fall 2014 - spring 2015
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Suggested Degree Pathway for Electrical Engineering

For students who entered fall 2015 and beyond.

Freshman Year

Fall Semester

<table>
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<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Crs</th>
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EECE.1070 (Intro to Elect. & Comp. Engin.)
MATH.1310 (Calculus I)
PHYS.1410 (Physics I)
PHYS.1410L (Physics Lab I)
ENGL.1010 (College Writing I)

Total
1
3

Spring Semester

Course# | Course Name | C r.
---------|-------------|------
MATH.1320 (Calculus II) | 4
PHYS.1440 (Physics II) | 3
PHYS.1440L (Physics II Lab) | 1
ENGL.1020 (College Writing II) | 3
CHEM.1210 (Chemistry I) | 3
CHEM.1230L (Chemistry I Lab) | 1

Total
1
5

Sophomore Year

Fall Semester

Course# | Course Name | C r.
---------|-------------|------
EECE.2010 (Circuit Theory I) | 3
EECE.2070 (Basic Circuits Lab I) | 2
EECE.2160 (ECE Applications Prog.) | 3

Spring Semester

Course# | Course Name | C r.
---------|-------------|------
EECE.2020 (Circuit Theory II) | 3
EECE.2080 (Basic Circuits Lab II) | 2
EECE.2650 (Logic Design) | 3
ECON.2010 (Principles of Microeconomics) | 3
ECON.2020 (Principles of Macroeconomics) | 3
MATH.2340 (Differential Equations) | 3

Total
1
7

Junior Year

Fall Semester

Course# | Course Name | C r.
---------|-------------|------
EECE.3110 (Electronics I Lab) | 2
EECE.3620 (Signals & Systems I) | 3
EECE.3640 (Engineering Mathematics) | 3
EECE.3650 (Electronics I (QL)) | 3
PHIL.3340 (Engin. Ethics) | 3
### Spring Semester

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<td>Electronics II Lab</td>
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<td>EECE.3170 (<a href="https://www.uml.edu/catalog/courses/EECE/3170">https://www.uml.edu/catalog/courses/EECE/3170</a>)</td>
<td>Microprocessors I</td>
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<td>EECE.3600 (<a href="https://www.uml.edu/catalog/courses/EECE/3600">https://www.uml.edu/catalog/courses/EECE/3600</a>)</td>
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### Senior Year

#### Fall Semester

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<td>Capstone Proposal (IL), (WOC)</td>
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<td>Electromechanics</td>
<td>3</td>
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<td>EECE.4/5xxx (<a href="https://www.uml.edu/catalog/courses/EECE/E4/5xxx">https://www.uml.edu/catalog/courses/EECE/E4/5xxx</a>)</td>
<td>Technical Electives$^3$</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)$^4$</td>
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#### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>C r.</th>
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</thead>
<tbody>
<tr>
<td>EECE.4130</td>
<td>Linear Feedback</td>
<td>3</td>
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</table>

**Total Minimum Credits = 121**

1. Or MATH.1280 ([https://www.uml.edu/catalog/courses/MATH/1280](https://www.uml.edu/catalog/courses/MATH/1280)) Calculus IA and MATH.1290 ([https://www.uml.edu/catalog/courses/MATH/1290](https://www.uml.edu/catalog/courses/MATH/1290)) Calculus IB followed by MATH.1320 ([https://www.uml.edu/catalog/courses/MATH/1320](https://www.uml.edu/catalog/courses/MATH/1320)) Calculus II.

2. A grade of C or better in Calculus II is required.

3. Technical electives are non-required courses numbered EECE.4xxx ([https://www.uml.edu/catalog/courses/EECE](https://www.uml.edu/catalog/courses/EECE)) or EECE.5xxx ([https://www.uml.edu/catalog/courses/EECE](https://www.uml.edu/catalog/courses/EECE)).

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_Last Updated: 11/04/2021_
Suggested Degree Pathway for Computer Engineering

For students who entered fall 2015 and beyond

Freshman Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>EECE.1070</td>
<td>Introduction to Electrical and Computer Engineering</td>
<td>2</td>
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<tr>
<td>MATH.1310</td>
<td>Calculus I (MATH1)</td>
<td>4</td>
<td></td>
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<tr>
<td>PHYS.1410</td>
<td>Physics I (SCL)</td>
<td>3</td>
<td></td>
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<tr>
<td>PHYS.1410L</td>
<td>Physics I Lab</td>
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<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
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Sophomore Year

Fall Semester

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<tbody>
<tr>
<td>EECE.2010</td>
<td>Circuit Theory I</td>
<td>3</td>
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<tr>
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<td>Basic Electrical Engineering Lab I</td>
<td>2</td>
</tr>
<tr>
<td>EECE.2650</td>
<td>Logic Design</td>
<td>3</td>
</tr>
<tr>
<td>MATH.2310</td>
<td>Calculus III</td>
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<td>x.xxxxx</td>
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Spring Semester

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<tbody>
<tr>
<td>MATH.1320</td>
<td>Calculus II</td>
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<tr>
<td>PHYS.1440</td>
<td>Physics II (STEM)</td>
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<tr>
<td>PHYS.1440L</td>
<td>Physics II Lab</td>
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<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
<td>3</td>
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<tr>
<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
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</tr>
<tr>
<td>CHEM.1230L</td>
<td>Chemistry I Lab</td>
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<tr>
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Academic Catalog 2021 - 2022 / Electrical & Computer Engineering - General Information
### Junior Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>EECE.3650</td>
<td>Electronics I (QL)</td>
<td>3</td>
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<tr>
<td>EECE.3110</td>
<td>Electronics I Lab (CTPS)</td>
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</tr>
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<td>EECE.3220</td>
<td>Data Structures</td>
<td>3</td>
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<tr>
<td>EECE.3620</td>
<td>Signals and Systems I</td>
<td>3</td>
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<tr>
<td>EECE.3640</td>
<td>Engineering Mathematics</td>
<td>3</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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<tr>
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#### Spring Semester

<table>
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<tr>
<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>EECE.3170</td>
<td>Microprocessors Systems Design I</td>
</tr>
<tr>
<td>EECE.3630</td>
<td>Introduction to Probability and Random Processes</td>
</tr>
<tr>
<td>EECE.3660</td>
<td>Electronics II</td>
</tr>
<tr>
<td>EECE.3120</td>
<td>Electronics II Lab</td>
</tr>
<tr>
<td>PHIL.3340</td>
<td>Engineering and Ethics (AH), (SRE)</td>
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<tr>
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<td>Arts and Hum. Persp. (AH)</td>
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### Senior Year

#### Fall Semester

<table>
<thead>
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<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>EECE.3991</td>
<td>Capstone Proposal (IL), (WOC)</td>
</tr>
<tr>
<td>EECE.4500</td>
<td>Advanced Digital System Design</td>
</tr>
<tr>
<td>EECE.4520</td>
<td>Microprocessor Systems II and Embedded Systems</td>
</tr>
<tr>
<td>EECE.4811</td>
<td>Operating Systems</td>
</tr>
<tr>
<td>EECE.4/5xxx</td>
<td>Technical Elective3</td>
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### Spring Semester

<table>
<thead>
<tr>
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<th>Course Name</th>
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<tbody>
<tr>
<td>EECE.4821</td>
<td>Computer Architecture and Design</td>
</tr>
<tr>
<td>EECE.4830</td>
<td>Network Design: Principles, Protocols &amp; Applications</td>
</tr>
<tr>
<td>EECE.4991</td>
<td>Capstone Project (AIL)</td>
</tr>
<tr>
<td>EECE.4/5xxx</td>
<td>Technical Elective3</td>
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<td>Social Sciences Persp. (SS)</td>
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<tr>
<td><strong>Total</strong></td>
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</tbody>
</table>

**Total Minimum Credits = 124**


2. A grade of C or better in Calculus II is required.

3. Technical electives are non-required courses numbered EECE.4xxx (https://www.uml.edu/catalog/courses/EECE) or EECE.5xxx (https://www.uml.edu/catalog/courses/EECE).

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Last Updated: 11/04/2021

Suggested Degree Pathway for Double Major in Electrical Engineering & Computer Science

For students who entered fall 2017 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EECE.1070</td>
<td>Intro to Electrical and Computer Engineering</td>
<td>2</td>
</tr>
<tr>
<td>MATH.1310</td>
<td>Calculus I (MATH)</td>
<td>4</td>
</tr>
<tr>
<td>COMP.1010</td>
<td>Computing I</td>
<td>3</td>
</tr>
<tr>
<td>COMP.1030L</td>
<td>Computing I Lab</td>
<td>1</td>
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<tr>
<td>ENGL.1010</td>
<td>College Writing I (CW)</td>
<td>3</td>
</tr>
<tr>
<td>ECON.2010</td>
<td>Principles of Microeconomics</td>
<td>3</td>
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<td>Principles of Macroeconomics (SS)</td>
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Spring Semester

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<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credit</th>
</tr>
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<tbody>
<tr>
<td>COMP.1020</td>
<td>Computing II</td>
<td>3</td>
</tr>
<tr>
<td>COMP.1040L</td>
<td>Computing II Lab</td>
<td>1</td>
</tr>
<tr>
<td>MATH.1320</td>
<td>Calculus II2</td>
<td>4</td>
</tr>
<tr>
<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
<td>3</td>
</tr>
<tr>
<td>CHEM.1230L</td>
<td>Chemistry I Lab (SCL)</td>
<td>1</td>
</tr>
<tr>
<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)3</td>
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Sophomore Year

Fall Semester

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<th>Course Name</th>
<th>Credit</th>
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<tbody>
<tr>
<td>EECE 2010</td>
<td>Circuit Theory I</td>
<td>3</td>
</tr>
<tr>
<td>EECE 2070</td>
<td>Basic Electrical Engineering Lab I</td>
<td>2</td>
</tr>
<tr>
<td>COMP.2010</td>
<td>Computing III</td>
<td>3</td>
</tr>
<tr>
<td>COMP.2010L</td>
<td>Computing III Lab</td>
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</tr>
<tr>
<td>MATH.2310</td>
<td>Calculus III</td>
<td>4</td>
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</table>
### Junior Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>EECE.3110</td>
<td>Electronics I Lab (CTPS)</td>
<td>2</td>
</tr>
<tr>
<td>EECE.3170</td>
<td>Microprocessors I / Assembly Language Programming</td>
<td>3</td>
</tr>
<tr>
<td>ECE.3620</td>
<td>Signals &amp; Systems I</td>
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| Total       |                                                  | 8   |

#### Spring Semester

<table>
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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>EECE.3120</td>
<td>Electronics II Lab</td>
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<tr>
<td>EECE.3630</td>
<td>Intro Prob. &amp; Random Proc. / Stats for Sci &amp; Eng.</td>
<td>3</td>
</tr>
<tr>
<td>ECE.3640</td>
<td>Engineering Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>ECE.3660</td>
<td>Electronics II</td>
<td>3</td>
</tr>
<tr>
<td>COMP.3040</td>
<td>Foundations of Computer Science</td>
<td>3</td>
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<tr>
<td>COMP.3050</td>
<td>Computer Architecture</td>
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| Total       |                                                  | 7   |

### Senior Year

#### Fall Semester

<table>
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<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>EECE.3600</td>
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<td>ECE.3991</td>
<td>Capstone Proposal (IL), (WOC)</td>
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| Total       |                                                  | 7   |
Spring Semester

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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>EECE.4130</td>
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<td>EECE.4610</td>
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<td>EECE.4991</td>
<td>Capstone Project (AIL)</td>
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<tr>
<td>COMP.3010</td>
<td>Organization of Programming Languages</td>
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<td>COMP.4040</td>
<td>Analysis of Algorithms</td>
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<td>COMP.xxx</td>
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</table>

Total Minimum Credits = 139


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<table>
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<th>Course Name</th>
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<tbody>
<tr>
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<td>ECE Application Programming</td>
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<tr>
<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
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<td>CHEM.1220</td>
<td>Chemistry II (SCL)</td>
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<tr>
<td>CHEM.1240L</td>
<td>Chemistry II Lab (SCL)</td>
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<tr>
<td>MATH.1320</td>
<td>Calculus II</td>
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<tr>
<td>PHYS.1120</td>
<td>Freshman Physics Seminar</td>
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<tr>
<td>PHYS.1440</td>
<td>Physics II</td>
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### Sophomore Year

#### Fall Semester

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</thead>
<tbody>
<tr>
<td>EECE.2010</td>
<td>Circuit Theory I</td>
<td>3</td>
</tr>
<tr>
<td>EECE.2070</td>
<td>Basic Electrical Engineering Lab I</td>
<td>2</td>
</tr>
<tr>
<td>EECE.2650</td>
<td>Logic Design</td>
<td>3</td>
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<td>MATH.2310</td>
<td>Calculus III</td>
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<td>PHYS.2450</td>
<td>Physical Properties of Matter</td>
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<td>PHYS.2450L</td>
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#### Spring Semester

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<th>Course Name</th>
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<td>Basic Electrical Engineering Lab II</td>
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</tr>
<tr>
<td>EECE.3170</td>
<td>Microprocessors I</td>
<td>3</td>
</tr>
<tr>
<td>MATH.2340</td>
<td>Differential Equations</td>
<td>3</td>
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<td>PHYS.2100</td>
<td>Introductory Modern Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS.2620L</td>
<td>Principles in Laboratory Automation (TE)</td>
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<td><strong>Total</strong></td>
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### Junior Year

#### Fall Semester

<table>
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<th>Course Name</th>
<th>C r.</th>
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</thead>
<tbody>
<tr>
<td>EECE.3110</td>
<td>Electronics I Lab (CTPS)</td>
<td>2</td>
</tr>
<tr>
<td>EECE.3550</td>
<td>Electromechanics</td>
<td>3</td>
</tr>
<tr>
<td>EECE.3620</td>
<td>Signals &amp;Systems I</td>
<td>3</td>
</tr>
<tr>
<td>EECE.3650</td>
<td>Electronics I (QL)</td>
<td>3</td>
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<tr>
<td>PHYS.3810</td>
<td>Mathematical Physics I</td>
<td>3</td>
</tr>
<tr>
<td>ECON.2010</td>
<td>Principles of Microeconomics / Principles of Macroeconomics</td>
<td>3</td>
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</tbody>
</table>
### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>EECE.3120</td>
<td>Electronics II Lab</td>
<td>2</td>
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<tr>
<td>EECE.3600</td>
<td>Engineering Electromagnetics I</td>
<td>3</td>
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<tr>
<td>EECE.3630</td>
<td>Introduction to Probability &amp; Random Processes</td>
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<tr>
<td>EECE.3660</td>
<td>Electronics II</td>
<td>3</td>
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<tr>
<td>PHYS.3820</td>
<td>Mathematical Physics II</td>
<td>3</td>
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<tr>
<td>PHYS.4350</td>
<td>Introductory Quantum Mechanics I</td>
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Total: 17

### Senior Year

#### Fall Semester

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<tr>
<th>Course #</th>
<th>Course Name</th>
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<tr>
<td>EECE.3991</td>
<td>Capstone Proposal (IL), (WOC)</td>
<td>3</td>
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<tr>
<td>EECE.4610</td>
<td>Engineering Electromagnetics II</td>
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<tr>
<td>PHIL.3340</td>
<td>Engineering Ethics (AH), (SRE)</td>
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<tr>
<td>PHYS.xxxx</td>
<td>Elective (TE)</td>
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<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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Total: 18

#### Spring Semester

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<tr>
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<th>Course Name</th>
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<tbody>
<tr>
<td>EECE.4130</td>
<td>Linear Feedback Systems</td>
<td>3</td>
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<tr>
<td>EECE.4991</td>
<td>Capstone Project (AIL).</td>
<td>3</td>
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<tr>
<td>ECEE.45xxx</td>
<td>Technical Elective (TE)4</td>
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<tr>
<td>PHYS.3930L</td>
<td>Advanced Experimental Physics Lab I</td>
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<td>xxxx.xxxx</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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Total Minimum Credits = 138

1. Or MATH.1280 (Calculus IA and MATH.1290 Calculus IB, followed by MATH.1320 Calculus II.

2. A grade of C or better in Calculus II is required.

3. PHYS.3380 (Optics and Waves) satisfies the prerequisite for PHYS.5390 Electro-Optics, a core course in the Optical Sciences option for the M.S. in Physics.

4. ECEE.5680 (Electro-Optic Systems, also offered as ECEE.4680), satisfies an elective course in the Optical Sciences option for the M.S. in Physics.

5. Electrical Engineering & Physics students meet the Core Curriculum Essential Learning Outcome of Diversity and Cultural Awareness (DCA) outside of the major. See the DCA course listing for a complete list of options.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be
taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS. If you need assistance, please contact your advisor.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

Last Updated: 11/04/2021

Learning Outcome

A graduate in ECE will be able to:

1. Demonstrate a strong grounding in the fundamentals including the ability to formulate and solve engineering problems by applying the principles of mathematics, science and electrical & computer engineering.
2. Analyze and synthesize engineering problems including design and conduct experiments, use standard test equipment and interpret experimental data.
3. Design reliable systems, devices or processes from initial specifications to a deliverable system.
4. Work in a multidisciplinary team environment.
5. Communicate effectively in both verbal and written forms.
6. Appreciate the complexities of professional environments, including taking responsibility for oneself, working effectively and professionally as a team member, and being mindful of ethical, economic, and contemporary concerns.
7. Demonstrate competence in taking the initiative for one’s own professional development and recognition of the need and ability in engaging in post graduate education and lifelong continual learning.
8. Independently accomplish engineering tasks
9. Ability to enter industry with the engineering techniques, skills, and tools required to be able to solve real-world problems in electrical and computer engineering.
EECE.1070 Introduction to Electrical and Computer Engineering (Formerly 25/16.107) - Credits: 2
This course is divided into two parts in which students focus on core skills to help them thrive in electrical and computer engineering. The first half of the course focuses on application programming in Matlab where students learn basics of Programming, Digital Signal Processing, and Data Analysis. In the second part of the course students program a microcontroller and learn about the function of basic electronic components. Students learn to use basic test equipment such as an Oscilloscope, Function Generator, Volt Meter. This course is project and lab based.

EECE.1CO-OP Curricula Practical Training - Credits: 0-1
Curricula Practical Training. “Variable credit course, student chooses appropriate amount of credits when registering.”

EECE.2010 Circuit Theory I (Formerly 16.201) - Credits: 3
This course covers ideal elements, active and passive. It introduces and applies Ohm’s Law and Kirchhoff’s Laws. Introduces concepts of network topology, independent and dependent variables, mesh and nodal analysis, the definition and consequences of linearity, source transformation, the superposition principle, Thevenin’s and Norton’s theorems, and maximum power transfer. Also covers ideal inductance and capacitance in simple circuits with the study of transient response and behavior under DC conditions.

EECE.2020 Circuit Theory II (Formerly 16.202) - Credits: 3
This course covers AC circuits under sinusoidal steady-state conditions using the concept of the frequency domain. Introduces the use of complex numbers, phasors, impedance and admittance for the application of circuit laws introduced in Circuit Theory I: Thevenin and Norton’s theorems, source transformation, superposition, maximum power transfer, nodal and mesh analysis. Covers power in the frequency domain, including RMS values, average power, reactive power, and apparent power. Introduction to magnetic coupling, mutual inductance, and the ideal transformer. Introduction to transfer functions, poles and zeroes in the s-plane.

EECE.2070 Basic Electrical Engineering Laboratory I (Formerly 16.207) - Credits: 2
Experimental work designed to verify theory and to acquaint students with electrical measurement techniques: experiments on meters, bridges, and oscilloscopes. Experiments are correlated with Circuit Theory I and concern: resistive measurements, Kirchhoff’s laws, network theorems, conservation of power and maximum power transfer, inductance and capacitance, and first and second-order transients, operational amplifiers. MATLAB will be utilized throughout the course.

EECE.2080 Basic Electrical Engineering Lab II (Formerly 16.208) - Credits: 2
Presents experimental work designed to emphasize electrical measurement techniques of linear systems with time-varying signals. Waveform measurements with DC and AC meters as well as advanced use of the oscilloscope are also discussed. Experiments are integrated with Circuit Theory II. Experiments cover: Kirchhoff’s laws for phasors, magnitude and phase measurements of impedance, network theorems, frequency response, resonance, inductance, maximum power transfer, and MATLAB techniques.

EECE.2110 Fundamentals of Electricity I (Formerly 16.211/213) - Credits: 3
This course serves as an introduction to direct current (DC) and alternating current (AC) analysis of electric circuits, with emphasis on energy and power. Covers the explanation of basic components (resistor, capacitor and inductor) and their use in electronics. Cover also the design and use of multi-range voltmeters, ammeters, and ohmmeters, series and parallel and series parallel circuits, the use of bridges, phasor analysis of AC circuits, transformers, relays, solenoids, etc. Different techniques like Superposition theorem, Thevenin equivalent circuit or Maximum Power will be presented. Students will also be introduced to DC and AC motors and generators, first and second order filters as well as basic sensors. Not for ECE students.

EECE.2140 Fundamentals of Sound Recording (Formerly 16.214) - Credits: 3
This course serves to instruct sound recording technology through the concepts of voltage, current, power, resistance and Ohm’s law; series, parallel and resonant circuits, Kirchhoff’s voltage and current laws; the Wheatstone bridge, Thevenin equivalent circuits and maximum power transfer theorem; magnetism, electromagnetism, electromagnetic devices, and transformers; a.c. current, RF signals, capacitors, and inductors; RC, RL, and RLC circuits; d.c. power sources; diodes, transistors, tubes (thermonic emission), and amplifiers. Use of voltmeters, ammeters, ohmmeters, and oscilloscopes are discussed and used in lab throughout the course. Not for ECE students.

EECE.2160 ECE Application Programming (Formerly
16.216) - Credits: 3
Introduces C programming for engineers. Covers fundamentals of procedural programming with applications in electrical and computer engineering and embedded systems. Topics include variables, expressions and statements, console input/output, modularization and functions, arrays, pointers and strings algorithms, structures, and file input/output. Introduces working with C at the bit manipulation level. Laboratories include designing and programming engineering applications.

EECE.2330 History of Radio (Formerly 16.233) - Credits: 3
Intended primarily for students majoring in the liberal arts. The course develops the theory of electricity from an historical perspective. Sufficient background in circuit theory, resistance, field theory and radio waves is given to provide an understanding of the principles of radio from its antecedents in the nineteenth century through the invention of the transistor in the mid twentieth century. The fundamental contributions of, for example Volta, Oersted, Morse, Maxwell, Faraday, Hertz, Lodge, and Marconi are considered. In the present century the technical advances of such figures as de Forest, Fleming, Fessenden, Armstrong and Shockley are studied. The growth, regulation and culture of American broadcasting are also central to the course. Laboratory work is required and students may use this course toward fulfilling the General Education (science/experimental component) requirement of the University. Not open to students in the College of Engineering.

EECE.2460 Introduction to Data Communication Networks - Credits: 3
This course is designed to convey the essentials of data communication and networking. This includes an understanding of the Open Systems Interconnection (OSI), TCP/IP and Internet models. It covers various protocols and architectures of interconnection technologies. Several concepts will be discussed that will enable students to apply the basic concepts of data communication and networking technology in many practical situations.

EECE.2650 Logic Design (Formerly 16.265) - Credits: 3

EECE.3110 Electronics I Lab (Formerly 16.311) - Credits: 2
Laboratory experiments coordinated with the subject matter of Electronics I. This lab explores the characteristics and use of electronic instrumentation for measuring electronic circuits. Labs will utilize the methods of designing and characterizing diode and transistor circuits. They will analyze the performance characteristics of digital and linear semiconductor circuits, including logic elements and amplifiers. The design and construction of circuits using monolithic op amps will also be explored.

EECE.3120 Electronics II Laboratory (Formerly 16.312) - Credits: 2
This course covers laboratory experiments coordinated with the subject matter of Electronics II. Study of high-frequency characteristics of transistors and transistor amplifiers. Covers feedback in electronic circuits, electronic oscillators and differential amplifier. Covers also the properties of linear IC operational amplifiers and their application in amplifier circuits and waveform generation circuits. Design and analysis of linear circuits.

EECE.3170 Microprocessors Systems Design I (Formerly 16.317) - Credits: 3
Introduction to microprocessors, Uses assembly language to develop a foundation on the hardware which executes a program. Memory and I/O interface design and programming. Design and operation of computer systems. Study of microprocessor and its basic support components, including detailed schematics, timing and functional analysis of their interactions. Laboratories directly related to microprocessor functions and its interfaces (e.g. memory subsystem, I/O devices and coprocessors).

EECE.3220 Data Structures (Formerly 16.322) - Credits: 3
Covers algorithms and their performance analysis, data structures, abstraction, and encapsulation. Introduces stacks, queues, linked lists, trees, heaps, priority queues, and hash tables, and their physical representation. Discusses efficient sorting (quicksort and heapsort) and experimental algorithm analysis. Examines several design issues, including selection of data structures based on operations to be optimized, algorithm encapsulation using classes and templates, and how and when to use recursion. Assignments include programming of data structures in an object-oriented language.
EECE.3650 Electronics I (Formerly 16.365) - Credits: 3

Alternating current circuits, three phase circuits, basics of electromagnetic field theory, magnetic circuits, inductance, electromechanical energy conversion. Ideal transformer, iron-core transformer, voltage regulation, efficiency equivalent circuits, and three phase transformers. Induction machine construction, equivalent circuit, torque speed characteristics, and single phase motors. Synchronous machine construction, equivalent circuits, power relationships phasor diagrams, and synchronous motors. Direct current machines construction, types, efficiency, power flow diagram, and external characteristics.

EECE.3660 Electronics II (Formerly 16.366) - Credits: 3

A brief introduction to solid-state physics, leading to discussion of physical characteristics of p-n junction diodes, bipolar junction transistors, and field-effect transistors: active, saturated, and cutoff models of bipolar transistors and triode, constant current, and cutoff models of MOSFETs. Circuit models for diodes, and diode applications. Circuit models for transistors, and transistor applications in bipolar and MOS digital circuits and low-frequency amplifier circuits. Analysis of digital circuits and linear circuits based on application of circuit models of devices and circuit theory.

EECE.3991 Capstone Proposal (Formerly 16.399) - Credits: 3

This course is the first in a two semester capstone sequence. In a group, students will work with a client to define their project, by identifying the problem, objective and requirements, and engage in design, analysis, test and fabrication tasks as appropriate to meet the project goals. Project management
tools are discussed and applied in this process.

EECE.4030 Microwave Engineering (Formerly 16.403) - Credits: 3
An introductory course in the analysis and design of passive microwave circuits beginning with a review of time-varying electromagnetic field concepts and transmission lines. Smith Chart problems; single and double stub matching; impedance transformer design; maximally flat and Chebyshev transformers; microstrip transmission lines, slot lines, coplanar lines; rectangular and circular waveguides; waveguide windows and their use in impedance matching; design of directional couplers; features of weak and strong couplings; microwave filter design; characteristics of low-pass, high-pass, band-pass, band-stop filter designs; two-port network representation of junctions; Z and Y parameters, ABCD parameters, scattering matrix; microwave measurements; measurement of VSWR, complex impedance, dielectric constant, attenuation, and power. A design project constitutes a major part of the course.

EECE.4040 VLSI Fabrication (Formerly 16.470/EECE.4700) - Credits: 3
Fabrication of resistors, capacitors, p-n junction and Schottky barrier diodes, BJT's and MOS devices and integrated circuits. Topics include: silicon structure, wafer preparation, sequential techniques in microelectronic processing, testing and packaging, yield and clean room environments. MOS structures, crystal defects, Fick's laws of diffusion; oxidation of silicon, photolithography including photoresist, development and stripping. Metallization for conductors, Ion implantation for depletion mode and CMOS transistors for better yield speed, low power dissipation and reliability. Students will fabricate circuits using the DSIP Laboratory.

EECE.4060 Antenna Theory and Design (Formerly 16.462/EECE.4620) - Credits: 3

EECE.4090 Directed Studies (Formerly 16.409) - Credits: 3
Provides an opportunity for qualified Electrical Engineering students to investigate specific areas of interest. The actual project undertaken may be software or hardware oriented. The most important characteristics of the projects are that the end results represent independent study, that they are research and development oriented, and that they are accomplished in an engineering environment. Design reviews and progress reports are expected for each project. A final formal report to be permanently filed in the EE Department is required for each project.

EECE.4100 Directed Studies (Formerly 16.410) - Credits: 1-3
The purpose of this course is to provide an opportunity for qualified Electrical Engineering students to investigate specific areas of interest. The actual project undertaken may be software or hardware oriented. The most important characteristics of the projects are that the end results represent independent study and that they are research and development oriented, and that they are accomplished in an engineering environment. Design reviews and progress reports are expected for each project. A final formal report to be permanently filed in the EE Department is required for each project.

EECE.4120 Directed Studies (Formerly 16.412) - Credits: 3
The purpose of this course is to provide an opportunity for qualified Electrical Engineering students to investigate specific areas of interest. The actual project undertaken may be software or hardware oriented. The most important characteristics of the projects are that the end results represent independent study and that they are research and development oriented, and that they are accomplished in an engineering environment. Design reviews and progress reports are expected for each project. A final formal report to be permanently filed in the EE Department is required for each project.

EECE.4130 Linear Feedback System (Formerly 16.413) - Credits: 3

EECE.4140 Integrated Power Systems (Formerly
16.414/514) - Credits: 3

Power System Operations and Electricity Markets provide a comprehensive overview to understand and meet the challenges of the new competitive highly deregulated power industry. The course presents new methods for power systems operations in a unified integrated framework combining the business and technical aspects of the restructured power industry. An outlook on power policy models, regulation, reliability, and economics is attentively reviewed. The course lay the groundwork for the coming era of unbundling, open access, power marketing, self-generation, and regional transmission operations.

EECE.4150 Power Electronics (Formerly 16.473/515 & EECE.4730/5150) - Credits: 3

A one-semester course with emphasis on the engineering design and performance analysis of power electronics converters. Topics include: power electronics devices (power MOSFETs, power transistors, diodes, silicon controlled rectifiers SCRs, TRIACs, DIACs and Power Darlington Transistors), rectifiers, inverters, ac voltage controllers, dc choppers, cycloconverters, and power supplies. The course includes a project, which requires that the student design and build one of the power electronics converters. A demonstrative laboratory to expose the students to all kinds of projects is part of the course.

EECE.4180 Wireless Communication (Formerly 16.418) - Credits: 3

Cellular systems and design principles, co-channel and adjacent channel interference, mobile radio propagation and determination of large scale path loss, propagation mechanisms like reflection, diffraction and scattering, outdoor propagation models, Okumura and Hata models, small scale fading and multipath, Doppler shift and effects, statistical models for multipath, digital modulation techniques QPSK, DPSK, GMSK, multiple access techniques, TDMA, FDMA, CDMA, spread spectrum techniques, frequency hopped systems, wireless systems and worldwide standards.

EECE.4210 Real Time Digital Signal Processing (Formerly 16.421) - Credits: 3

This course provides an introduction to real-time digital signal processing techniques using floating point and fixed point processors. The architecture, instruction set and software development tools for these processors will be studied via a series of C and assembly language computer projects where real-time adaptive filters, modems, digital control systems and speech recognition systems are implemented.

EECE.4230 Semiconductor Physics for Solid-State

Electronics (Formerly 16.423) - Credits: 3

The course covers fundamental solid-state and semiconductor physics relevant for understanding electronic devices. Topics include quantum mechanics of electrons in solids, crystalline structures, band theory of semiconductors, electron statistics and dynamics in energy bands, lattice dynamics and phonons, carrier transport, and optical processes in semiconductors.

EECE.4240 Computational Methods for Power System Analysis (Formerly 16.424/524) - Credits: 3

The course explores some of the mathematical and simulation tools used for the design, analysis and operation of electric power systems. Computational methods based on linear and nonlinear optimization algorithms are used to solve load flow problems, to analyze and characterize system faults and contingencies, and to complete economic dispatch of electric power systems. Real case studies and theoretical projects are assigned to implement the techniques learned and to propose recommendations. Different software applications will be used concurrently including ATP, PowerWorld Simulator, Aspen, MatLab with Simulink and Power System Toolbox, PSCAD, etc.

EECE.4250 Power Distribution System (Formerly 16.4440/EECE.4440) - Credits: 3

An intermediate course in analysis and operation of electrical power distribution systems using applied calculus and matrix algebra. Topics include electrical loads characteristics, modeling, metering, customer billing, voltage regulation, voltage levels, and power factor correction. The design and operation of the power distribution system components will be introduced: distribution transformers, distribution substation, distribution networks, and distribution equipment.

EECE.4260 Power Systems Stability and Control (Formerly 16.426/526) - Credits: 3


EECE.4270 Advanced VLSI Design Techniques (Formerly 16.427/527) - Credits: 3

This course builds on the previous experience with Cadence design tools and covers advanced VLSI design techniques for low power circuits. Topics covered include aspects of the
design of low voltage and low power circuits including process technology, device modeling, CMOS circuit design, memory circuits and subsystem design. This will be a research-oriented course based on team projects.

EECE.4280 Alternative Energy Sources (Formerly 16.428) - Credits: 3

PV conversion, cell efficiency, cell response, systems and applications. Wind Energy conversion systems: Wind and its characteristics; aerodynamic theory of windmills; wind turbines and generators; wind farms; siting of windmills. Other alternative energy sources: Tidal energy, wave energy, ocean thermal energy conversion, geothermal energy, solar thermal power, satellite power, biofuels. Energy storage: Batteries, fuel cells, hydro pump storage, flywheels, compressed air.

EECE.4290 Electric Vehicle Technology (Formerly 16.429) - Credits: 3

Electric vehicle VS internal combustion engine vehicle. Electric vehicle (EV) saves the environment. EV design, EV motors, EV batteries, EV battery chargers and charging algorithms, EV instrumentation and EV wiring diagram. Hybrid electric vehicles. Fuel cells. Fuel cell electric vehicles. The course includes independent work.

EECE.4300 Introduction to Medical Image Reconstruction - Credits: 3

This course provides both traditional and state-of-the-art tomographic reconstruction algorithms in a unified way. It includes analytic reconstruction, iterative reconstruction, and deep reconstruction based on the state-of-the-art deep learning techniques. This course provides fundamental knowledge for careers in medical image reconstruction.

EECE.4310 R F Design (Formerly 16.431) - Credits: 3

Two-port network parameters, Smith chart applications for impedance matching, transmission line structures like stripline, microstrip line and coaxial line, filter designs for low-pass, high-pass and band-pass characteristics, amplifier design based on s-parameters, bias network designs, one port and two port oscillator circuits, noise in RF systems.

EECE.4330 Electronic Materials (Formerly 16.333/EECE.3330) - Credits: 3

The production and processing of materials into finished products constitute a large part of the present economy. To prepare students for the use of a variety of traditional and new materials, this course will cover: atomic structure and chemical bonding, crystal geometry and defects, mechanical properties and phase diagrams of metals and alloys, electrical and optical properties of semiconductors, ceramics, and polymers; brief description of electronic, quantum electronic and photonic devices; benefits and difficulties of materials design with decreasing dimensions from millimeters to micrometers and to nanometers.

EECE.4410 Introduction to Biosensors (Formerly 16.441/541) - Credits: 3

This course introduces the theory and design of biosensors and their applications for pathology, pharmacogenetics, public health, food safety civil defense, and environmental monitoring. Optical, electrochemical and mechanical sensing techniques will be discussed.

EECE.4450 Analog Devices and Techniques (Formerly 16.445/565 & EECE.4450/5650) - Credits: 3

A survey of analog devices and techniques, concentrating on operational amplifier design and applications. Operational amplifier design is studied to reveal the limitations of real opamps, and to develop a basis for interpreting their specifications. Representative applications are covered, including: simple amplifiers, differential and instrumentation amplifiers, summers, integrators, active filters, nonlinear circuits, and waveform generation circuits. A design project is required.

EECE.4500 Advanced Digital System Design (Formerly 16.450) - Credits: 3

Design of logic machines. Finite state machines, gate array designs, ALU and 4 bit CPU unit designs, micro-programmed systems. Hardware design of advanced digital circuits using XILINX. Application of probability and statistics for hardware performance, and upgrading hardware systems. Laboratories incorporate specification, top-down design, modeling, implementation and testing of actual advanced digital design systems hardware. Laboratories also include simulation of circuits using VHDL before actual hardware implementation and PLDs programming.

EECE.4510 Heterogeneous Computing - Credits: 3

This course introduces heterogeneous computing architecture and the design and optimization of applications that best utilize the resources on such platforms. The course topics include heterogeneous computer architecture, offloading architecture/API, platform, memory and execution models, GPU/FPGA acceleration, OpenCL programming framework, Data Parallel C++ programming framework, performance analysis and optimization. Labs are included to practice design
methodology and development tools.

EECE.4520 Microprocessor Systems II & Embedded Systems (Formerly 16.480/EECE.4800) - Credits: 3

CPU architecture, memory interfaces and management, coprocessor interfaces, bus concepts, bus arbitration techniques, serial I/O devices, DMA, interrupt control devices. Including Design, construction, and testing of dedicated microprocessor systems (static and real-time). Hardware limitations of the single-chip system. Includes micro-controllers, programming for small systems, interfacing, communications, validating hardware and software, microprogramming of controller chips, design methods and testing of embedded systems.

EECE.4530 Software Engineering (Formerly 16.453) - Credits: 3

Introduces software life cycle models, and engineering methods for software design and development. Design and implementation, testing, and maintenance of large software packages in a dynamic environment, and systematic approach to software design with emphasis on portability and ease of modification. Laboratories include a project where some of the software engineering methods (from modeling to testing) are applied in an engineering example.

EECE.4550 Computer System Security - Credits: 3

An introduction to computer system security. This course introduces the threats and vulnerabilities in computer systems. This course covers the elementary cryptography, program security, security in operating system, database security, network, web, and e-commerce. It also covers some aspects of hardware security, legal, ethical and privacy issues in computer system security.

EECE.4560 Fundamentals of Robotics - Credits: 3

The material in this course is a combination of essential topics, techniques, algorithms, and tools that will be used in future robotics courses. Fundamental topics relevant to robots (linear algebra, numerical methods, programming) will be reinforced throughout the course using introductions to other robotics topics that are each worthy of a full semester of study (dynamics, kinematics, controls, planning, sensing). Students will program real robots to further refine their skills and experience the material fully.

EECE.4590 Introduction to Nanoelectronics (Formerly 16.459/559) - Credits: 3

This course introduces the use of nanomaterials for electronic devices such as sensors and transistors. Synthesis methods for nanoparticles, nanotubes, nanowires, and 2-D materials such as graphene will be covered. The challenges in incorporating nanomaterials into devices will also be discussed. These methods will be compared to techniques used in the semiconductor industry and what challenges, technically and financially, exist for their widespread adoption will be addressed. Finally, examples of devices that use nanomaterials will be reviewed. The course will have some hands on demonstrations.

EECE.4600 Biomedical Instrumentation (Formerly 16.460/560) - Credits: 3

A survey of biomedical instrumentation that leads to the analysis of various medical system designs and the related factors involved in medical device innovation. In addition to the technical aspects of system integration of biosensors and physiological transducers there will be coverage of a biodesign innovation process that can translate clinical needs into designs. A significant course component will be project-based prototyping of mobile health applications. The overall goals of the course are to provide the theoretical background as well as specific requirements for medical device development along with some practical project experience that would thereby enable students to design electrical and computer based medical systems.

EECE.4610 Engineering Electromagnetics II (Formerly 16.461) - Credits: 3

Continuation of Magnetostatics, Maxwell’s Equations for Time-varying Fields, plane waves: time-harmonic fields, polarization, current flow in good conductors and skin effect, power density and Poynting vector, wave reflection and transmission; Snell’s Law, fiber optics, Brewster angle, radiation and simple antennas, electromagnetic concepts involved in a topical technology in development.

EECE.4670 Special Topics (Formerly 16.467) - Credits: 3

Topics of current interest in Electrical and Computer Engineering. Subject matter to be announced in advance.

EECE.4680 Electro-optics & Integrated Optics (Formerly 16.468) - Credits: 3

An introduction to physical optics, electro-optics and integrated optics. Topics include: Waves and polarization, optical resonators, optical waveguides, coupling between waveguides, electro-optical properties of crystals, electro-optic modulators, Micro-Optical-Electro-Mechanical (MEMS) Devices and photonic and microwave wireless systems.
EECE.4690 VLSI Design (Formerly 16.469/502 & EECE.4690/5020) - Credits: 3

Introduction to CMOS circuits including transmission gate, inverter, NAND, NOR gates, MUXEs, latches and registers. MOS transistor theory including threshold voltage and design equations. CMOS inverter’s DC and AC characteristics along with noise margins. Circuit characterization and performance estimation including resistance, capacitance, routing capacitance, multiple conductor capacitance, distributed RC capacitance, multiple conductor capacitance, distributed RC capacitance, switching characteristics incorporating analytic delay models, transistor sizing and power dissipation. CMOS circuit and logic design including fan-in, fan-out, gate delays, logic gate layout incorporating standard cell design, gate array layout, and single as well as two-phase clocking. CMOS test methodologies including stuck-at-0, stuck-at-1, fault models, fault coverage, ATPG, fault grading and simulation including scan-based and self test techniques with signature analysis. A project of modest complexity would be designed to be fabricated at MOSIS.

EECE.4720 Embedded Real Time Systems (Formerly 16.472) - Credits: 3

Designing embedded real-time computer systems. Types of real-time systems, including foreground/background, non-preemptive multitasking, and priority-based pre-emptive multitasking systems. Soft vs. hard real time systems. Task scheduling algorithms and deterministic behavior. Ask synchronization: semaphores, mailboxes and message queues. Robust memory management schemes. Application and design of a real-time kernel. A project is required.

EECE.4760 Principles Of Solid State Devices (Formerly 16.474/EECE.4740) - Credits: 3

This course introduces the operating principles of Solid State Devices. Basic semiconductor science is covered including crystalline properties, quantum mechanics principles, energy bands and the behavior of atoms and electrons in solids. The transport of electrons and holes (drift and diffusion) and the concepts of carrier lifetime and mobility are covered. The course describes the physics of operation of several semiconductor devices including p-n junction diodes (forward/reverse bias, avalanche breakdown), MOSFETs (including the calculation of MOSFET threshold voltages), Bipolar transistor operation, and optoelectronic devices (LEDs, lasers, photodiodes).

EECE.4811 Operating Systems (Formerly 16.481/EECE.4810) - Credits: 3

Covers the components, design, implementation, and internal operations of computer operating systems. Topics include basic structure of operating systems, Kernel, user interface, I/O device management, device drivers, process environment, concurrent processes and synchronization, inter-process communication, process scheduling, memory management, deadlock management and resolution, and file system structures. Laboratories include examples of components design of a real operating systems.

EECE.4821 Computer Architecture and Design (Formerly 16.482/EECE.4820) - Credits: 3


EECE.4830 Network Design: Principles, Protocols & Applications (Formerly 16.483) - Credits: 3

Covers design and implementation of network software that transforms raw hardware into a richly functional communication system. Real networks (such as the Internet, ATM, Ethernet, Token Ring) will be used as examples. Presents the different harmonizing functions needed for the interconnection of many heterogeneous computer networks. Internet protocols, such as UDP, TCP, IP, ARP, BGP and IGMP, are used as examples to demonstrate how internetworking is realized. Applications such as electronic mail and the WWW are studied.

EECE.4841 Computer Vision and Digital Image Processing (Formerly 16.484/EECE.4840) - Credits: 3

Introduces the principles and the fundamental techniques for Image Processing and Computer Vision. Topics include programming aspects of vision, image formation and representation, multi-scale analysis, boundary detection, texture analysis, shape from shading, object modeling, stereo-vision, motion and optical flow, shape description and objects recognition (classification), and hardware design of video cards. AI techniques for Computer Vision are also covered. Laboratories include real applications from industry and the latest research areas.

EECE.4850 Fundamentals of Network and Cyber Security - Credits: 3

This course will cover two categories of topics: One part is the fundamental principles of cryptography and its applications to cyber & network security in general. This part focuses on
cryptography algorithms and the fundamental cyber & network security enabling mechanisms. Topics include cyber-attack analysis and classifications, public key cryptography (RSA, Diffie-Hellman), secret key cryptography (DES, IDEA), Hash (MD2, MD5, SHA-1) algorithms, key distribution and management, security handshake pitfalls and authentications, and well-known cyber & network security protocols such as Kerberos, IPSec, SSL/SET, PGP & PKI, WEP, etc. The second part surveys unique challenges and the general security & Privacy solutions for the emerging data/communication/information/computing networks (e.g., Ad Hoc & sensor network, IoTs, cloud and edge computing, big data, social networks, cyber-physical systems, critical infrastructures such as smart grids and smart transportation systems, etc.).

EECE.4900 Fiber Optic Communication (Formerly 16.490) - Credits: 3
Optical fiber; waveguide modes, multimode vs single mode; bandwidth and data rates; fiber losses; splices, couplers, connectors, taps and gratings; optical transmitters; optical receivers; high speed optoelectronic devices; optical link design; broadband switching; single wavelength systems (FDDI, SONET, ATM); coherent transmission; wavelength division multiplexing and CDMA; fiber amplifiers.

EECE.4991 Capstone Project (Formerly 16.499) - Credits: 3
The objective of this course is to execute the project defined in Capstone Proposal. The design of the project will be completed, prototyped, tested, refined, constructed and delivered to the client. Practical experience will be gained in solving engineering problems, designing a system to meet technical requirements, using modern design elements and following accepted engineering practices. Students will work in a team environment and deliver the completed system to the project client. Proper documentation of activities is required.
Educational Objectives and Learning Outcomes

Program Educational Objectives

are defined as the expected accomplishments of graduates of the program in the first few years after graduation. Graduates of the BSE Industrial Engineering program at the University of Massachusetts at Lowell will be able to:

• Pursue successful careers, in mechanical engineering or related fields, that sustain or improve socio-economic levels for themselves and their families and/or enhance personal fulfillment.
• Engage in continuing education and development in their professional field.
• Engage in service activities, related to their profession, that benefit society and the community.
• Continually evaluate their professional actions in light of their personal and professional ethics.
• Apply the principles of sustainable engineering in their professional careers.

The student outcomes for the BSE degree in industrial engineering at UMass Lowell are as follows. At graduation students should:

• Be able to apply the principles of advanced engineering math and science to the solution of problems in engineering.
• Be able to design and conduct experiments, as well as to analyze and interpret data.
• Be able to design, build, and test a system, component, or process to meet required needs.
• Be able to integrate the use of modern computer-based engineering tools into engineering practice.
• Be able to communicate effectively and function on multi-disciplinary teams.
• Understand the need to assess the impact of engineering designs on society. This should include factors such as economics, ergonomics, the environment, and sustainability.
• Understand the concept of the engineering profession through an exposure to professional societies, professional registration, the need for lifelong learning, and professional ethics.

Educational Objectives and Learning Outcomes

Program Educational Objectives

are defined as the expected accomplishments of graduates of the program in the first few years after graduation. Graduates of the BSE Mechanical Engineering program at the University of Massachusetts at Lowell will be able to:

1. pursue successful careers, in mechanical engineering or related fields, that enhance personal fulfillment and contribute positively to society and their communities.
2. engage in lifelong continuing education and development in their professional field.
3. engage in service activities, related to their profession, that benefit society and their communities.
4. continually evaluate their professional actions in light of their personal and professional ethics.
5. apply the principles of sustainable engineering in their professional careers.
6. effectively participate in and collaborate with local, national and international inter/multidisciplinary/cross-cultural teams.

The student outcomes for the BSE degree in mechanical engineering at UMass Lowell are as follows. At graduation students should:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of
engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies
8. an ability to integrate the use of modern computer-based engineering tools into engineering practice

Suggested Degree Pathway for Mechanical Engineering

For students who entered fall 2015 to spring 2022.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<td>CHEM.1210L (<a href="https://www.uml.edu/catalog/courses/CHEM/1210L">https://www.uml.edu/catalog/courses/CHEM/1210L</a>)</td>
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Spring Semester

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Sophomore Year

Fall Semester

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<td>Statics2</td>
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<td>MECH.2960 (<a href="https://www.uml.edu/catalog/courses/MECH/2960">https://www.uml.edu/catalog/courses/MECH/2960</a>)</td>
<td>Materials Science for Engineers 2</td>
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<td>Calculus III</td>
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<td>PHYS.2450 (<a href="https://www.uml.edu/catalog/courses/PHYS/2450">https://www.uml.edu/catalog/courses/PHYS/2450</a>)</td>
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Spring Semester

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<td>MECH.2020 (<a href="https://www.uml.edu/catalog/courses/MECH/2020">https://www.uml.edu/catalog/courses/MECH/2020</a>)</td>
<td>Manufacturing Laboratory2</td>
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<td>ENGN.2060 (<a href="https://www.uml.edu/catalog/courses/ENGN/2060">https://www.uml.edu/catalog/courses/ENGN/2060</a>)</td>
<td>Strength of Materials2</td>
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<td>ENGN.2070</td>
<td>Dynamics2</td>
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### Junior Year

#### Fall Semester

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<td>MECH.3810</td>
<td>Fluid Mechanics2</td>
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<td>MECH.3210</td>
<td>Kinematics of Mechanisms (CTPS)2</td>
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<td>MECH.3610</td>
<td>Math Methods MEs</td>
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<td>PHIL.2030</td>
<td>Intro to Ethics / Engineering Ethics (AH), (SRE)</td>
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### Senior Year

#### Fall Semester

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<tr>
<td>MECH.4410</td>
<td>Thermo-Fluid Applications</td>
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<td>MECH.4030</td>
<td>Thermal Fluids Lab (QL)</td>
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<td>MECH.4510</td>
<td>Dynamic Systems</td>
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<td>MECH.4250</td>
<td>Des. Mach. Elements</td>
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<td>MECH.4730</td>
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#### Spring Semester

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<tr>
<td>MECH.4230</td>
<td>Capstone Design (IL), (WOC), (AIL)</td>
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<tr>
<td>MECH.4420</td>
<td>Thermo-Fluid Systems Design (DCA)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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<tr>
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</table>

**Total Minimum Credits = 127**
Technical electives must be taken at the 4000 level or above in engineering (MECH.xxxx, CIVE.xxxx, PLAS.xxxx, BMEN.xxxx, CHEN.xxxx, EECE.xxxx). Technical electives can also be taken at the 3000 level or above in math (excluding MATH.3630, MATH.4100, MATH.4190, MATH.4350, and MATH.4660), physics, or other science discipline.

Students entering after Fall 2009 must achieve C- (C minus) or better in MECH.2010, MECH.2020, ENGN.2050, ENGN.2060, or MECH.2420 before attempting subsequent courses in the prerequisite chain.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS. If you need assistance, please contact your advisor.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

**Last Updated: 11/08/2021**

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### Suggested Degree Pathway for Industrial Engineering

**For students who entered fall 2020 and beyond.**

#### Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
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<tr>
<td>CHEM.1210</td>
<td>Chemistry 1 (SCL)</td>
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<td>Chemistry 1 Lab (SCL)</td>
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<td>IENG.1010</td>
<td>Introduction to Industrial Engineering</td>
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<tr>
<td>MATH.1310</td>
<td>Calculus I (MATH)</td>
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<td>Social Sciences Persp. (SS), (DCA recommended)1</td>
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**Total**: 16

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#### Spring Semester

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<tr>
<td>CHEM.1210</td>
<td>Chemistry 1 (SCL)</td>
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<tr>
<td>CHEM.1230</td>
<td>Chemistry 1 Lab (SCL)</td>
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<td>IENG.1010</td>
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**Total**: 16
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Junior Year

Fall Semester

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<td>EECE.2650 (<a href="https://www.uml.edu/catalog/courses/EECE/2650">https://www.uml.edu/catalog/courses/EECE/2650</a>)</td>
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Spring Semester

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<td>Operations Management</td>
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Arts and Hum. Persp. (AH)  3

Total  15

Senior Year

Fall Semester

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<td>ENGN.4019</td>
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<td>IENG.4010</td>
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Spring Semester

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<tr>
<td>IENG.4041</td>
<td>Manufacturing Systems Automation Lab</td>
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<td>IENG.4080</td>
<td>Human-Machines Systems Design</td>
<td>3</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Technical Elective2</td>
<td>3</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Mgmt or Technical Elective2</td>
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<tr>
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</table>

Total Minimum Credits = 127

Industrial Engineering majors must take one course that meets the Core Curriculum Essential Learning Outcome of Diversity and Cultural Awareness (DCA); students must select at least one Breadth of Knowledge course in either Arts and Humanities or Social Sciences that has been approved for DCA. Please see the DCA course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a complete list of classes that fulfill this requirement.

Technical electives must be taken at the 4000 level or above in engineering. Technical electives can also be taken at the 3000 level or above in math (excluding MATH.3630 (https://www.uml.edu/catalog/courses/MATH/3630), MATH.4100 (https://www.uml.edu/catalog/courses/MATH/4100), MATH.4190 (https://www.uml.edu/catalog/courses/MATH/4190), MATH.4350 (https://www.uml.edu/catalog/courses/MATH/4350), and MATH.4660 (https://www.uml.edu/catalog/courses/MATH/4660)), physics, or other science discipline.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS (https://www.uml.edu/Enrollment/SiS/default.aspx). If you need assistance, please contact your advisor.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last Updated: 12/02/2021

Suggested Degree Pathway for Mechanical Engineering

For students who entered fall 2022 and beyond.
### Freshman Year
**Fall Semester**

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>MECH.1070</td>
<td>Intro to Mechanical Engineering</td>
<td>2</td>
</tr>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
</tr>
<tr>
<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
<td>3</td>
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<tr>
<td>CHEM.1230L</td>
<td>Chemistry I Lab (SCL)</td>
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<tr>
<td>MATH.1310</td>
<td>Calculus I (MATH)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
<td>3</td>
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### Spring Semester

<table>
<thead>
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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
<td>3</td>
</tr>
<tr>
<td>MATH.1320</td>
<td>Calculus II (STEM)</td>
<td>4</td>
</tr>
<tr>
<td>PHYS.1410</td>
<td>Physics I (SCL)</td>
<td>3</td>
</tr>
<tr>
<td>PHYS.1410L</td>
<td>Physics I Lab (SCL)</td>
<td>1</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
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<td><strong>Total</strong></td>
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### Sophomore Year
**Fall Semester**

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<tbody>
<tr>
<td>MECH.2010</td>
<td>Computing Aided Design2</td>
<td>2</td>
</tr>
<tr>
<td>ENGN.2050</td>
<td>Statics2</td>
<td>3</td>
</tr>
<tr>
<td>MECH.2960</td>
<td>Materials Science for Engineers 2</td>
<td>3</td>
</tr>
<tr>
<td>MATH.2310</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>PHYS.2450</td>
<td>Physics of Matter</td>
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</tr>
<tr>
<td>PHYS.2450L</td>
<td>Physics III Lab</td>
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### Junior Year
**Fall Semester**

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<tbody>
<tr>
<td>PHYS.1440</td>
<td>Physics II</td>
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<td>PHYS.1440L</td>
<td>Physics II Lab</td>
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<tr>
<td>MECH.3810</td>
<td>Fluid Mechanics2</td>
<td>3</td>
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<tr>
<td>Course#</td>
<td>Course Name</td>
<td>C r.</td>
</tr>
<tr>
<td>------------</td>
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<tr>
<td>MECH.3020</td>
<td>Instrumentation and Measurement Lab</td>
<td>3</td>
</tr>
<tr>
<td>MECH.3220</td>
<td>Control of Mechanical Systems2</td>
<td>3</td>
</tr>
<tr>
<td>MECH.3820</td>
<td>Heat Transfer2</td>
<td>3</td>
</tr>
<tr>
<td>MECH.3110</td>
<td>Applied Strength of Materials2</td>
<td>3</td>
</tr>
<tr>
<td>ECON.2010</td>
<td>Principles of Microeconomics/ Principles of Macroeconomics( SS)</td>
<td>3</td>
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**Spring Semester**

<table>
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<tr>
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<th>Course Name</th>
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<tbody>
<tr>
<td>MECH.4230</td>
<td>Capstone Design (IL), (WOC), (AIL)</td>
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<tr>
<td>MECH.4420</td>
<td>Thermo-Fluid Systems Design (DCA)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>ME Tech. Elective1</td>
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<td>xxxx.xxxx</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
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<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

**Total Minimum Credits = 127**


2Students entering after Fall 2009 must achieve C- (C minus) or better in MECH.2010 (https://www.uml.edu/catalog/courses/MECH/2010), MECH.2020
Enter Fall 2014, and later, must achieve a C- in these courses before attempting a subsequent course in the prerequisite chain.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS. If you need assistance, please contact your advisor.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

Last Updated: 11/08/2021
MECH.1010 Kinetic Projects - Credits: 3
Kinetic Projects is a hybrid course designed for a variety of majors to explore the intersections between mechanical engineering and sculpture. In this project-driven class, students will learn principles and practice in both the fields of engineering and art, and put them into practice by creating functioning kinetic objects to be displayed in a public setting. The course will also include guest lectures from practitioners in Art and Engineering. The course also provides an introduction to technical communications, teamwork, data analysis, computer coding, and introduction to CAD prototyping, report-writing and/or oral presentation.

MECH.1070 Introduction to Mechanical Engineering (Formerly 22/25.107) - Credits: 2
This course provides a hands-on introduction to mechanical engineering and the engineering design process. Through assignments and projects, students learn how to: identify a problem, develop alternative solutions, select the best alternative, make critical decisions, and work as a team. Lecture and lab component.

MECH.1CO-OP Curricula Practical Training - Credits: 0-1
Curricula Practical Training. "Variable credit course, student chooses appropriate amount of credits when registering."

MECH.2000 Mechanical Engineering Project I (Formerly 22.200) - Credits: 1
Students work on engineering design/build/test (DBT) projects under the supervision of a mechanical engineering faculty member. Projects can include student club based DBT projects.

MECH.2010 Computer Aided Design (Formerly 22.201) - Credits: 2
Course emphasis is on introducing the use of computer aided design tools in the engineering problem solving process. Assigned design projects require the use of both wire frame and solid modeling tools. Lecture and lab activities are used to support project requirements, and to provide more in-depth understanding of computer aided engineering design and drawing.

MECH.2020 Manufacturing Laboratory (Formerly 22.202) - Credits: 2
This is an introductory course in manufacturing processes covering the basic machine tool practices utilized in the manufacturing of a product. The objective of the course is to develop a broad understanding of manufacturing operations and their relationship to engineering product design. Students manufacture, fabricate and measure the accuracy of a mechanical assembly from design drawings, using lathes, milling machines, drill presses and other conventional processes.

MECH.2420 Thermodynamics (Formerly 22.242) - Credits: 3
The first and second laws of thermodynamics are introduced and applied to the analysis of thermodynamic systems in terms of work, heat, energy transformation, and system efficiency. The use of tables, graphs, and equations of state is introduced to obtain various properties of pure substances. The concepts of work, heat and energy, as well as their relationships, are studied. The theory and application of reversible and irreversible thermodynamic process, Carnot cycles, and entropy are studied in relation to the energy analysis of engineering systems. Energy balances and ideal efficiencies of steady flow engineering systems are analyzed.

MECH.2960 Materials Science for Engineers (Formerly 22.296) - Credits: 3
Properties and characterization of engineering materials. The behavior of engineering materials is studied experimentally to develop an understanding of properties important in materials selection and engineering design. Structure-property-processing relationships are discussed. Topics include stress, strain, strength, stiffness, thermal expansion, hardness, tensile and bending tests, strain gages, corrosion, microstructure of metals, polymers, ceramics and composites.

MECH.3000 Mechanical Engineering Project II (Formerly 22.300) - Credits: 1
Students work on engineering design/build/test (DBT) projects under the supervision of a mechanical engineering faculty member. Projects can include student club based DBT projects.

MECH.3020 Instrumentation and Measurement Laboratory (Formerly 22.302) - Credits: 3
Students set up and conduct specific experiments designed to study: 1) fundamental ME instrumentation systems; 2) fundamental experimental techniques and 3) basic physical principles of mechanical systems. Experiments are divided into two areas; solid-mechanical and thermo-fluids. Students develop models for use in validating and comparing with experimental results. Written communication techniques are emphasized.
MECH.3110 Applied Strength of Materials (Formerly 22.311) - Credits: 3

Strength of materials principles are applied to the stress analysis of machine components and structures. The effects of buckling and combined bending, torsion, and axial loadings are studied together with the effects of stress risers due to geometrical complexities. Topics include: 3D stress transformations; principal stresses; Mohr's circle; failure criteria; torsion of non-circular and hollow cross sections; stress concentration factors; equilibrium and energy method; global and local buckling; introduction to finite element methods; introduction to composites.

MECH.3210 Kinematics of Mechanisms (Formerly 22.321) - Credits: 3

Design and kinematic analysis of mechanisms. Course topics include: synthesis and motion analysis (position, velocity, acceleration), cam, gear, and power train design, and technical communication. This course meets the Essential Learning Outcome of Critical Thinking and Problem Solving as defined under the Core Curriculum requirements. As such, the course will reinforce the students’ ability to identify, analyze, interpret, and evaluate arguments, data, evidence, problems, and conclusions as part of formulating an opinion or conclusion, and then use that information to design, evaluate and implement a strategy to achieve a desired outcome.

MECH.3220 Control of Mechanical Systems (Formerly 22.322) - Credits: 3

Design of cams and gears and control of mechanical devices. Course topics include: cam sizing and manufacture, cam and gear train kinematics, dynamic force analysis, machine balancing, introduction to the control of mechanical systems. The major project involves the design, analysis, manufacture, and dynamic testing of a cam having specified performance requirements; computer aided design (CAD) and computer numerically controlled (CNC) milling machines are applied. Dynamic simulation (MATLAB) is used throughout the course.

MECH.3230 Control of Automated Systems - Credits: 3

Control of various elements of automated and cyber-physical systems. Course topics include: introduction to modeling in continuous and discrete time, ordinary differential and difference equations, transfer functions, noise modeling and digital filtering, introduction to feedback control, and PID controller design and tuning. Course will also include discussion of case studies related to the security, stability, safety, reliability, and ethics of automated systems, with focus on diagnostics and prognostics. This course will rely on project-based learning to evaluate outcomes.

MECH.3410 Conduction & Radiation Heat Transfer (Formerly 22.341) - Credits: 3

The theory of steady state and transient heat conduction in solids is developed and applied. The concepts of Biot and Fourier numbers are covered and their applications are studied. The principals of thermal radiation with application to heat exchange between black and non-black body surfaces are studied. The use of radiation networks (electrical network analogy) is examined. Surface radiation properties are extensively covered. Design projects are integrated into the course.

MECH.3420 Convective Processes (Formerly 22.342) - Credits: 3

Internal and external flows with friction, Reynold’s number, laminar and turbulent flows. Mathematical development of the hydrodynamic boundary layer. Boundary layer separation and fluid dynamic drag. Flow in pipes. Forced and free convective heat transfer, the thermal boundary layer, Reynolds’ analogy, Prandtl and Grashof numbers. Empirical engineering convection relations. Students engage in a design project throughout the term.

MECH.3610 Mathematical Methods for Mechanical Engineers (Formerly 22.361) - Credits: 3

This course focuses on the application of a variety of mathematical techniques to solve engineering problems. Topics include, error analysis, root finding, optimization, linear algebra, solutions to linear and non-linear systems, statistics, curve fitting, eigen value analysis, Fourier analysis, numerical integration and differentiation as well as numerical solutions to ordinary differential equations. MATLAB program development and modification as well as application of existing codes are required.

MECH.3810 Fluid Mechanics (Formerly 22.381) - Credits: 3

A calculus-based engineering course which deals with the development of basic fluid mechanic relations. Emphasis is placed on the control-volume approach for solving problems. Topics includes fluid behavior and fluid properties: hydrostatic pressure and forces; buoyancy and stability; continuity, momentum, and Bernoulli equations; similitude and dimensional analysis; scale analysis and modeling; internal and external flows with friction; Reynolds number; laminar and turbulent flows; mathematical development of the hydrodynamic boundary layer; boundary layer separation and fluid dynamic drag; fluid flow in pipes and ducts.; friction and
minor losses.

MECH.3820 Heat Transfer (Formerly 22.382) - Credits: 3
A calculus-based engineering course providing treatment of the fundamental modes of heat transfer. Topics include: steady-state and transient heat conduction in solids; forced and natural convection; the concept of thermal boundary layer; scale analysis and dimensionless number such as Reynolds, Prandtl, and Grashof numbers; Reynolds analogy; empirical engineering convection relations; thermal radiation involving heat exchange between black and non-black body surfaces.

MECH.4000 Mechanical Engineering Project III (Formerly 22.400) - Credits: 1
Students work on engineering design/build/test (DBT) projects under the supervision of a mechanical engineering faculty member. Projects can include student club based DBT projects. Completion of 22.400, 22.300, and 22.200 can count as a mechanical engineering technical elective (academic petition required).

MECH.4030 Thermal Fluids Laboratory (Formerly 22.403) - Credits: 3
Continuation of Mechanical Engineering Lab I. Focuses on digital data acquisition systems used on mechanical engineering equipment. Students design measurement systems composed of various transducers, their associated signal conditioners and digital data acquisition and recording devices. Statistical methods are emphasized. Experiments require the students to provide calibration and to select appropriate sampling rates and test durations. Systems under test range from simple multisensor laboratory apparatus to actual operating mechanical systems. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

MECH.4040 Advanced Mechanical Dynamic Measurement Systems (Formerly 22.404) - Credits: 3
This course is an extension of 22.302 Mechanical Engineering Lab I, and extends the laboratory measurements for a wide variety of dynamic systems applications including first order and second order systems using both time domain and frequency domain approaches for the measurement and analysis of dynamic response. Lectures will delve into more depth on time domain digital signal processing (extending the ME lab I course material) and progress into frequency domain representations of time response. This course counts as a mechanical engineering technical elective.

MECH.4230 Capstone Design (Formerly 22.423) - Credits: 3
Students perform independent design work and participate in team efforts to develop conceptual designs from functional requirements. Perform design analysis and synthesis, modeling, fabrication, testing, cost estimating, and documenting the essential elements of the system design. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL), Information Literacy (IL), and Written & Oral Communication (WOC).

MECH.4250 Design of Machine Elements (Formerly 22.425) - Credits: 3
The principles of mechanics and commonly used failure theories are applied to the design and analysis of machine elements subjected to static and dynamic (fatigue) load conditions. Elements studied include power screws, bolts, springs, bearings, gears, lubrication, shafts, brakes, clutches, and belts.

MECH.4260 Green Energy Engineering (Formerly 22.426) - Credits: 3
Introduces a comprehensive range of green energy sources, and the tools and techniques to use that energy. A strong emphasis is given to residential applications, particularly those that are cost effective. Topics include solar energy, photovoltaic, water power, wind power, geothermal heating, and bio-fuel production and use. Course will also investigate architectural considerations essential to effective implementation of green energy. Course is open to Seniors in engineering and science and those with a solid knowledge of vector notations and college algebra. Familiarity with the MATLAB computing environment would be useful.

MECH.4280 Fundamentals of Engineering (ME) Review (Formerly 22.428) - Credits: 3
This is a review course for students planning on taking the Mechanical Engineering version of the Fundamentals of Engineering (FE) Exam. Lectures will review theory, and students will be required to complete representative multiple-choice practice and test questions. Subject areas to be covered are as follows: mathematics and statistics, computers, ethics and economics, electromagnetism, engineering mechanics, materials, thermal fluids, measurement and instrumentation, dynamic systems and controls, and ME design and analysis. FE exam protocols will also be reviewed. The course counts as a mechanical engineering technical elective. Taking and /or passing the FE exam is not required in order to pass this course.

MECH.4410 Thermo-fluid Applications (Formerly 22.441) - Credits: 3
...
22.441) - Credits: 3
Topics covered include: heat exchanger analysis and design; thermodynamic analysis of: gas power cycles, steam and combined cycles, and refrigeration cycles; mixtures of ideal gases; air-vapor mixtures and psychrometric charts with application to air conditioning systems; flow of a compressible fluid through a variable area passage: Mach number, choking conditions, and normal shock.

MECH.4420 Thermo-fluid Systems Design (Formerly 22.442) - Credits: 3
Application of the principles of thermodynamics, fluid mechanics and heat transfer to the design of thermo-fluid systems. Techniques will be presented for modeling, simulation, and economic analysis. The evolution of thermo-fluid systems from the Industrial Revolution to state-of-the-art systems as well as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability of systems will be studied. Use and regulation of thermo-fluid systems on a global and regional scale will be investigated. Systems to be studied and designed include combined power cycles, trigeneration (combined power, heating, and cooling) as well as energy storage systems.

MECH.4510 Dynamic Systems Analysis (Formerly 22.451) - Credits: 3
Dynamic modeling of mechanical, electrical, electromechanical, hydraulic and thermal components. Application of ordinary differential equations, Laplace transforms, and numerical simulation for the response of these systems; response due to initial conditions and to transient and sinusoidal inputs using both time and frequency domain approaches considered. Use of block diagrams and numerical simulation using MATLAB and Simulink for linear time invariant systems is emphasized. Project work includes model identification and synthesis from measured data for first and second order systems.

MECH.4530 Mechatronics (Formerly 22.453) - Credits: 3
Devices and methods to monitor and control mechanical systems, with particular emphasis on the use of embedded microprocessors.

MECH.4730 Design Theory and Constraints (Formerly 22.473) - Credits: 3
Concepts of world class design and manufacturing of modern products, including the issues of Design for Quality (DFQ), cost and the customer will be studied. Tools and techniques to be studied include Total Quality Management (TQM), statistical process control, process capability studies, six sigma quality, design efficiency ratings, design for cost, design of experiments, Analysis of Variance (ANOVA) of the mean and signal-to-noise ratio, and quality function deployment. Industrial case studies are used and student project work is required.

MECH.4830 Aerodynamics and Flight Mechanics (Formerly 22.483) - Credits: 3

MECH.4860 Ocean Engineering (Formerly 22.486) - Credits: 3

MECH.4910 Industrial Experience I (Formerly 22.491) - Credits: 1-3
MECH.4920 Industrial Experience II (Formerly 22.492) - Credits: 3
MECH.4930 Industrial Experience III (Formerly 22.493) - Credits: 3-9
MECH.4991 Directed Studies in Mechanical Engineering (Formerly 22.499) - Credits: 1-3
This course provides seniors in Mechanical Engineering with the opportunity to pursue the study of a technical topic or project, individually under the supervision of a faculty member and, if desired, a responsible project engineer from industry. The course is to result in a term paper or technical report.

MTEC.2030 Introduction to Automated Control Programming - Credits: 1-3
This course is designed to introduce machine tool programming languages and their use in modern manufacturing. Emphasis will be placed upon students developing a formal understanding of the programming variables and constraints of Computer-Numerically Controlled
manufacturing systems. Students will learn both introductory and advanced programming methods. Students will learn manual programming techniques developed from engineering drawings. Students will also learn manual programming techniques developed from engineering drawings. Students will also learn to use computer-based CAM software systems as well as computer based programming verification software. Mastercam, Esprit CAM, Autodesk CAM will be introduced in the course as exemplars of CAM software platforms. Vericut will be introduced as an exemplar of verification software.

MTEC.2040 Manufacturing Technology Laboratory (Formerly 23.301/MTEC.3010) - Credits: 2

Students will develop an understanding of precision metrology and the machine tools, related equipment, and systems used in manufacturing. Students will learn the inter-relationships between machine tools, various machining methods, engineering design considerations, and manufacturing techniques studied in the MET program. Lecture, case studies, and laboratory work are supported by a comprehensive text with supplemental materials provided by the instructor to enhance student learning. Students will work with lathes, drill presses, vertical milling machines, and abrasive finishing methods during laboratory sessions to manufacture several precision finished parts from engineering drawings. Course grades will be determined from student performance on examinations and laboratory projects.
Learning Outcomes and Educational Objectives

The primary objective of the Plastics Engineering Program is to provide a well-rounded engineering education that prepares our graduates to be readily employable professionals for a successful lifetime career. The curriculum aims to foster professionalism, ethics and safety with the highest standard of academic excellence in plastics engineering amidst a caring environment for students of diverse backgrounds with these

Program Educational Objectives:

- Graduates are expected to attain successful careers and be supportive of people with diverse backgrounds.
- Graduates are expected to pursue lifelong learning that addresses, from concept to commercialization, the design and manufacture of plastic products.
- Graduates are expected to apply theoretical knowledge and practical skills so that they make positive contributions.
- Graduates are expected to attain project/team leadership skills, allowing them to pursue advanced degrees in support of technical and managerial careers.
- Graduates are expected to recognize and adapt to emerging issues in Plastics Engineering such as globalization, environmental concerns, and sustainability.

Plastics Engineering graduates shall meet the student outcomes requirements of ABET Criterion 3 as follows:

- an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- an ability to communicate effectively with a range of audiences
- an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
- an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
- an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Plastics Electives

The Plastics Engineering Department offers electives that have a technical focus, a materials focus, or a design focus. Please use the links below to see what courses satisfy the requirements for each.

- Technical Electives
- Materials Electives
- Design Electives

Technical Electives

During the senior year, students are required to take a "technical" elective. Students can select a course from the course list below. Some courses are available only when there is sufficient demand. As an alternative, students can take an upper level technical course offered by another College of Engineering Department if it is approved by the Plastics Engineering chairperson and the student’s advisor. Plastics Engineering students doing a Minor in Business Administration should take either PLAS.5400 (https://www.uml.edu/catalog/courses/PLAS/5400) or PLAS.5900 (https://www.uml.edu/catalog/courses/PLAS/5900) for their technical elective.

- PLAS.5090 (https://www.uml.edu/catalog/courses/PLAS/5090) Plastics Processing Theory I
- PLAS.5110 (https://www.uml.edu/catalog/courses/PLAS/5110) Polymer Blends
• PLAS.5120
  (https://www.uml.edu/catalog/courses/PLAS/5120)
  Porous Polymers
• PLAS.5130
  (https://www.uml.edu/catalog/courses/PLAS/5130)
  New Plastics Materials
• PLAS.5140
  (https://www.uml.edu/catalog/courses/PLAS/5140)
  Statistics for Six Sigma
• PLAS.5150
  (https://www.uml.edu/catalog/courses/PLAS/5150)
  Lean Plastics Manufacturing
• PLAS.5240
  (https://www.uml.edu/catalog/courses/PLAS/5240)
  Process Analysis, Instrument and Control
• PLAS.5320
  (https://www.uml.edu/catalog/courses/PLAS/5320)
  Adhesives and Adhesion
• PLAS.5330
  (https://www.uml.edu/catalog/courses/PLAS/5330)
  Coatings Science and Technology I
• PLAS.5340
  (https://www.uml.edu/catalog/courses/PLAS/5340)
  Coatings Science and Technology II
• PLAS.5350
  (https://www.uml.edu/catalog/courses/PLAS/5350)
  Rubber Technology
• PLAS.5370
  (https://www.uml.edu/catalog/courses/PLAS/5370)
  Business Law for Engineers
• PLAS.5400
  (https://www.uml.edu/catalog/courses/PLAS/5400)
  Commercial Development of Plastics
• PLAS.5410
  (https://www.uml.edu/catalog/courses/PLAS/5410)
  Computer Applications in Plastics
• PLAS.5420
  (https://www.uml.edu/catalog/courses/PLAS/5420)
  Colloidal Nanoscience and Nanoscale Engineering
• PLAS.5450
  (https://www.uml.edu/catalog/courses/PLAS/5450)
  Additives for Polymer Materials
• PLAS.5470
  (https://www.uml.edu/catalog/courses/PLAS/5470)
  Materials for Renewable Energy and Sustainability
• PLAS.5480
  (https://www.uml.edu/catalog/courses/PLAS/5480)
  Analytical and Numerical Methods in Plastics Processing
• PLAS.5490
  (https://www.uml.edu/catalog/courses/PLAS/5490)
  Product Design for Elastomers
• PLAS.5500
  (https://www.uml.edu/catalog/courses/PLAS/5500)
  Processing with Elastomers
• PLAS.5510
  (https://www.uml.edu/catalog/courses/PLAS/5510)
  Extrusion Die Design
• PLAS.5520
  (https://www.uml.edu/catalog/courses/PLAS/5520)
  Machine Design
• PLAS.5530
  (https://www.uml.edu/catalog/courses/PLAS/5530)
  Medical Device Design I
• PLAS.5540
  (https://www.uml.edu/catalog/courses/PLAS/5540)
  Medical Device Design II
• PLAS.5650
  (https://www.uml.edu/catalog/courses/PLAS/5650)
  Thermosets
• PLAS.5660
  (https://www.uml.edu/catalog/courses/PLAS/5660)
  Polymer Materials Systems Solution
• PLAS.5680
  (https://www.uml.edu/catalog/courses/PLAS/5680)
  Dynamic Mechanical Properties II
• PLAS.5750
  (https://www.uml.edu/catalog/courses/PLAS/5750)
  Biomaterials I
During the junior year, Plastics Engineering students are required to take a "materials" elective. Students can select a course from the course list below. Some courses are available only when there is sufficient demand. Students can take an upper level design course offered by another College of Engineering Department (e.g. material science, composites.) if it is approved by the Plastics Engineering chairperson and the student's advisor.

- **PLAS.5110**
  (https://www.uml.edu/catalog/courses/PLAS/5110)
  Polymer Blends

- **PLAS.5120**
  (https://www.uml.edu/catalog/courses/PLAS/5120)
  Porous Polymers

- **PLAS.5130**
  (https://www.uml.edu/catalog/courses/PLAS/5130)
  New Plastics Materials

- **PLAS.5320**
  (https://www.uml.edu/catalog/courses/PLAS/5320)
  Adhesives and Adhesion

- **PLAS.5330**
  (https://www.uml.edu/catalog/courses/PLAS/5330)
  Coatings Science and Technology I

- **PLAS.5350**
  (https://www.uml.edu/catalog/courses/PLAS/5350)
  Rubber Technology

- **PLAS.5400**
  (https://www.uml.edu/catalog/courses/PLAS/5400)
  Commercial Development of Plastics

- **PLAS.5420**
  (https://www.uml.edu/catalog/courses/PLAS/5420)
  Colloidal Nanoscience and Nanoscale Engineering

- **PLAS.5450**
  (https://www.uml.edu/catalog/courses/PLAS/5450)
  Additives for Polymer Materials

- **PLAS.5470**

**Materials Electives**

- **PLAS.5760**
  (https://www.uml.edu/catalog/courses/PLAS/5760)
  Advanced Mold Design

- **PLAS.5790**
  (https://www.uml.edu/catalog/courses/PLAS/5790)
  Problems in Biomaterials Directed Studies

- **PLAS.5850**
  (https://www.uml.edu/catalog/courses/PLAS/5850)
  Computer Aided Engineering I

- **PLAS.5890**
  (https://www.uml.edu/catalog/courses/PLAS/5890)
  Polymer Nanocomposites

- **PLAS.5900**
  (https://www.uml.edu/catalog/courses/PLAS/5900)
  Survey of Intellectual Property

- **PLAS.5950**
  (https://www.uml.edu/catalog/courses/PLAS/5950)
  Thermoplastic Elastomers

- **PLAS.5960**
  (https://www.uml.edu/catalog/courses/PLAS/5960)
  Plastics, Elastomers, and Additives from Renewable Resources

- **PLAS.6020**
  (https://www.uml.edu/catalog/courses/PLAS/6020)
  Medical Device Development Regulation

- **PLAS.6060**
  (https://www.uml.edu/catalog/courses/PLAS/6060)
  Plastics Manufacturing Systems Engineering

- **PLAS.6100**
  (https://www.uml.edu/catalog/courses/PLAS/6100)
  Plastics Industry Development

- **PLAS.6180**
  (https://www.uml.edu/catalog/courses/PLAS/6180)
  Structural Product Design

- **PLAS.6500**
  (https://www.uml.edu/catalog/courses/PLAS/6500)
  Nanoscale Transport Phenomena for Manufacturing Nanodevices

- **PLAS.6750**
  (https://www.uml.edu/catalog/courses/PLAS/6750)
  Biomaterials II

**Materials Electives**

During the junior year, Plastics Engineering students are required to take a "materials" elective. Students can select a course from the course list below. Some courses are available only when there is sufficient demand. Students can take an upper level design course offered by another College of Engineering Department (e.g. material science, composites.) if it is approved by the Plastics Engineering chairperson and the student's advisor.

- **PLAS.5110**
  (https://www.uml.edu/catalog/courses/PLAS/5110)
  Polymer Blends

- **PLAS.5120**
  (https://www.uml.edu/catalog/courses/PLAS/5120)
  Porous Polymers

- **PLAS.5130**
  (https://www.uml.edu/catalog/courses/PLAS/5130)
  New Plastics Materials

- **PLAS.5320**
  (https://www.uml.edu/catalog/courses/PLAS/5320)
  Adhesives and Adhesion

- **PLAS.5330**
  (https://www.uml.edu/catalog/courses/PLAS/5330)
  Coatings Science and Technology I

- **PLAS.5350**
  (https://www.uml.edu/catalog/courses/PLAS/5350)
  Rubber Technology

- **PLAS.5400**
  (https://www.uml.edu/catalog/courses/PLAS/5400)
  Commercial Development of Plastics

- **PLAS.5420**
  (https://www.uml.edu/catalog/courses/PLAS/5420)
  Colloidal Nanoscience and Nanoscale Engineering

- **PLAS.5450**
  (https://www.uml.edu/catalog/courses/PLAS/5450)
  Additives for Polymer Materials

- **PLAS.5470**
During the senior year, students are required to take a "design" elective. Students can select a course from the course list below. Some courses are available only when there is sufficient demand. Students can take an upper level design course offered by another College of Engineering Department if it is approved by the Plastics Engineering chairperson and the student's advisor. Plastics Engineering students doing a Minor in Business Administration should take PLAS.5370 for their design elective.

- PLAS.5140 Statistics for 6 Sigma
- PLAS.5150 Lean Plastics Manufacturing
- PLAS.5370 Business Law for Engineers
- PLAS.5410 Computer Applications in Plastics
- PLAS.5490 Product Design for Elastomers
- PLAS.5510 Extrusion Die Design
- PLAS.5520 Machine Design
- PLAS.5530 Medical Device Design I
- PLAS.5540 Medical Device Design II
- PLAS.5760 Advanced Mold Design
- PLAS.5850 Computer Aided Engineering I
- PLAS.6020
Medical Device Development Regulation

- PLAS.6180
  (https://www.uml.edu/catalog/courses/PLAS/6180)

Structural Product Design

For more information contact the Department of Plastics Engineering
(https://www.uml.edu/Engineering/Plastics/Contact.aspx).

Learning Outcomes and Educational Objectives

ELECTRONIC ENGINEERING TECHNOLOGY and MECHANICAL ENGINEERING TECHNOLOGY PROGRAM EDUCATIONAL OBJECTIVES

The educational objectives of the UMass Lowell EET and MET programs are for graduate students that will:

1. Pursue successful careers, in EET and MET engineering or related fields, that sustain or improve socio-economic levels for themselves, and their families while enhancing personal fulfillment.
2. Engage in continuing education and development in their professional field.
3. Engage in service activities, related to their profession, that benefit society and the community.
4. Continually evaluate their professional actions in light of their personal and professional ethics.
5. Apply the principles of sustainable engineering in their professional careers.

EET AND MET COMMON STUDENT OUTCOMES

For the UMass Lowell baccalaureate degree programs, the student outcomes are the following learned capabilities:

1. an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline
2. an ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
3. an ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature
4. an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes
5. an ability to function effectively as a member as well as a leader on technical teams.

Broadly defined activities are those that involve a variety of resources; that involve the use of new processes, materials, or techniques in innovative ways; and that require a knowledge of standard operating procedures.

Degree Pathways

Degree Pathways are a semester-by-semester sequence of courses recommended for successful completion of a degree, diploma, credential or certificate from the university.

Plastics Engineering

- fall 2022 and beyond
- fall 2018 - spring 2022
- fall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Suggested Degree Pathway for Plastics Engineering

For students who entered fall 2018 to spring 2022.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr</th>
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<tbody>
<tr>
<td>PLAS.1070</td>
<td>Intro to Plastics Engineering (AIL)</td>
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<td>ECON.2010</td>
<td>Principles of</td>
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### Academic Catalog 2021 - 2022 / Plastics Engineering - General Information

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<td>College Writing I (SS)</td>
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<tr>
<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
<td>3</td>
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<tr>
<td>CHEM.1230L</td>
<td>Chemistry I Lab (SCL)</td>
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<tr>
<td>MATH.1310</td>
<td>Calculus I (MATH)</td>
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Total: 16

### Spring Semester

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Total: 15

### Sophomore Year

#### Fall Semester

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<td>PLAS.2010</td>
<td>Polymer Materials I</td>
<td>3</td>
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<td>PLAS.2150</td>
<td>Pl. Processing Lab I</td>
<td>1</td>
</tr>
<tr>
<td>CHEM.2040</td>
<td>Intro. Org. Poly. Chem.</td>
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### Junior Year

#### Fall Semester

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<td>PLAS.0010</td>
<td>Pl. Safety Lecture</td>
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<td>PLAS.3060</td>
<td>Methods of Exp. Analysis</td>
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<tr>
<td>PLAS.3140</td>
<td>Fluid Flow</td>
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<td>PLAS.3150</td>
<td>Pl. Processing Lab III</td>
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### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
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<tr>
<td>PLAS.0010</td>
<td>Pl. Safety Lecture</td>
<td>0</td>
</tr>
<tr>
<td>PLAS.4030</td>
<td>Mech. Behavior of Polymers</td>
<td>3</td>
</tr>
<tr>
<td>PLAS.4040</td>
<td>Proc. Control Systems (CTPS)</td>
<td>3</td>
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<tr>
<td>PLAS.4150</td>
<td>Capstone Design I (IL), (WOC)</td>
<td>1</td>
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<td>xxxx.xxxx</td>
<td>Technical Elective2</td>
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<td>xxxx.xxxx</td>
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<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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### Spring Semester

<table>
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<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
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<tr>
<td>PLAS.0020</td>
<td>Pl. Safety Lecture</td>
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</tr>
<tr>
<td>PLAS.3160</td>
<td>Pl. Processing Lab IV</td>
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<tr>
<td>PLAS.3480</td>
<td>Heat Transfer</td>
<td>3</td>
</tr>
<tr>
<td>PLAS.3730</td>
<td>Pl. Mold Engineering</td>
<td>4</td>
</tr>
<tr>
<td>PLAS.3780</td>
<td>Pl. Process Eng. II</td>
<td>3</td>
</tr>
<tr>
<td>PLAS.3820</td>
<td>Polymer Science for Eng. II</td>
<td>3</td>
</tr>
<tr>
<td>PLAS.3840</td>
<td>Polymer Science II Lab</td>
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</tr>
<tr>
<td>PHIL..2030 / PHIL..3340</td>
<td>Intro to Ethics / Engin. and Ethics (AH), (SRE)</td>
<td>3</td>
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<tr>
<td><strong>Total</strong></td>
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</table>

### Total Minimum Credits = 127

1. Appropriate honors courses may be substituted for students enrolled in the honors program.

2. The list of Technical Electives, Materials Electives and Design Electives can be found in undergraduate catalog. An upper level technical course given by another Engineering Department can be substituted if pre-approved by your advisor.

3. Plastics Engineering students meet the Core Curriculum Essential Learning Outcome of Diversity and Cultural Awareness (DCA) outside of the major. See the DCA course listing (https://www.uml.edu/resources/catalog-
archive/current/Undergraduate.pdf) for a complete list of options.

4PLAS.2100 (https://www.uml.edu/catalog/courses/PLAS/2100) Prof. Development Seminar may also be taken in Spring of the Junior Year.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the CoreCurriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS (http://www.uml.edu/Enrollment/SiS/default.aspx). If you need assistance, please contact your advisor.

Last Updated: 6/19/2018

Suggested Degree Pathway for Plastics Engineering

For students who entered fall 2022 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>PLAS.1070</td>
<td>Introduction to Plastics Engineering (AIL)</td>
<td>2</td>
</tr>
<tr>
<td>ECON.2010</td>
<td>Principles of Microeconomics (SS)</td>
<td>3</td>
</tr>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
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<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
<td>3</td>
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<td>Chemistry I Laboratory (SCL)</td>
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Spring Semester

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<td>College Writing II (CW)</td>
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<td>MATH.1320</td>
<td>Calculus II (STEM)</td>
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<td>Introduction to Polymer Sustainability</td>
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Sophomore Year

Fall Semester

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<td>Polymer Materials I1</td>
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<td>PLAS.2150</td>
<td>Plastics Processing Engineering Laboratory I</td>
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<td>Principles of Processing Equipment and Automation</td>
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<tr>
<td>CHEM.2040</td>
<td>Introduction to Organic and Polymer Chemistry</td>
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<td>MATH.2310</td>
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Spring Semester

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### Junior Year

#### Fall Semester

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<th>Course Name</th>
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<tbody>
<tr>
<td>PLAS.0010</td>
<td>Plastics Safety Lecture</td>
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<tr>
<td>PLAS.3060</td>
<td>Methods of Experimental Analysis</td>
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<td>PLAS.3830</td>
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#### Spring Semester

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<tr>
<td>PLAS.3160</td>
<td>Plastics Process Engineering Laboratory IV</td>
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<td>PLAS.3730</td>
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<td>PLAS.3780</td>
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### Senior Year

#### Fall Semester

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<td>Mechanical Behavior of Polymers</td>
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<td>PLAS.4040</td>
<td>Process Control (CTPS)</td>
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*Total 18*
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**Total Minimum Credits = 126**

1. Appropriate honors courses may be substituted for students enrolled in the honors program.

2. The list of Technical Electives, Materials Electives and Design Electives can be found in undergraduate catalog. An upper level technical course given by another Engineering Department can be substituted if pre-approved by your advisor.

3. Plastics Engineering students meet the Core Curriculum Essential Learning Outcome of Diversity and Cultural Awareness (DCA) outside of the major. See the DCA course listing [here](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a complete list of options.

4. PLAS.2100 [here](https://www.uml.edu/catalog/courses/PLAS/2100) Professional Development Seminar may also be taken in Spring of the Junior Year.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the [Core Curriculum policy](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.
PLAS.0010 Plastics Safety Lecture (Formerly 26.001)  
- Credits: 0  
All Plastics Engineering students enrolled in a plastics laboratory course are required to attend a one hour per week safety lecture for safety training.

PLAS.0020 Plastics Safety Lecture (Formerly 26.002)  
- Credits: 0  
All Plastics Engineering students enrolled in a plastics laboratory course are required to attend a one hour per week safety lecture for safety training. Continuation of 26.001.

PLAS.1070 Introduction to Plastics Engineering  
(Formerly 25.107/26.107) - Credits: 2  
This course is designed to teach basic principles of technical drawing, fundamentals of design, fundamentals of computer aided design (CAD), dimensioning and tolerances. Basic concepts of manufacturing, rapid prototyping and 3D printing are covered. The lecture component covers theoretical information, and the lab component covers hands-on learning, where students learn to use a commercial CAD software.

PLAS.1080 Introduction to Polymer Sustainability - Credits: 3  
This course provides a foundation in the principles of environmental sustainability and the relationship of polymers and plastics to the environment. The course introduces principles of lifecycle and material flow analysis, waste management, circular design, green chemistry and engineering and renewable materials. The basic concepts underpinning recyclability and toxicity are covered. We discuss current challenges of waste management systems and future options for increasing use of secondary feedstocks. Students learn about properties of biobased and biodegradable plastics. The course also covers fate of plastics in the environment and strategies for reducing leakage. The overarching objective is to provide an understanding of environmental challenges and solutions in the plastics industry.

PLAS.2010 Polymer Materials I (Formerly 26.201) - Credits: 3  
This introductory course in plastics materials first evaluates how commercial plastics were developed, characterized and compared throughout the relevant industry. Various ASTM testing protocols are reviewed followed by an initial study of commodity plastic materials, including polyethylene, poly (vinyl chloride), polystyrene, diene rubbers and other selected and relatively high-volume resins. Applicable commercial polymerization methods are introduced along with comparative structure/property relationships. Initial comparisons are drawn as between commodity thermoplastic resins and thermoset compositions. Comparative end-use applications are continuously discussed along with a consideration of selected environmental issues (recyclability).

PLAS.2020 Polymer Materials II (Formerly 26.202) - Credits: 3  
A critical review of the commercial family of materials known as engineering thermoplastics including an examination of relatively important thermoset polymer systems. Major commercial polymerization reactions are reviewed (e.g. applicable chain growth or step-growth polymerizations) including comparative market performance based upon mechanical, thermal, chemical properties and environmental considerations. Also considered are selective high performance plastic materials suitable for use at elevated temperatures and in other relatively extreme working environments. Recommended Pre-Req: 26.201 Polymer Materials I.

PLAS.2100 Professional Development Seminar  
(Formerly 26.210) - Credits: 1  
The Professional Development Seminar is designed to provide students with the necessary structure, resources, and support to successfully secure and engage in their first Plastics Cooperative Education experience. Through a variety of interactive teaching methodologies and assignments, students will participate in a sequence of learning activities including self-assessment, industry research, and the development of co-op learning objectives. Students will prepare to engage in the job search process through resume-writing, strategic interviewing, professional networking and learn professional behavior and presentation skills. The goal of the course is to assist each student in developing a sound plan of action to successfully participate in the cooperative education experience.

PLAS.2110 Engineering Mechanics (Formerly 26.211) - Credits: 3  
Equilibrium of structures subjected to forces and moments. Area and mass moments of inertia., Internal forces, shear and bending moments acting on loaded structures, including cantilevers, beams, trusses, bridges and machine frames. Friction.

PLAS.2120 Dynamics (Formerly 26.212) - Credits: 1  
This course covers the fundamentals of Newtonian mechanics, including kinematics, motion relative to accelerated reference frames, work and energy, impulse and momentum, 2D and 3D rigid body dynamics. The course pays special attention to applications in plastics engineering including introductory topics in material and energy balance.
PLAS.2150 Plastics Processing Engineering Laboratory I (Formerly 26.215) - Credits: 1

This lab course focuses on physical property testing of plastics. The tests covered include tensile properties, flexural properties, pendulum impact resistance, drop impact resistance, surface properties, and melt flow rate. The effect of environment on many of these properties is also evaluated.

PLAS.2160 Plastics Process Engineering Laboratory II (Formerly 26.216) - Credits: 1

This laboratory introduces students to the plastics manufacturing processes of single screw extrusion, injection molding, blow molding, sheet thermoforming and rotational molding. Experiments are designed so that the student will understand the theory of polymer conversion techniques by the interaction between process variables and materials characteristics.

PLAS.2180 Introduction to Design (Formerly 26.218) - Credits: 2

This course is designed to teach basic principles of technical drawing, fundamentals of design, dimensioning and tolerances. Basic concepts of manufacturing and rapid prototyping are covered. The lecture component covers theoretical information, and the lab component covers hands-on learning, where students learn to use a commercial CAD software. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL).

PLAS.2190 Principles of Processing Equipment & Automation - Credits: 4

This course provides a theoretical understanding of the design of plastics processing equipment and automation. Each system will be studied and analyzed discreetly, including the safety interlock system, hydraulic power system, pneumatic system, high voltage AC electrical power system, low voltage DC electrical control system, user interface with programmable logic controller (PLC), optical sensors, and associated mechanical aspects of the design. For each system, functions of components will be introduced, the theory underlying their operation will be discussed and analyzed, and components will be incorporated into a complete machine system detailed on associated machine prints. Lab will provide practical examples of the theory discussed in class.

PLAS.2470 Thermodynamics (Formerly 26.247) - Credits: 3

This course introduces the concepts of system definition, pure substance properties, phase behavior and engine cycles. The laws of Thermodynamics are introduced and used to determine equilibrium states of systems, conservation of energy and directionality of energy transformation. Mathematical analysis of closed and flowing systems and engineering devices used in polymer processing is reviewed. It concludes with a discussion of introductory level polymer thermodynamics. Meets Core Curriculum Essential Learning Outcomes for Quantitative Literacy (QL).

PLAS.3060 Methods of Experimental Analysis (Formerly 26.306) - Credits: 3

Methods for design and analysis of experiments provided in three course modules: (1) descriptive and inferential statistics for hypothesis testing; (2) analysis of variance and linear regression for model building; and (3) factorial, fractional factorial, and response surface design of experiments for decision support and optimization. Course incorporates project work with modern statistical programming. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL) and Critical thinking and problem solving (CTPS).

PLAS.3100 Co-op Assessment I (Formerly 26.310) - Credits: 1

The primary goal of this seminar is to assist students in the overall assessment of their overall cooperative education experience. Through facilitated small group discussion, individual consultation and hands on practice, students will have an opportunity to identify and articulate their technical and professional skills, and explore how these skills and their co-op employment might be translated and leveraged into future work environments and their academic program at UML.

PLAS.3140 Fluid Flow (Formerly 26.314) - Credits: 3


PLAS.3150 Plastics Process Laboratory III (Formerly 26.315) - Credits: 1

This laboratory introduces students to the plastics manufacturing processes of twin screw extrusion, film extrusion, tube extrusion, and injection molding process monitoring. Experiments are designed so that the student will understand the theory of polymer conversion techniques by the interaction between process variables and material
characteristics.

PLAS.3160 Plastics Process Engineering Laboratory IV (Formerly 26.316) - Credits: 1

This laboratory introduces students to variations of injection molding, extrusion, blow molding and thermoset manufacturing processes not previously studied. Advanced process set-up, including design of experiments, is covered. Experiments are designed so that the student will understand the theory of polymer conversion techniques by the interaction between process variables and material characteristics.

PLAS.3200 Co-op Assessment I (6 months) - Credits: 2

This seminar is designed to support and assist students in the assessment of their 6 month cooperative education experience. Students will reflect on their extended time in a work environment, the impact of their experience on their planning, and how organizational culture, personal interests and values can inform their subsequent decisions for career development. Through facilitated small group discussions, individual consultation and hands on practice, students will have the opportunity to identify and articulate their technical and professional skills.

PLAS.3480 Heat Transfer (Formerly 26.348) - Credits: 3

This course covers the theory and application of steady and transient heat conduction, convection, and radiation. Particular emphasis is placed on heat transfer problems in plastics processing and modern engineered systems. Computational methods and analysis of heat exchangers are covered.

PLAS.3730 Mold Engineering (Formerly 26.373) - Credits: 4

The course provides a comprehensive systematic approach to mold engineering and design, specifically focused on injection molds. Topics are presented in a top-down manner, beginning with significant design objectives and constraints followed by application specific analysis. Topics include: mold types and functions, mold layout, cost estimation, cavity filling, feed systems, gating, venting, cooling systems, shrinkage, ejector systems, and structural design. Junior status or permission of instructor. Includes laboratory experience in mold design and mold making.

PLAS.3780 Plastics Process Engineering II (Formerly 26.378) - Credits: 3

Plastics Process Engineering II introduces four of the five major plastics forming (manufacturing) processes: rotational molding, thermoforming, blow molding, and injection molding with emphasis on how polymeric materials, machine and tooling components, and process variables affect properties of the products produced with each process. The course also examines melt mixing in polymer processing, including mixing in single screw systems and mixing in co-rotating twin screw extruders.

PLAS.3810 Polymer Science for Engineers I (Formerly 26.381) - Credits: 3

An introduction to polymer science with a focus on making polymers. Topics covered include the chemistry, kinetics, and statistics of step and chain polymerizations and copolymerizations, polymerization processes. Industrially relevant polymers and commercial polymerization processes will be highlighted, with coverage of the health and safety aspects of various approaches to the preparation of various polymers given. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

PLAS.3820 Polymer Science for Engineers II (Formerly 26.382) - Credits: 3

An introduction to polymer science with a focus on polymer properties and behavior. Topics covered include analytical techniques (chemical, thermal, and microstructural analysis of polymers, measurement of molecular weight distribution, etc.), as well as the underlying physical, rheological and solution properties that make these techniques possible. Recommended Pre-Req: 26.381 Polymer Science for Engineers I

PLAS.3830 Polymer Science II Lab (Formerly 26.383) - Credits: 1

Synthesis of polymers by step growth, condensation, suspension and free radical emulsion polymerization techniques. Fundamental concepts in polymerization kinetics and mechanism will be covered as well as structure-property considerations and polymerization with functional groups.

PLAS.3840 Polymer Science II Lab (Formerly 26.384) - Credits: 1

Polymer characterization techniques including molecular weight distribution by gel permeation chromatography, crystallinity and order by differential scanning calorimetry; polymer morphology and surface properties, and spectroscopic (nuclear magnetic resonance, Raman, infrared) and mechanical (tensile, dynamic mechanical, rheological) techniques will also be covered. Recommended Pre-Reqs: 26.381 Polymer Science for Engineers I and 26.383 Polymer Science II Lab; Co-Req: 26.382 Polymer Science for Engineers II.
PLAS.3CO-OP Plastics Engineering Curricular Practical Training (CPT) (Formerly 26.3CO-OP) - Credits: 0-1

Plastics Engineering Curricular Practical Training (CPT). "Variable credit course, student chooses appropriate amount of credits when registering."

PLAS.4020 Medical Device Development Regulation - Credits: 3

Comprehensive and in-depth analysis of US medical device diagnostics development and approval requirements. Detailed analysis of quality assurance issues and regulatory reforms implemented under the Food and Drug Administration. Provides a step-by-step guide through the Center for Devices and Radiological Health (CRDH) investigational device exemptions, premarket approval, 510(k) application process, and product development protocol and review processes.

PLAS.4030 Mechanical Behavior of Polymers (Formerly 26.403/503) - Credits: 3

Topics covered in this course include linear viscoelasticity, creep, stress relaxation, dynamic behavior, hysteresis, stress-strain response phenomena, principles of time-temperature superposition, rubber elasticity, failure and fracture mechanisms for polymers, and the effect of additives on mechanical behavior. Real life design examples are used to demonstrate the topics and concepts as much as possible.

PLAS.4040 Process Control (Formerly 26.404) - Credits: 3

Basic principles of control systems used with plastics processing equipment. Included are instrumentation, signal conditioning, data acquisition, feedback control, process monitoring, data reduction, and SPC/SQC. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Written & Oral Communication (WOC).

PLAS.4060 Polymer Structure, Properties and Applications (Formerly 26.406) - Credits: 3

The fundamental relationships between molecular structure, properties and end-use applications of plastics materials will be explored in detail. Molecular structural features include chemical composition, molecular size and flexibility, intermolecular order and bonding, and supermolecular structure. Properties include processability, mechanical, acoustic, thermal, electrical, optical and chemical properties, price, and balance of properties. Applications include rigid solids, flexible solids, foams, film and non-plastic applications.

PLAS.4100 Coop Assessment II (Formerly 26.410) - Credits: 2

This seminar is designed to support and assist students in the continued assessment of their cooperative education experience. Through a deepening of their work in Co-op assessment I, students will review their overall performance in the cooperative education program, while continuing to demonstrate their technical and professional skills through written work and public presentations to multiple audiences. It is expected that students will clearly define their future academic and career goals, enhance their professional networks, and develop a future plan to support aspirations related to their major.

PLAS.4150 Capstone Project I (Formerly 26.415) - Credits: 1

first half of a two-semester capstone experience. Students, working in teams under the supervision of faculty members, select a project related to the field of plastics engineering, prepare a project charter considering constraints and mitigations, conduct experimental research, and propose potential project solutions.

PLAS.4160 Capstone Project II (Formerly 26.416) - Credits: 1

Second half of a two-semester capstone experience. Students, working in teams under the supervision of faculty members, continue a project related to the field of plastics engineering, implement one or more project solutions, conduct experimental research, author a final report, and provide a presentation according to professional conference guidelines.

PLAS.4170 Honors Capstone Project II (Formerly 26.417) - Credits: 1-3

A section of capstone laboratory for honor students only. Honors student groups design, perform, analyze, report and defend a research project which incorporates the processing and characterization of plastics materials. Supporting practicum on literature searches, plastics processing, basic plastics testing techniques, and data analysis are included in the course.

PLAS.4180 Product and Process Design (Formerly 26.418) - Credits: 3

Theoretical principles and engineering practices for development of new plastic products with a focus on conventional and advanced injection molding processes. Topics include design methodology, plastic materials selection, design for manufacturing, computer aided engineering, mechanical
behavior of plastics, structural design of plastic parts, prototyping techniques, experimental stress analysis, assembly techniques for plastic parts, and design for recyclability.

PLAS.4200 Co-op Assessment 2 (6 months) -
Credits: 2

This seminar is designed to support and assist students in the assessment of their second cooperative education work experience that was for a 6 month cycle. Students will reflect on their extended time in this second work environment, and how their two different co-op work experiences impacts their subsequent decisions for career development. Students will review their overall performance in the cooperative education program, and demonstrate their technical and professional skills through written work and public presentations to multiple audiences.

PLAS.4500 Nanoscale Trans. Phenomena for Manuf. Nanodevices (Formerly 10/22/26.450) - Credits: 3

An interdisciplinary course taught by faculty from the Chemical, Mechanical and Plastics Engineering Departments, who have special knowledge in nanoscale fluid mechanics and heat transfer. The course on nanoscale transport phenomena constitutes a bridge between existing fluid and heat transfer courses in multiple disciplines and emerging nanoscale science and engineering concepts to reflect the forefront of nanomanufacturing. The course is designed to incorporate recent advances in manufacturing polymer based nanodevices. Key issues of the implementation and maintenance costs for fabrication will be addressed. Hands-on laboratory experiments will be performed to complement the lectures with the ultimate goal of designing and building a complete nanodevice at the end of the course. The course will prepare graduates for employment focused on designing and manufacturing nano/microfluidic systems, lab on chip devices, electronic devices, medical devices and other emerging technologies.

PTEC.2010 Plastics Material Science I (Commodity Thermoplast) - Credits: 3

Serves as an introductory course reviewing the history, classification, definitions and terminology, raw materials, methods of manufacturing, testing-characterization of typical physical properties, and end-uses of polymeric materials systems. Emphasis will be on the commodity thermoplastics, polyolefins, vinyls and styrenics.
Programs

Majors

- American Studies
  Thematic Option
- Art
- Studio Art Concentration
- Composition for New Media
- Criminal Justice
  Correction Option
  Crime and Mental Health Option
  Homeland Security Option
  Information Technology Option
  Police Option
  Violence Option
- Digital Media: B.A.
- Economics: B.A.
- English
  Journalism and Professional Writing Concentration
  Literature Concentration
  Theatre Arts Concentration
- Graphic Design:
- History
- Liberal Arts
- Music Studies
- Music Performance
- Instrumental Option
- Voice Option
- Music Business
- Peace & Conflict Studies
  Communications and Critical Thinking Option
  Philosophy and Religious Studies Option
- Political Science: B.A. American Politics Concentration
  International Relations and Comparative Politics Concentration
  Law and Politics Concentration
  Political Communication and Public Opinion Concentration
  Sustainability and Environmental Politics Concentration
- Psychology
  Behavior Analysis Concentration
  Developmental Disabilities Concentration
  Community Social Psychology Concentration
  Clinical Psychology Concentration
  Health Psychology Concentration
- Quantitative Economics: B.S.
- Sociology
  Policy and Social Problems Concentration
  Racial Equity and Inclusion Concentration
- Sound Recording Technology
- Spanish Option

Minors
• American Studies
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Arabic Studies
• Architectural Studies
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Art
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Art History
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Asian Studies
• Creative Writing
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Criminal Justice
• Digital Media
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• Disability Studies
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• Economics
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• Medieval and Renaissance Studies
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• Philosophy
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• Political Science
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• Portuguese Studies
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• Psychology
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• Race and Ethnic Studies
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• Sociology
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Sound Recording Technology
  For Computer Science Majors
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
archive/current/Undergraduate.pdf)For Electrical Engineering Majors
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Spanish
- Technology, Society and Human Values2
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Theatre Arts2 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)/empty
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

1Interdisciplinary majors.
2Interdisciplinary minors.
College of Fine Arts, Humanities & Social Sciences

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A student's catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

American Studies

- General Option
  fall 2015 and beyond

- Thematic Option
  fall 2021 and beyond

Art

- Animation & Interactive Media Concentration
  fall 2017 and beyond

- Graphic Design Concentration
  fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Studio Art Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Composition for New Media

- fall 2022 and beyond
- fall 2019 - spring 2022

Criminal Justice

- General Option
  fall 2022 and beyond

Corrections Option

- fall 2016 and beyond

- Police Option
  fall 2022 and beyond

- Homeland Security Option
  fall 2022 and beyond

- Violence Option
  fall 2016 and beyond

- Crime and Mental Health Option
Digital Media

- fall 2021 and beyond

Economics

- fall 2015 and beyond

English

- Literature Concentration
  - fall 2021 and beyond
  - fall 2015 - spring 2021

- Journalism & Professional Writing Concentration
  - fall 2015 and beyond
  - fall 2010 - spring 2015

- Creative Writing Concentration
  - fall 2018 and beyond
  - fall 2015 - spring 2018

- Theatre Arts Concentration
  - fall 2015 and beyond
  - fall 2010 - spring 2015

Graphic Design

- fall 2021 and beyond
- fall 2020 - spring 2021
- fall 2015 - spring 2020

History

- fall 2020 and beyond
- fall 2015 - spring 2020

Liberal Arts

- fall 2015 and beyond

Music Studies

- General Option fall 2022 and beyond
- Instrumental Option fall 2015 - spring 2018
- Voice Option fall 2015 - spring 2018

Music Performance

- Instrumental Option fall 2022 and beyond
- Voice Option fall 2022 and beyond

Music Business

- fall 2022 and beyond
- fall 2015 - spring 2022
- prior to fall 2015

Peace and Conflict Studies

- fall 2021 and beyond
- fall 2015 - spring 2021
Philosophy

- General Option
  fall 2015 and beyond

- Communications & Critical Thinking Option
  fall 2015 and beyond

- Philosophy & Religious Studies Option
  fall 2015 and beyond

Political Science

- American Politics Concentration fall 2020 and beyond
- International Relations and Comparative Politics Concentration fall 2020 and beyond
- Law and Politics Concentration fall 2020 and beyond
- Political Communication and Public Opinion Concentration fall 2020 and beyond
- Sustainability and Environmental Politics Concentration fall 2022 and beyond

Political Science (prior to fall 2020)

- fall 2015 - spring 2020
- fall 2013 - spring 2015

Psychology

- General Concentration
  fall 2022 and beyond
- Behavior Analysis Concentration
  fall 2022 and beyond
- Community Social Psychology Concentration
  fall 2022 and beyond
- Clinical Psychology Concentration
  fall 2022 and beyond
- Developmental Disabilities Concentration
  fall 2022 and beyond
- Health Psychology Concentration
  fall 2022 and beyond

Quantitative Economics

- fall 2022 and beyond

Sociology

- General Concentration fall 2016 and beyond
- Policy & Social Problems Concentration fall 2021 and beyond
Sample Degree Pathway for American Studies - Thematic Option

For students who entered fall 2021 and beyond.

Freshman Year

Fall Semester

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Spring Semester

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Sophomore Year

Fall Semester

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### American Studies - General Information

**Spring Semester**

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<td>American Literary Traditions</td>
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**Total** 15

**Junior Year**

**Fall Semester**

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<tr>
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<td>xxxx.3/4xxx</td>
<td>American Studies Elective</td>
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</tr>
<tr>
<td>xxxx.xxxx</td>
<td>World Ready Elective or Free Elective</td>
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<tr>
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**Total** 15

**Spring Semester**

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<th>Course Name</th>
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**Total** 15

**Senior Year**

**Fall Semester**

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<td>AMST.4010</td>
<td>American Studies Seminar</td>
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<tr>
<td>AMST.4910</td>
<td>Directed Studies in American Studies (AIL)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Thematic Elective (Discipline 2)</td>
<td>3</td>
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**Total** 15

**Spring Semester**

<table>
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<td>Free Elective</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
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</table>

**Total** 15

**Total Minimum Credits = 120**

1 Required for entering freshmen.

2 Quantitative Literacy (QL) is fulfilled outside the American Studies major. The department recommends that all majors take a math course that satisfies the QL outcome, such as MATH 1110.

3 American Studies students meet the Core Curriculum Essential Learning Outcome for Critical Thinking and Problem Solving (CTPS) outside of the major. CTPS may be satisfied with PHIL.2010 Introduction to Philosophy or PHIL.2020 Introduction to Logic and Critical Reasoning. Additionally, the following Research Seminars satisfy CTPS (some have prerequisite courses):

- HIST.4320 Research Seminar
- POLI.3010 Research Methods in Political Sci.
• PSYC.3750
  (https://www.uml.edu/catalog/courses/PSYC/3750)
  Research III: Laboratory
• SOCI.4030
  (https://www.uml.edu/catalog/courses/SOCI/4030)
  Research II: Qualitative Methods

See the CTPS course listing
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a complete list of options.

4World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) in the undergraduate catalog.

5Students may take Research Methods in any of the following subjects: english, history, political science, psychology, or sociology.

6To satisfy the Thematic Electives requirement, students choose two disciplines to explore, taking a total of 15 credits (12 must be at the 3000/4000 level), with at least six credits from each discipline. A list of approved courses is available through the student’s SIS (http://www.uml.edu/Enrollment/sis/default.aspx) account or from the coordinator.

Students must take 36-45 credits within the major, with at least 15 credits at the 3000 or 4000 level.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS (http://www.uml.edu/Enrollment/sis/default.aspx). If you need assistance, please contact your advisor.

Restriction on off-campus study:

Be advised that any course taken at another institution must be
formally approved
AMST.2480 Perspectives American Culture
(Formerly 40/42.248) - Credits: 3
The goal of this class is to enhance students’ ability to read and interpret American texts by learning how to see them in context, to understand the way readers approach texts from interpretative lenses, and to express their insights about American culture in a variety of forms and genres. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

AMST.2570 The Family in American Literature
(Formerly 40.257) - Credits: 3
A study of literary selections dealing with traditions of family life, the individual, and social change. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

AMST.2740 Literature of Beat Movement (Formerly 40.274) - Credits: 3
A survey of fiction and poetry by Beat Movement authors, including Lowell native Jack Kerouac, Allen Ginsberg, William Burroughs, Herbert Huncke, Gregory Corso, and Lawrence Ferlinghetti

AMST.3110 South in American Literature (Formerly 40.311) - Credits: 3

AMST.4010 American Studies Seminar (Formerly 40.401) - Credits: 3
A required seminar for American studies majors normally taken during the second semester of the junior year or during the senior year. Students undertake a research project leading to the writing of a major paper with a theme that combines more than one discipline.

AMST.4910 Directed Studies in American Studies
(Formerly 40.491) - Credits: 1-3
An investigation of a topic using an interdisciplinary approach and leading to the writing of a major paper. The course provides an opportunity for a student to work closely with an instructor on a topic of special interest.

AMST.4960 Practicum Experience in American Studies
(Formerly 40.496) - Credits: 3
Allows students an opportunity to combine their formal education with an off campus project. After developing a proposal for the practicum under the guidance of an instructor, the student spends a portion of his or her time working with persons engaged in business, the arts, museums, the professions, community service, or government. The coordinator for American studies maintains a file of organizations that accept students.

AMST.4970 Practicum in American Studies
(Formerly 40.497) - Credits: 1-3
College of Fine Arts, Humanities & Social Sciences

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A student's catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

American Studies

- General Option
  fall 2015 and beyond
- Thematic Option
  fall 2021 and beyondfall 2015 - spring 2021

Art

- Animation & Interactive Media Concentration
  fall 2017 and beyond
- Graphic Design Concentration
  fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Studio Art Concentration
  fall 2022 and beyondfall 2015 - spring 2022

Composition for New Media

- fall 2022 and beyond
- fall 2019 - spring 2022

Criminal Justice

- General Option
  fall 2022 and beyondfall 2016 - spring 2022
Digital Media
- fall 2021 and beyond

Economics
- fall 2015 and beyond

English
- Literature Concentration
  fall 2021 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- fall 2015 - spring 2021
- fall 2010 - spring 2015
- Journalism & Professional Writing Concentration
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- fall 2014 - spring 2015
- Creative Writing Concentration
  fall 2018 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- fall 2015 - spring 2018
- Theatre Arts Concentration
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- fall 2010 - spring 2015

Graphic Design
- fall 2021 and beyond
- fall 2020 - spring 2021

History
- fall 2020 and beyond
- fall 2015 - spring 2020

Liberal Arts
- fall 2015 and beyond

Music Studies
- General Option fall 2022 and beyond
- fall 2018 - spring 2022
- Instrumental Option fall 2015 - spring 2018
- Voice Option fall 2015 - spring 2018

Music Performance
- Instrumental Option fall 2022 and beyond
- fall 2019 - spring 2022
- Voice Option fall 2022 and beyond
- fall 2019 - spring 2022

Music Business
- fall 2022 and beyond
- fall 2015 - spring 2022
- prior to fall 2015

Peace and Conflict Studies
- fall 2021 and beyond
- fall 2015 - spring 2021
Philosophy

- General Option
  - fall 2015 and beyond
- Communications & Critical Thinking Option
  - fall 2015 and beyond
- Philosophy & Religious Studies Option
  - fall 2015 and beyond

Political Science

- American Politics Concentration fall 2020 and beyond
- International Relations and Comparative Politics Concentration fall 2020 and beyond
- Law and Politics Concentration fall 2020 and beyond
- Political Communication and Public Opinion Concentration fall 2020 and beyond
- Sustainability and Environmental Politics Concentration fall 2022 and beyond

Psychology

- General Concentration
  - fall 2022 and beyond
  - fall 2017 - spring 2022
- Behavior Analysis Concentration
  - fall 2022 and beyond
- Community Social Psychology Concentration
  - fall 2022 and beyond
- Clinical Psychology Concentration
  - fall 2022 and beyond
- Developmental Disabilities Concentration
  - fall 2022 and beyond
- Health Psychology Concentration
  - fall 2022 and beyond

Quantitative Economics

- fall 2022 and beyond

Sociology

- General Concentration fall 2016 and beyond
- Policy & Social Problems Concentration fall 2021 and beyond
beyondfall 2016 - spring 2021 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Racial Equity and Inclusion Concentration fall 2021 and beyond

**Sound Recording Technology**

- fall 2022 and beyond
- fall 2019 - spring 2022
- fall 2015 - spring 2019
- prior to fall 2015

**World Languages and Cultures**

- French Option
- Italian/Spanish Option
- Spanish Option

**Sample Degree Pathway for Art - Studio Art Concentration**

**For students who entered fall 2015 to spring 2022.**

**Freshman Year**

**Fall Semester**

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH</td>
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**Spring Semester**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
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<tr>
<td>ARTS.1010</td>
<td>Art Concepts I Studio</td>
<td>3</td>
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<tr>
<td>ARTS.1130</td>
<td>Digital Foundations</td>
<td>3</td>
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<tr>
<td>ARTS.1550</td>
<td>Drawing I</td>
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<tr>
<td>FAHS.1090</td>
<td>First Year Experience Seminar</td>
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| xxxxx.xxxx   | Math Persp. (MATH) - MATH.1110 (https://www.uml.edu/catalog/courses/MATH/1110) (QL) recommended | 3 |

**Total**

16

**Sophomore Year**

**Fall Semester**

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<tr>
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<td>ARTS.2700</td>
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### Spring Semester

<table>
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<th>Req.</th>
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<tbody>
<tr>
<td>ARHI.2040</td>
<td>History of Art II</td>
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<td>ARTS.2610</td>
<td>Photograph I</td>
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<td>Arts and Hum. Persp. (AH)</td>
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<tr>
<td>xxxxx.xxx</td>
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### Junior Year

#### Fall Semester

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<tr>
<td>ARHL.2210</td>
<td>20th Century Art (WOC)</td>
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<td>ARTS.2670</td>
<td>Printmaking I</td>
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<td>ARTS.xxx</td>
<td>Concentration Elective2</td>
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<td>ARTS.xxx</td>
<td>Concentration Elective2</td>
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<td>xxxxx.xxx</td>
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#### Spring Semester

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<tr>
<td>ARTS.2350</td>
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<td>ARTS.xxx</td>
<td>Concentration Elective2</td>
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<td>ARTS.xxx</td>
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<td>xxxxx.xxx</td>
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### Senior Year

#### Fall Semester

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<tbody>
<tr>
<td>ARTS.4930</td>
<td>Senior Studio I (AIL), (CTPS), (IL)</td>
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<tr>
<td>ARTS.xxx</td>
<td>Concentration Elective2</td>
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<td></td>
</tr>
<tr>
<td>ARTS.xxx</td>
<td>Concentration Elective2</td>
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<td></td>
</tr>
<tr>
<td>AEST.xxx</td>
<td>Aesth./Critical Studies</td>
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<td>xxxxx.xxx</td>
<td>Sciences with Lab Persp. (SCL)</td>
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#### Spring Semester

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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
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<tr>
<td>ARTS.4980</td>
<td>Senior Studio II</td>
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<td>ARHL.3520</td>
<td>Contemporary Art &amp;Culture (DCA)</td>
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**Total Minimum Credits = 123**

1Quantitative Literacy (QL) is fulfilled outside the Art Department requirements. The department recommends that all majors take Math.1110 which fulfills both the Math Breadth of Knowledge requirement and the Quantitative Literacy ELO. See QL course listing [here](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill this requirement. Art students may also satisfy QL by taking ARTS.3820 [here](https://www.uml.edu/catalog/courses/ARTS/3820), Art &Design of Data Visualization as a Concentration Elective. (This course is taught biannually).

2Concentration Electives:

- ARTS.2100 [here](https://www.uml.edu/catalog/courses/ARTS/2100) Graphic Design I
- ARTS.2200 [here](https://www.uml.edu/catalog/courses/ARTS/2200) Web Design I
- ARTS.2300 [here](https://www.uml.edu/catalog/courses/ARTS/2300) Typography I
- ARTS.2320 [here](https://www.uml.edu/catalog/courses/ARTS/2320) Ceramics I
- ARTS.2420 [here](https://www.uml.edu/catalog/courses/ARTS/2420) The Language of Video
- ARTS.2560 [here](https://www.uml.edu/catalog/courses/ARTS/2560) Drawing III
- ARTS.2570 [here](https://www.uml.edu/catalog/courses/ARTS/2570) Monotypes
- ARTS.2590 [here](https://www.uml.edu/catalog/courses/ARTS/2590) Papermaking
- ARTS.2660 [here](https://www.uml.edu/catalog/courses/ARTS/2660) Alternative Photo Processes
- ARTS.2720 [here](https://www.uml.edu/catalog/courses/ARTS/2720) 2D Animation I
- ARTS.2730 [here](https://www.uml.edu/catalog/courses/ARTS/2730) Water Media
- ARTS.2741 [here](https://www.uml.edu/catalog/courses/ARTS/2741) Storyboarding
- ARTS.2760 [here](https://www.uml.edu/catalog/courses/ARTS/2760) Intro 3D Modeling & Animation
- ARTS.2770 [here](https://www.uml.edu/catalog/courses/ARTS/2770) Compositing and Motion Graphics
- ARTS.2810 [here](https://www.uml.edu/catalog/courses/ARTS/2810) Introduction to Game Design
- ARTS.2900 [here](https://www.uml.edu/catalog/courses/ARTS/2900) Illustration I
- ARTS.2950 [here](https://www.uml.edu/catalog/courses/ARTS/2950) Studio Workshop Abroad
- ARTS.2960 [here](https://www.uml.edu/catalog/courses/ARTS/2960) Character and Layout Design
- ARTS.3320 [here](https://www.uml.edu/catalog/courses/ARTS/3320) Ceramics II
- ARTS.3350 [here](https://www.uml.edu/catalog/courses/ARTS/3350) Sculpture II
- ARTS.3610 [here](https://www.uml.edu/catalog/courses/ARTS/3610) Photography II
ARTS.3670  
(https://www.uml.edu/catalog/courses/ARTS/3670) Printmaking II

ARTS.3710  
(https://www.uml.edu/catalog/courses/ARTS/3710) Painting II

ARTS.3730  
(https://www.uml.edu/catalog/courses/ARTS/3730) Professional Studio Photography

ARTS.3740  
(https://www.uml.edu/catalog/courses/ARTS/3740) Animation Studio

ARTS.3760  
(https://www.uml.edu/catalog/courses/ARTS/3760) 3D Animation I

ARTS.3770  
(https://www.uml.edu/catalog/courses/ARTS/3770) 2D Animation II

ARTS.3780  
(https://www.uml.edu/catalog/courses/ARTS/3780) Interactive Media II

ARTS.3800  
(https://www.uml.edu/catalog/courses/ARTS/3800) Special Topics in Art & Design

ARTS.3820  
(https://www.uml.edu/catalog/courses/ARTS/3820) Art & Design of Data Visualization

ARTS.4350  
(https://www.uml.edu/catalog/courses/ARTS/4350) Sculpture III

ARTS.4550  
(https://www.uml.edu/catalog/courses/ARTS/4550) Thought Made Visible

ARTS.4710  
(https://www.uml.edu/catalog/courses/ARTS/4710) Painting III

ARTS.4910  
(https://www.uml.edu/catalog/courses/ARTS/4910) Advanced Studio

ARTS.4940  
(https://www.uml.edu/catalog/courses/ARTS/4940) Directed Studies

ARTS.4950  
(https://www.uml.edu/catalog/courses/ARTS/4950) Advanced Tutorial

Current UMass Lowell students should use their Advisement Report in SIS  
(https://www.uml.edu/Enrollment/SiS/default.aspx). If you need assistance, please contact your advisor.

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Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved  
(https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy  
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.


Sample Degree Pathway for Art - Animation & Interactive Media Concentration

For students who entered fall 2017 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL_1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
</tr>
<tr>
<td>HONR.1100</td>
<td>Art Concepts I Studio</td>
<td>3</td>
</tr>
<tr>
<td>ARTS.1130</td>
<td>Digital Foundations</td>
<td>3</td>
</tr>
</tbody>
</table>
### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>C. r.</th>
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<tr>
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### Sophomore Year

#### Fall Semester

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<td>Web Design I</td>
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<td>2D Animation I</td>
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<td>ARTS.2760</td>
<td>3D Modeling and Animation I</td>
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<tr>
<td>ARTS.2770</td>
<td>Compositing &amp; Motion Graphics / Concentration</td>
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<td>ARTS.xxxx</td>
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### Junior Year

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<tbody>
<tr>
<td>ARTS.2780</td>
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<td>ARTS.2960</td>
<td>Character Layout and Design</td>
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#### Spring Semester

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### Senior Year

#### Fall Semester

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<td>Storyboarding &amp; Comics</td>
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**Total Minimum Credits = 123**

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2Concentration Electives:

- ARTS.2100 Graphic Design I
- ARTS.2300 Typography I
- ARTS.2350 Sculpture I
- ARTS.2420 The Language of Video
- ARTS.2610 Photography I
- ARTS.2690 Color
- ARTS.2700 Figure Drawing

#### Spring Semester

<table>
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<th>Course Name</th>
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<tr>
<td>ARTS.4980</td>
<td>Senior Studio II (AIL), (CTPS), (IL)</td>
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<td>ARTS.2210</td>
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Academic Catalog 2021 - 2022 / Art & Design - General Information
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**Last updated: 4/05/2022**

**Sample Degree Pathway for Graphic Design**

For students who entered fall 2021 and beyond.

**Freshman Year**

**Fall Semester**

<table>
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<tr>
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<th>Course Name</th>
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<td>ARTS.2730</td>
<td>Water Media</td>
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<tr>
<td>ARTS.2900</td>
<td>Illustration I</td>
</tr>
<tr>
<td>ARTS.3200</td>
<td>Web Design II</td>
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<td>Animation Studio</td>
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<tr>
<td>ARTS.3760</td>
<td>3D Animation I</td>
</tr>
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<td>ARTS.3770</td>
<td>2D Animation II</td>
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<tr>
<td>ARTS.3810</td>
<td>Advanced Game Design</td>
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<td>ARTS.3820</td>
<td>Art &amp; Design of Data Visualization</td>
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<td>ARTS.4110</td>
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<td>DGMD.2200</td>
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<td>DGMD.2510</td>
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<td>DGMD.3100</td>
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<td>DGMD.3701</td>
<td>Visual Motion Effects</td>
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### Academic Catalog 2021 - 2022 / Art & Design - General Information

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<th>Course Name</th>
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<td>Art Concepts I</td>
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<td>ARTS.1130</td>
<td>Digital Foundations</td>
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#### Summer Semester

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<td>History of Art I: Prehistoric to Medieval Art</td>
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<td>ARTS.2100</td>
<td>Graphic Design I</td>
<td>3</td>
</tr>
<tr>
<td>ARTS.2300</td>
<td>Typography I</td>
<td>3</td>
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<td>ARTS.2610</td>
<td>Photography I</td>
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### Sophomore Year

#### Fall Semester

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<tr>
<td>ARHL.2030</td>
<td>History of Art I: Prehistoric to Medieval Art</td>
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#### Spring Semester

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<tr>
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<td>ARTS.2200</td>
<td>Website Design I</td>
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<tr>
<td>ARTS.3100</td>
<td>Graphic Design II</td>
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<td>ARTS.3300</td>
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### Junior Year

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<td>ARTS.3200</td>
<td>Website Design II</td>
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<td>ARTS.4100</td>
<td>Graphic Design III</td>
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<td>ARTS.4300</td>
<td>Typography III</td>
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**Spring Semester**

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Art &Design Electives:

- ARTS.2320 Ceramics I
- ARTS.2350 Sculpture I
- ARTS.2420 Language of Video
- ARTS.2570 Monotypes
- ARTS.2590 Papermaking
- ARTS.2670 Printmaking
- ARTS.2710 Painting I
• ARTS.2720 (https://www.uml.edu/catalog/courses/ARTS/2720) 2D Animation I
• ARTS.2730 (https://www.uml.edu/catalog/courses/ARTS/2730) Watercolor
• ARTS.2741 (https://www.uml.edu/catalog/courses/ARTS/2741) Storyboarding and Comics
• ARTS.2760 (https://www.uml.edu/catalog/courses/ARTS/2760) Introduction to 3D Modeling and Animation
• ARTS.2770 (https://www.uml.edu/catalog/courses/ARTS/2770) Compositing and Motion Graphics
• ARTS.2780 (https://www.uml.edu/catalog/courses/ARTS/2780) Interactive Media
• ARTS.2900 (https://www.uml.edu/catalog/courses/ARTS/2900) Illustration I
• ARTS.2960 (https://www.uml.edu/catalog/courses/ARTS/2960) Character and Layout Design
• ARTS.3610 (https://www.uml.edu/catalog/courses/ARTS/3610) Photography II
• ARTS.3670 (https://www.uml.edu/catalog/courses/ARTS/3670) Printmaking II
• ARTS.3730 (https://www.uml.edu/catalog/courses/ARTS/3730) Professional Photography
• ARTS.3740 (https://www.uml.edu/catalog/courses/ARTS/3740) Animation Studio
• ARTS.3760 (https://www.uml.edu/catalog/courses/ARTS/3760) 3D Animation I
• ARTS.3770 (https://www.uml.edu/catalog/courses/ARTS/3770) 2D Animation II
• ARTS.3780 (https://www.uml.edu/catalog/courses/ARTS/3780) Interactive Media II
• ARTS.3800 (https://www.uml.edu/catalog/courses/ARTS/3800) Special Topics in Art & Design
• ARTS.3811 (https://www.uml.edu/catalog/courses/ARTS/3811) Game Design: Narrative
• ARTS.3820 (https://www.uml.edu/catalog/courses/ARTS/3820) Art & Design of Data Visualization
• ARTS.3950 (https://www.uml.edu/catalog/courses/ARTS/3950) Advertising Design Studio
• ARTS.4110 (https://www.uml.edu/catalog/courses/ARTS/4110) Design in Motion
• ARTS.4200 (https://www.uml.edu/catalog/courses/ARTS/4200) Web Design III
• ARTS.4310 (https://www.uml.edu/catalog/courses/ARTS/4310) Publication Design
• ARTS.4610 (https://www.uml.edu/catalog/courses/ARTS/4610) Photography Workshop
• ARTS.4910 (https://www.uml.edu/catalog/courses/ARTS/4910) Advanced Studio
• ARTS.4940 (https://www.uml.edu/catalog/courses/ARTS/4940) Directed Studies
• ARTS.4950 (https://www.uml.edu/catalog/courses/ARTS/4950) Advanced Tutorial
Additional Requirements

- All students who are admitted to the BFA in Graphic Design must pass a degree milestone at the end of the second year to continue in the major. Students should create a body of work displayed in a portfolio with eight pieces of Graphic Design work from their Graphic Design II and Typography II classes to be reviewed by a faculty panel. The faculty panel will give feedback to students to help them determine the correct course path. Students at this time may be advised to move to a different degree program.

- All designers are expected to maintain a 2.5 cumulative GPA. Students who are not able to consistently maintain this GPA could be required to change their major. Students should consult with the Graphic Design coordinator to discuss their ability to be successful in completing this degree or moving to an alternative program.

- Transfer students who intend to apply directly to pass the requirements for BFA in Graphic Design must meet with the Graphic Design coordinator for review of their transcript and portfolio. All course requirements must be satisfied in order for a student to be eligible for admission to the BFA Graphic Design professional program.

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Last updated: 4/07/2021

Sample Degree Pathway for Art - Studio Art Concentration

For students who entered fall 2022 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr</th>
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<tr>
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<td>ARTS.1010</td>
<td>Art Concepts I Studio</td>
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<td>ARTS.1130</td>
<td>Digital Foundations</td>
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Total: 16

Spring Semester

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### Sophomore Year

#### Fall Semester

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<th>Course Name</th>
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<td>ARTS.2610 (<a href="https://www.uml.edu/catalog/courses/ARTS/2610">https://www.uml.edu/catalog/courses/ARTS/2610</a>)</td>
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#### Spring Semester

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### Junior Year

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#### Spring Semester

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### Senior Year

#### Fall Semester

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<td>xxxx.xxx</td>
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**Total Minimum Credits = 122**

1Quantitative Literacy (QL) is fulfilled outside the Art Department requirements. The department recommends that all majors take MATH.1110 [which fulfills both the Math Breadth of Knowledge requirement and the Quantitative Literacy ELO. See QL course listing](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill this requirement. Art students may also satisfy QL by taking ARTS.3820 [Art &Design of Data Visualization as a Concentration Elective. (This course is taught biannually).](https://www.uml.edu/catalog/courses/ARTS/3820)

2Concentration Electives:

- ARTS.2100 [Graphic Design I](https://www.uml.edu/catalog/courses/ARTS/2100)
- ARTS.2200 [Web Design I](https://www.uml.edu/catalog/courses/ARTS/2200)
- ARTS.2300 [Typography I](https://www.uml.edu/catalog/courses/ARTS/2300)
- ARTS.2320 [Ceramics I](https://www.uml.edu/catalog/courses/ARTS/2320)
- ARTS.2420 [The Language of Video](https://www.uml.edu/catalog/courses/ARTS/2420)
- ARTS.2560 [Drawing III](https://www.uml.edu/catalog/courses/ARTS/2560)
- ARTS.2570 [Monotypes](https://www.uml.edu/catalog/courses/ARTS/2570)
- ARTS.2590 [Papermaking](https://www.uml.edu/catalog/courses/ARTS/2590)
- ARTS.2660 [Alternative Photo Processes](https://www.uml.edu/catalog/courses/ARTS/2660)
- ARTS.2720 [2D Animation I](https://www.uml.edu/catalog/courses/ARTS/2720)
- ARTS.2730 [Water Media](https://www.uml.edu/catalog/courses/ARTS/2730)
- ARTS.2741 [Storyboarding](https://www.uml.edu/catalog/courses/ARTS/2741)
- ARTS.2760 [Compositing and Motion Graphics](https://www.uml.edu/catalog/courses/ARTS/2760)
- ARTS.2770 [Intro 3D Modeling &Animation](https://www.uml.edu/catalog/courses/ARTS/2770)
- ARTS.2810 [Introduction to Game Design](https://www.uml.edu/catalog/courses/ARTS/2810)
- ARTS.2900 (https://www.uml.edu/catalog/courses/ARTS/2900) Illustration I
- ARTS.2950 (https://www.uml.edu/catalog/courses/ARTS/2950) Studio Workshop Abroad
- ARTS.2960 (https://www.uml.edu/catalog/courses/ARTS/2960) Character and Layout Design
- ARTS.3320 (https://www.uml.edu/catalog/courses/ARTS/3320) Ceramics II
- ARTS.3350 (https://www.uml.edu/catalog/courses/ARTS/3350) Sculpture II
- ARTS.3610 (https://www.uml.edu/catalog/courses/ARTS/3610) Photography II
- ARTS.3670 (https://www.uml.edu/catalog/courses/ARTS/3670) Printmaking II
- ARTS.3710 (https://www.uml.edu/catalog/courses/ARTS/3710) Painting II
- ARTS.3730 (https://www.uml.edu/catalog/courses/ARTS/3730) Professional Studio Photography
- ARTS.3740 (https://www.uml.edu/catalog/courses/ARTS/3740) Animation Studio
- ARTS.3760 (https://www.uml.edu/catalog/courses/ARTS/3760) 3D Animation I
- ARTS.3770 (https://www.uml.edu/catalog/courses/ARTS/3770) 2D Animation II
- ARTS.3780 (https://www.uml.edu/catalog/courses/ARTS/3780) Interactive Media II
- ARTS.3800 (https://www.uml.edu/catalog/courses/ARTS/3800) Special Topics in Art & Design
- ARTS.3820 (https://www.uml.edu/catalog/courses/ARTS/3820) Art & Design of Data Visualization
- ARTS.4350 (https://www.uml.edu/catalog/courses/ARTS/4350) Sculpture III
- ARTS.4550 (https://www.uml.edu/catalog/courses/ARTS/4550) Thought Made Visible
- ARTS.4710 (https://www.uml.edu/catalog/courses/ARTS/4710) Painting III
- ARTS.4910 (https://www.uml.edu/catalog/courses/ARTS/4910) Advanced Studio
- ARTS.4940 (https://www.uml.edu/catalog/courses/ARTS/4940) Directed Studies
- ARTS.4950 (https://www.uml.edu/catalog/courses/ARTS/4950) Advanced Tutorial


Current UMass Lowell students should use their Advisement Report in SIS (https://www.uml.edu/Enrollment/SIS/default.aspx). If you need assistance, please contact your advisor.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further
details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

*Last updated: 4/27/2022.*
AEST.2210 20th Century Art (Formerly 79.221) - Credits: 3

A study of American and European movements in painting, sculpture, and architecture from 1900 to the present. Emphasis is placed on Fauvism, Cubism, Expressionism, Surrealism, International Style, Pop, Op Art, Minimal Art, Photorealism, and Post-Modernism.

AEST.2250 History of Photography (Formerly 79.225) - Credits: 3

Less than 200 years old, photography seems to span millennia. With 1839 as the invention’s launch date, there is no photograph of George Washington, but very soon we are flooded with the faces of composers, painters, and presidents: we know and are reminded of the ravages of civil and world wars, industrial progress and social injustice, or the beauty of pristine landscapes and their ecological demise. In this course, students will become familiar with some 100 notable photographers, from the beginning years of its invention to contemporary times with works by major artists and forgotten visionaries, all serving as a foundation for inspiration and understanding of the art worlds most visible medium. Grading in the course is based on a mid-term and final exam along with a major research paper.

AEST.2310 Aesthetics and Critical Studies Seminar (Formerly 79.231/490) - Credits: 3

The Aesthetics and Critical Studies Seminar introduces a wide variety of artists, designers, images, concepts, movements and theories. The objective of this course is to improve critical awareness and provide a theoretical background to art and design studio courses. Topics to be announced. Course may be repeated.

AEST.2410 Art Serving Political, Religious, & Social Needs (Formerly 79.241) - Credits: 3

The objectives are to study the production of meaning in paintings and frescos, sculpture, stained glass, architecture and other art forms that were commissioned through the church and state patronage system; to analyze how these images are used to represent and define social order; how these images support the patron’s interpretation of history while appealing to aesthetic needs; and ways in which art supported the educational and evangelical aims of church and state. The course will introduce students to the visual and critical language of art produced at this time and analyze works in the context of contemporary history. The thematic focus of this class is designed for Italian cultural studies. No knowledge of Italian is required.

AEST.2800 From Collective to Personal Aesthetics (Formerly 79.280) - Credits: 3

This course is an exploration in aesthetics and culture. The seminar examines a variety of works by contemporary artists and designers; and also introduces important texts by philosophers, art theorists, and critics. Throughout the semester, student will study current trends in visual studies. They will examine a range of works form popular culture to high art and respond to various readings through class discussions and papers. In addition, the course will facilitate intellectual engagement with ones own visual work. Through their research, student will explore the connections between their work and that of other artists and designers. They will situate their artwork within the field of criticism, creating a bridge across the traditional divide between theory and practice.

AEST.3600 Aesthetics and Critical Studies of Graphic Design (Formerly 79.360) - Credits: 3

Examination of the aesthetic theories and practice of graphic design. Significant practitioners of the art will be highlighted.

AEST.3620 Post-digital Aesthetics - Credits: 3

Post-digital Aesthetics explores art after the digital revolution focusing on critical analysis of digital images and environments. We will study how digital technology has transformed art making and also how it impacts the very definition of art. The blurring of boundaries between art, life and design is more than ever evident as human experiences are increasingly mediated through technological devices and high-quality design. The internet has dramatically altered how and why we make art while virtual presence and embodiment in VR bring unprecedented questions about the role of artists and designers in our understanding of the world. This course will be taught as a face-to-face seminar. However, we will also travel beyond the classroom walls into virtual worlds and environments.

AEST.3623 Politics and a photograph - Credits: 3

The course will examine the existing discourses around photography’s role in important individual social and cultural issues. Through lectures, readings, discussions, writing, and creative projects we will explore the medium as inherently political. In the studio portion of the class, students will focus on producing a self-defined body of work that will explore the political dimension of photographic images. Students are expected to be active participants in the course by producing photographic projects, participating in class discussions, and looking and thinking about images and texts beyond those offered in class.
AEST.3700 Strategies of Visual Dissent - Credits: 3
This course will study visual modes of social & political dissent. As an art and design history course, we will examine cases of social, cultural, political repression and the methods used to successfully change those realities. This course focuses on examples of ethical, non-violent, social intervention, education, and calls for action. We will look at history, identify current areas of social concern, study the issues, and create artwork, design, and engagement strategies.

AEST.3800 Understanding Movies: Cinema as Social Commentary (Formerly 79.380) - Credits: 3
This film theory seminar has several main objectives: to study the production of meaning in films; to analyze how moving images are used in social representation; and to introduce students to the visual and critical language of cinema. In this course, we will view a series of films by international authors. These address some of the most pressing issues of today's global world such as identity, subjectivity, difference and otherness, race relations, representations of gender and sexuality, immigration, war, colonialism and post-colonialism, poverty, and social inequalities. The films that we watch will be studied not as isolated cinematic texts but as illustrations and examples of theories of representation. Students will develop their critical analysis skills by being introduced to theoretical concepts such as "the gaze" in art and cinema as well as formal elements such as mise-en-scene, cinematography, editing, and sound.

AEST.4900 Aesthetics and Critical Studies Seminar (Formerly 79.231/490) - Credits: 3
The Aesthetics and Critical Studies Seminar introduces a wide variety of artists, designers, images, concepts, movements and theories. The objective of this course is to improve critical awareness and provide a theoretical background to art and design studio courses. Topics to be announced. Course may be repeated.

AEST.4940 Directed Study in Aesthetic Concepts (Formerly 79.494) - Credits: 3
An individual supervised research project relating to questions of aesthetic interpretation and understandings. Fall and Spring.

AEST.4960 Practicum Experience in Aesthetic Concepts (Formerly 79.496) - Credits: 3
A program of on-campus and/or off-campus experiences for art majors only. Specific requirements will vary depending upon department policies and the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural or artistic area and for applying techniques of problem solving and/or credits. Students will be graded "satisfactory" or "unsatisfactory". Fall and Spring.

ARTS.1010 Art Concepts I (formerly 70.101) - Credits: 3
Art Concepts I will focus on learning the visual language of the creative process through an examination of the principles of two-dimensional visual organization. These fundamental basics form the underlying structure of all studio and communication arts. Through slide lecture, guest lecturers, field trips, and studio projects, students will begin to understand the many forms that visual expression takes. The course will develop creative problem solving skills and students will learn to respond to personal challenge. Students will also be instructed in the principles of professional execution and be introduced to diverse modes of thought, media, and aesthetic expression. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS).

ARTS.1020 Art Concepts II (formerly 70.102) - Credits: 3
Art Concepts II will focus on learning the visual language of the creative process through an examination of the principles of three-dimensional visual organization. These fundamental basics form the underlying structure of architecture, environmental graphic design, product design and sculpture. Through slide lecture, guest lecturers, field trips, and studio projects, students will begin to understand the many forms that three dimensional expression takes. The course will develop creative problem solving skills and students will learn to respond to personal challenge. Students will also be instructed in the principles of professional execution and be introduced to diverse modes of thought, media, and aesthetic expression. Art majors only. Fall and Spring.

ARTS.1130 Digital Foundations (Formerly 70.113) - Credits: 3
This course explores the computer as a tool of the visual language. Topics include raster and vector-based image making, art for the internet & mobile devices, and current image capture and output methods. This course will introduce Photoshop, Illustrator, Flash and a basic programming with the aim of expanding the artist’s toolkit. Lectures, readings, and discussions will provide an overview of history and contemporary ideas on the use of computers in art. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

ARTS.1140 The Creative Process (formerly 70.114) -
Credits: 3

This course explores the relationship between the creative process, self-expression and communication, through the visual arts. The creative process is first explored broadly as a problem-solving tool applicable to all fields of human endeavor. The student then experiences the creative process in studio explorations and the creation of art works with an emphasis on process rather than product with the goal of broadening the basis for student self confidence in creative skill development, originality, critical thinking/writing, the use of information technology resources, and appreciation of the visual arts as a powerful vehicle for communication.

ARTS.1150 Drawing for Non-Art Majors - Credits: 3

This introductory drawing course is intended for students with little or no drawing experience. It is a studio art course involving the learner in a hands-on approach to basic drawing and composition. Learners explore, comprehend, and employ the basic elements and principles of art, use various graphic media and become familiar with the vocabulary, concepts and techniques of drawing.

ARTS.1160 Graphic Design for Non-Majors - Credits: 3

In this course, non-major students with an interest in Graphic Design will be introduced to design and typography fundamentals and how they apply to both print and screen-based media. In a variety of assignments, students will learn design process, image-making and layout, writing and responding to a client brief, including brand identity creation and a social awareness project. They will work with the Adobe Creative Cloud programs Illustrator, Photoshop and InDesign and be able to execute their designs using the appropriate software. This class will meet once a week for 3 hours.

ARTS.1170 An Introduction to the Language of Painting - Credits: 3

This is an introductory course which is designed for students who have either no or minimal painting experience. Focusing on the basic elements of painting, both in theory and practice there will be an emphasis on the familiarization of materials and techniques. Over the course of the semester, students will develop a greater fluency and larger understanding of the visual and material vocabulary of painting. Over the course of the semester, an emphasis is put on developing the student’s ability to critically evaluate their work, contributing to the development of their individual vision.

ARTS.1350 Kinetic Projects (Formerly 70.135) - Credits: 3

Kinetic Projects is a hybrid course designed for a variety of majors to explore the intersections between mechanical engineering and sculpture. In this project-driven class, students will learn principles and practice in both the fields of engineering and art, and put them into practice by creating functioning kinetic objects to be displayed in a public setting. The course will also include guest lectures from practitioners in Art and Engineering. The course provides an introduction to technical communications, teamwork, data analysis, computer coding, computer-aided drafting/design/modeling program usage, prototyping techniques, report-writing and/or oral presentation.

ARTS.1550 Drawing I (formerly 70.155, 70.255) - Credits: 3

Provides a foundation in basic drawing concepts using a variety of media and approaches. The emphasis is on building visual literacy and its application to the realm of ideas. A wide range of assignments are given to develop graphic expression.

ARTS.1560 Drawing II (Formerly 70.156, 70.256) - Credits: 3

The emphasis is on giving form to ideas through building a solid sense of visual literacy. Assignments include a wide range of color media, surface, and subject matter with the focus on the psychological and structural use of color, creative experimentation, and the development of personal style. Fall and spring.

ARTS.1610 Introduction to Photography (formerly 70.161) - Credits: 3

Photography for Non Majors. Students learn how to transform the three-dimensional world before their eyes into the two-dimensional world of photography utilizing the human invention of the lens and camera. They come to appreciate the role photography plays in composition, lighting, and concept creation. Does not count towards a BLA minor or a BFA degree. AH.

ARTS.2010 Form And Content (formerly 70.201) - Credits: 3

Form and Content is considered the capstone course of the Art Foundations Requirement. Through a variety of studio assignments and individual projects students will explore the integration of humanities related concepts and develop an understanding of how visual artists think, live and function in the twenty first century. As part of the course requirements students will participate in the foundations exhibition at the end of the semester. Art majors only. Fall and Spring.
ARTS.2100 Graphic Design I (Formerly 70.210) - Credits: 3

Exercises, lectures and projects will introduce students to graphic design principles and techniques. Course will begin with a fundamental study of image, form, and space relations, then cover such topics as working with grids, typography basics, page layout, the introduction of color, rendering techniques, denotative and connotative image making, history, and more. Students will be assigned a series of projects to enhance their visual communication skills. Students will be introduced to the software used in contemporary design practice. Students must earn a C+ or better in the course to continue in the Graphic Design BFA program.

ARTS.2200 Website Design I (formerly 70.220) - Credits: 3

This course will focus on the creation of visual content for the web and will explore what constitutes a visually exciting and engaging site. Other topics that will be covered are: file formats, compression, web color strategies, and platform standards. Basic familiarity with Mac OS and/or Windows platforms required.

ARTS.2210 Practicum/Internship (formerly 70.221) - Credits: 3

The Practicum/Internship is an on-campus or off-campus learning experience. Specific requirements will vary depending on department policies and the nature of the program undertaken by the student. The practicum experience is to provide an occasion for practical experience in an area of particular interest to the student.

ARTS.2300 Typography I (Formerly 70.230) - Credits: 3

This introductory typography course is for students interested in visual communication, type and its use. Students begin the semester working with a single letterform and numeral and end the semester researching and design and entire book. Proper typographic systems must be used including a detailed look at page layout software, creating grids, working with "style sheets" and the finer points of setting typography. We will also explore how to transfer these skills and concepts for use in screen-based media. This is a project based course which contains visual, written, and research components. Students will be introduced to the software used in contemporary design practice. Students must earn a C+ or better in this course to continue in the Graphic Design BFA program.

ARTS.2320 Ceramics I (formerly 70.232) - Credits: 3

Learn the basics of working with clay with a focus on traditional Khmer hand building and surface carving practices. Hand building techniques including slab construction, coil pinch, low relief carving, slip joinery, and additive processes to create vessels and sculptures will be covered as well as glazing, color, and traditional wood kiln firing processes. Students make sculptural and functional forms to fire in a Cambodian style environmentally green smokeless wood burning kiln. Course is suitable for both beginners and intermediate ceramists. This is a General Education elective in arts & humanities.

ARTS.2330 Khmer Ceramics - Credits: 3

Learn the basics of working with clay with a focus on traditional Khmer hand building and surface carving practices. Hand building techniques including slab construction, coil pinch, low relief carving, slip joinery, and additive processes to create vessels and sculptures will be covered as well as glazing, color, and traditional wood kiln firing processes. Students make sculptural and functional forms to fire in a Cambodian style environmentally green smokeless wood burning kiln. Course is suitable for both beginners and intermediate ceramists. This is a General Education elective in the arts & humanities.

ARTS.2350 Sculpture I (formerly 70.235) - Credits: 3

The exploration of three-dimensional form through the use of basic materials, methods and approaches. Assignments will include expressive problems based on human and non-objective form relationships. Spring.

ARTS.2420 Language of Video (formerly 70.242) - Credits: 3

An introductory course in video camera principles and editing functions. Utilizing writing and still photography, students will explore the language of video in both images and sound as they produce factual documents and/or personal fiction.

ARTS.2560 Drawing III (formerly 70.256) - Credits: 3

This advanced course in drawing is designed to help students develop the expressive and conceptual concerns of their drawing practice while developing their ability to work in an independent manner. Designed for students in all disciplines, the course will emphasize the development of strong research skills through the exploration of historical and contemporary modes of drawing. The class will be combination of studio work, presentations, and individual and group critiques. Critiques are designed to provide feedback and to encourage and nurture each student's vision. Exploring a variety of drawing media, the ultimate goal of the course is the development of a visually coherent and conceptually unified body of work.
ARTS.2570 Monotypes (formerly 70.257) - Credits: 3
Exploration of the one-of-a-kind "painter's print ". Emphasis is on the development of personal expression through a variety of assignments and techniques. Three portfolios of prints are required, two with assigned topics, and one with a self-assigned theme. Fall, alternate years.

ARTS.2590 Papermaking (formerly 70.259) - Credits: 3
The papermaking course is designed to explore paper, not just as a surface to receive an image, but as a material capable of being an artistic expression in and of itself. The course will explore the processes and techniques of making images in handmade paper, making images on handmade paper, making visual designs out of handmade paper and casting handmade paper into three-dimensional sculptural forms. Spring, alternate years.

ARTS.2610 Photography I (formerly 70.261) - Credits: 3
A foundation course that covers the basic analogue and digital camera techniques, as well as aesthetic principles, Student learn to make, develop and print their own photographs.

ARTS.2620 Digital Imaging and Photography: Photoshop (formerly 70.262) - Credits: 3
This course will offer the student a transition between traditional photographic imaging and digital photographic imaging. The course will cover the fundamentals of digital scanning, digital capture and image manipulation. Image preparation for other media will also be explored. Basic familiarity with the Mac OS and/or Windows platforms required. 6 Contact Hours required for Day School students.

ARTS.2660 Alternative Photo Processing (formerly 70.266) - Credits: 3
Alternative Photo Processing give the serious photography student an opportunity to Learn historic and contemporary alternative processes such as Cyanotype, Van Dyke Brown, Kallitype, Palladium, and Image Transfers. Alternative methods of creating negatives utilizing photocopiers, inkjet printers, Clich Verre, and Acrylic Lifts will give student the opportunity to make handmade photographs with and without a camera.

ARTS.2670 Printmaking (formerly 70.267) - Credits: 3
An introduction to basic printmaking processes and aesthetics with the emphasis on etching. The approach is concept oriented, emphasizing experimentation and exploration on an individual level to communicate ideas. Fall.

ARTS.2690 Color (formerly 70.269) - Credits: 3
A course in the systematic study of color and color theory to sharpen visual acuity, stimulate creativity and develop a greater facility in the use of color.

ARTS.2700 Figure Drawing (formerly 70.270) - Credits: 3
The study of the draped and undraped figure from life, stressing both sound observation and the creative use of human form as a vehicle for personal expression. A variety of assignments, graphic media, and approaches will be given in order to help explore both philosophical and aesthetic issues. Fall, alternate years.

ARTS.2710 Painting I (formerly 70.271) - Credits: 3
Presents oil painting techniques as vehicles for serious creative expression. A variety of assignments will be given to help the student build proficiency in the use of color, paint handling, and subject matter.

ARTS.2720 2D Animation I (formerly 70.272) - Credits: 3
This course will provide students with the fundamental understanding about the process and the concepts in animation for narrative and experimental expression. Preproduction including scripting and storyboarding will be especially emphasized. Hybrid techniques in both traditional and digital animations including hand-drawing, stop-motion, rotoscoping, pixilation as well as tweening will be introduced. Static and kinetic aesthetics of moving images will be explored through the review of historic and contemporary animations, and through the production. Students from this course will make a much smoother transition to 3D animation courses, Language of Video, Interactive media as well as Web Design/Art. The course will also introduce the student to historical and contemporary perspectives related to the discipline.

ARTS.2730 Watercolor (formerly 70.273) - Credits: 3
The technical and creative use of water based media as they apply to fine arts and graphic design. Assignments in acrylic, gouache, watercolor, and ink are designed to stimulate independent thinking. A final self-assigned project is required.

ARTS.2741 Storyboarding and Comics (formerly 70.274) - Credits: 3
This course focuses on applying industry-standard storyboarding and storytelling techniques to animation. Contents to be covered include the various purposes and formats of storyboards, the basic terminology and concepts used in storyboarding, and the application of storyboarding techniques to the creation of storyboards with or without a written script.

ARTS.2760 3D Modeling and Animation I (formerly 70.276) - Credits: 3

This course will focus mainly on the forms, materials, and composition of 3D computer graphics in the various environments. Students will explore the possibility of 3D computer graphics for creative expression as well as innovative visual communications such as animation, game, sculpture, print and design. Rendering, lighting and camera as well as material and texturing techniques will be also explored. The course will also introduce the student to historical and contemporary perspectives related to the discipline.

ARTS.2770 Compositing and Motion Graphics (formerly 70.277) - Credits: 3

Students in this course learn the concepts, techniques and vocabulary of compositing and motion graphics in animation using Adobe After Effects. Students will produce animated videos, motion graphics and montages integrating image manipulation applications and other image processing support.

ARTS.2780 Interactive Media (formerly 70.278) - Credits: 3

This course provides students with the ability to create interactive motion graphics for Multimedia projects using Adobe Flash and Adobe After Effects. Students learn how to make sophisticated vector and pixel based graphics with basic action scripting and a variety of interactive graphic elements as well as compositing, editing, character rigging, effects for digital media and animation.

ARTS.2900 Illustration I (formerly 70.290) - Credits: 3

This course will provide students with an understanding of the creative, visual and formal aspects of the applied art of illustration. Project challenges will be based on several real-world applications of illustration in a variety of genres including editorial, sequential narrative, portrait, nature and product application. The course includes an introduction to different illustration media, the stages and process of creating illustrations and learning about both contemporary and historic illustrators. They will be encouraged to develop unique thinking and conceptual approaches as they hone their artistic voice. Students will learn to communicate ideas and develop content through research, discussion, sketching, critique and creating.

ARTS.2950 Studio Workshop Abroad (formerly 70.295) - Credits: 3

In this course students will make a portfolio of small works and take them abroad to exhibit internationally. While on tour, participants will create further works by interaction with their surroundings, take visual notes, and collect items to broaden artistic practice upon return home. Participants are to generate work that develops their own artistic voice, explores and expresses their visions open to the surrounding foreign cultural influences. As this course takes place largely abroad, the unique challenges of interpreting culture, representing profound experience, and learning from a mix of ancient and modern sources will frame artistic investigations.

ARTS.2951 BioArt Workshop in Portugal - Credits: 3

This is an interdisciplinary course that combines art and science a Cultivamos Cultural in San Luis Portugal. The intersection of Art, Biology and the Environment offer unique opportunities to visual artists. This innovative summer course, which is already on its fourth edition, will allow non-specialists to acquire theoretical and practical skills in biological and environmental sciences in connection to the visual arts. The Summer School explores the interdisciplinary relationship between art, line and environmental sciences through hands-on exercises, combining theory and practice in an informal environment, e.g.: seminars, debates, visits, and the creation of artworks with biological media.

ARTS.2960 Character and Layout Design (formerly 70.296) - Credits: 3

This course is designed for students to understand the fundamentals of character and layout design for Animation. Students will focus on rendering life forms in space. Emphasis will be placed on the anatomical structure of characters as well as practical and aesthetic elements of pre-production. Shot design, composition, staging, mood, texture and lighting for layout and background design will be covered in this course as well. Students will also learn the basics of using props a background and foreground design elements.

ARTS.2970 Studio Workshop (formerly 70.297) - Credits: 3

Presents a study of studio problems in visual structures and organization, as well as an exploration of various media and techniques. Topics will vary. This course may be repeated.

ARTS.2980 Book Arts (formerly 70.298) - Credits: 3
Book Arts will engage students in the design and fabrication of handmade, one-of-a-kind artists books. A wide variety of material and processes will be investigated. Students will learn how to produce compelling book structures for visual and graphic content. The course will introduce students to the history of Eastern and Western methods of bookmaking as well as the contemporary practice of one-of-a-kind conceptual artists books. The three-dimensional possibilities of bookmaking will also be explored.

ARTS.3100 Graphic Design II (formerly 70.310) - Credits: 3

Students will continue improving their visual communication skills, and develop their ability to take a project to its final stage and render it as a professional portfolio piece. In a variety of print, screen-based, interactive, and time-based projects, students will be expected to conceive inventive, conceptual solutions to design problems. Building on design fundamentals, students are encouraged to maintain consistent, sophisticated design systems and explore various types of image-making. While strengthening their technical proficiency and design process, students will learn to apply concepts to multi-format project deliverables. Common projects include brand identity systems, dat visualization, publication design, poster design, packaging, design for screens, and motion design. Students must earn a C+ or better in this course to continue in the Graphic Design BFA program.

ARTS.3150 Packaging and Point of Purchase - Credits: 3

This course explores design in a physically three-dimensional space, such as packaging and environmental graphics. Through multiple projects students learn packaging systems, the billboard effect and how designs live and interact in their physical space. Improving form, industrial design and sustainability are challenges this course will explore. This course expands to touch on printing techniques and constraints, die lines and conceptual design beyond the screen.

ARTS.3200 Web Design II (formerly 70.320) - Credits: 3

This advanced-level course is designed for students who have completed Website Development (90.238) and Website Design (70.379). The course will cover advanced topics such as user-centered design, information architecture, testing, and usage analysis. Students will have the opportunity to further develop their design, development, and conceptualization skills.

ARTS.3300 Typography II (formerly 70.330) - Credits: 3

Continuation of 70.230

ARTS.3320 Ceramics II (formerly 70.322) - Credits: 3

Building on Ceramics I as an introductory course, Ceramics II will ask the student to explore functional and nonfunctional ceramic form. Students will be expected to challenge themselves with scale, advanced glaze methods and they will become familiar with kiln firings. Historical and contemporary issues in ceramics will be covered through lectures, slide presentations and critiques.

ARTS.3350 Sculpture II (formerly 70.335) - Credits: 3

A course allowing the student to further develop his or her techniques and understanding of sculptural form, leading to a more personal vocabulary. Conventional techniques will be extended to cover more contemporary materials and methods. Spring, alternate years.

ARTS.3610 Photography II (formerly 70.361) - Credits: 3

This is an intermediate course that will build on the experience of Photography I and further emphasize the medium as a complex cultural practice with its many approaches. Students will be asked to conceive, research and execute a long-term project as a culmination of the semester which will take a format of a photo book. Weekly instructions, lectures, demonstrations, and assignments are aimed at helping students further enhance their conceptual and technical skills, and to allow them to form their own vision and approach to the medium. Advanced digital camera and inkjet printing techniques will be taught along with the proper exhibition practices. Ideas related to contemporary, historical, and aesthetic concerns of the medium will be extensively explored. A meaningful portion of the course will be dedicated to reading, discussion, and critique of work in progress. Students are expected to be self-motivated and work independently.

ARTS.3670 Printmaking II (formerly 70.367) - Credits: 3

This course builds on the printmaking techniques and aesthetic issues explored in Printmaking and Monotypes, using advanced methods in relief, intaglio and silkscreen to further develop individual aesthetic and conceptual goals. Students will use studio work, critique discussion, writing and research to explore cultural, conceptual and historical issues at the heart of printmaking. High levels of quality in imagery, increased technical proficiency and conceptual development are expected in the creation of work throughout the semester. Studio work is done during and outside of class time, along with image lectures, technical demonstrations and critique discussions.
ARTS.3680 Relief Printmaking - Credits: 3
Relief Printmaking focuses on western relief printmaking using subtractive methods with carving tools on linoleum and wood to produce both single and multicolor prints. Presentations will explore and show examples of the historical and contemporary use of relief printmaking as an accessible method to distribute information and imagery and also as a means to produce a fine art print. Emphasis will be given on relief technique building using a printmaking press, traditional printmaking tools, shop etiquette and exploratory research to tie each individual students’ concepts and interests to the imagery they create.

ARTS.3710 Painting II (formerly 70.371) - Credits: 3
Designed to allow students to develop individual style and approach to content through a series of self-initiated paintings. Students will work closely with the instructor to develop a cohesive series that has a sound philosophical and aesthetic basis. Spring, alternate years.

ARTS.3711 Place: A Visual Exploration of Lowell (Formerly ARTS.2711) - Credits: 3
This studio course is designed for students who have an interest in making images to explore the concept of "place", using the landscape of Lowell as a creative resource. Open to all university students, the course is structured for students who are new to the arts as well as students who have previous studio art experience. Drawing upon the unique features of the particular landscape that is the city of Lowell, students will build a body of images that is a response to the geographical and cultural histories evident in the city’s physical attributes. From its history as the center of industry and textile design to the present day, the city will be viewed as raw material for the conceptual foundation of the work produced in this course. (Class will meet both on and off-campus.)

ARTS.3730 Professional Photography (formerly 70.373) - Credits: 3
A professional level course in advertising product and studio portrait photography. Students will learn view camera techniques as well as principles of lighting using strobe equipment. Fall, alternate years.

ARTS.3740 Animation Studio (formerly 70.374) - Credits: 3
This course focuses on applying industry-standard storyboarding, character and layout and background design and scripting techniques to animation. Contents to be covered include the various purposes and formats of storyboards, the basic terminology and concepts used in production, and the application of production techniques to the creation of animated films with or without a written script and the production process of an animated film from idea to execution of complete film.

ARTS.3760 3D Modeling and Animation II (formerly 70.376) - Credits: 3
Students will learn the fundamentals of computer generated 3D modeling and animation. The emphasis will be on 3D character creation and the fundamental process of animation production including: concept development, organic modeling, rigging, posing, character animation, rendering and post-production. The course will also introduce the student to historical and contemporary perspectives related to the discipline. Various independent short animations will be screened for aesthetic and critical inquiry with the lectures dedicated to production techniques. The course will also introduce the student to historical and contemporary perspectives related to the discipline.

ARTS.3765 Adaptive Devices for Better Life - Credits: 3
In this interdisciplinary course, students and professors from Art and Design and Physical Therapy and Kinesiology will collaborate with a hospital partner to create adaptive devices to improve the lives of children with disabilities. Students will work in small, interdisciplinary teams to invent devices to better facilitate the daily activities of children with disabilities, such as customized spoons and creating VR wheel chair training. Class time will consist of demonstrations, studio/production, visits to the hospital for testing and consultation, and final presentation to patients, therapists, and potential investors. Numerous production work flows, including 3D modeling, 3D scanning, 3D printing, VR sculpting, and physical object making with various materials will be utilized.

ARTS.3770 2D Animation II (formerly 70.377) - Credits: 3
This course focuses on applying industry-standard storyboarding, character and layout design and scripting techniques to animation. Contents to be covered include the various purposes and formats of storyboards, the basic terminology and concepts used in production, and the application of production techniques to the creation of animated films with or without a written script and the production process of an animated film from idea to execution of complete film.

ARTS.3780 Interactive Media II - Credits: 3
This course will immerse students in interactive storytelling. The class will investigate time-based interactive media practices
and feature hands-on lab projects. The course will contextualize interactivity within the relevant history shaping contemporary storytelling. Students will engage with exemplary interactive media projects as well as survey experimental ones. The students will apply design thinking, user experience design (UX), and media archaeology to increasingly self-directed projects. The course will engage in cross-platform content publishing to browsers, mobile devices, and emergent technology platforms such as Virtual Reality.

ARTS.3800 Special Topics in Art & Design - Credits: 3
Topics of current interest in Art & Design.

ARTS.3811 Game Design: Narrative (formerly ARTS.2810 Introduction to Game Design) - Credits: 3
The goal of this course is to introduce students to game design. Students will begin by creating basic tabletop games that take advantage of the playful classroom environment where different ideas and narratives can be quickly prototyped, played, and evaluated. Students will move to digital game creation for the screen using an industry standard game engine (Unity). The course includes exercises, lectures, readings, and two main projects. Students will be able to analyze the mechanics, dynamics, and aesthetics of games, create unique and innovative prototypes or games, contextualize class productions in the context of new media art and/or mainstream culture, work collaboratively in a group context, and learn the basics of a screen-based game engine.

ARTS.3820 Art & Design of Data Visualization - Credits: 3
This course focuses on applying foundations of artistic information graphics and data visualization to increasingly self-directed data driven projects. Participants will use data from various sources and engage diverse topics. The course covers the various purposes and formats of data visualization, the basic terminology and concepts used in the field, and the application of design techniques to the creation of static and interactive creative displays powered by data sets of varying sizes. Elements of typographic design, layout, and color theory will be used to sharpen communication and make projects accessible. The theory of information visualization will be balanced with hands on use of proprietary and open source tools including Adobe, Spreadsheets, and scripting (e.g. JavaScript).

ARTS.3950 Advertising Design Studio (formerly 70.395) - Credits: 3
This course introduces the components and principles of advertising design. Students will learn to develop strategic approaches to creating compelling ad campaigns for print and cross platform related media as they gain an understanding of the synergy between art and copy. The course covers how to write effective creative briefs, create storyboards, use social media, make engaging presentations and work as part of a team. Projects include both product, service and social campaigns, a unique self-promo piece, and working with real clients. In addition, students will learn how to negotiate and communicate in the advertising field with respectful and empowering language.

ARTS.3970 Art and Copy (formerly 70.397) - Credits: 3
The real world of advertising incorporates selling words and memorable images in a dynamic visual/verbal design unit. As copywriters and art directors, students learn to think pictures and see words as they prepare advertising campaign concepts for a variety of products and media, including print and television. Spring, alternate years.

ARTS.3980 Documentary Image (formerly 70.398) - Credits: 3
In a world of increasing manipulation, documentary photographs still astound us with their visual truths. In this course, students will utilize words and images "the primary tools of the photojournalist " to explore the significant issues of our time. Works by Fenton, O'Sullivan, Gardner, Riis, Hine, Bourke-White, Lange, Smith, Davidson, Salgado, Mark and others are studied for content, style, and inspiration. Fall, alternate years.

ARTS.3982 Study Abroad / Photography in the Azores - Credits: 3
A photograph as a witness is the primary concern of this course. The meaning of any photograph is determined by several cultural, social, and historical contexts. This class explores theses issues through visits to local Azorean communities and with a trip to the Azores. Photographers are bound by an invisible social contract of either reaffirming or questioning the world surrounding them. During this course, students will consider the mythologies of hierarchy and objectivity permeating the concept of documentary photography. Social engagement through work with the local community will be a large component of this course.

ARTS.4100 Graphic Design III (Formerly 70.410) - Credits: 3
Students will drive their own content creation to solve visual, conceptual and technical problems through independently and collaboratively-generated analysis, evaluation, and refinement. Through research, they will create an extensive multi-part
project that addresses communication design (audience, messaging, interaction/experience) and representation of an idea across multiple elements in a system. The visual strategy should explore a brand language and system, and be applied to print and screen-based deliverables including, but not limited to: brand identity guidelines, packaging, website/app, print and social media advertising, and promotional motion graphics. They will write about and document their process throughout, and present final work in a professional presentation. Students must earn a C+ or better in this course to continue in the Graphic Design BFA program.

ARTS.4110 Design In Motion (formerly 70.411) - Credits: 3

The course aims to provide students with an understanding of the creative, visual and formal aspects of time based communication and motion graphic design from both a contextual and technical point of view. Designers, with their comprehension of the principles of graphic design, typography and theories of visual communication will develop a knowledge and understanding of processes and techniques involved in creating time-based media including title sequence design. Projects Introduce students to time-based visual communication environments. Unique conditions influencing the roles of story boarding, planning, typography, graphics, symbolic systems, narrative, sound and time.

ARTS.4150 Advanced Graphic Design Exploration - Credits: 3

This advanced graphic design studio elective encourages students to question the purpose of graphic design in the context of our current world, parallel existences, and possible futures. Drawing from historical and contemporary design influences, they will develop a personal methodology to form making. Building upon their fundamental knowledge of design, they will explore and test current skills and technology (use of online and digital solutions such as AR, motion and web). Using critical theory and research, they will consider their future roles in the industry and speculate and design for: brand identity guidelines, packaging, website/app, print and screen-based deliverables including, but not limited to. The visual strategy be stressed.

ARTS.4300 Typography III (Formerly 70.340) - Credits: 3

Typography III is a course in typographic theory and practice. This is a project based course, which includes a visual, research and writing component. During this course students, will create at least two grid systems and use them as primary units of organization. Students will apply typographic systems and basic interaction principles to two complex, text/image structures: a book and a series of web pages. Through readings, lectures and projects/critiques, you will be introduced to various theoretical approaches to the typographic page, as well as various approaches to designing interactive structures (book, web page/site) that hold and present typographic content. Students must earn a C+ or better in this course to continue in the Graphic Design BFA program.

ARTS.4310 Publication Design - Credits: 3

This is a book design course. using the typographic knowledge acquired in Typography I and Typography II, students will explore 3 forms of book design (traditional, digital, handmade) + 3 types of content (fiction, non-fiction, call-to-action).

ARTS.4350 Sculpture III (formerly 70.435) - Credits: 3

Sculpture III will allow students with a continued, special interest in three-dimensional media and installation art to find their personal visual voice and begin to develop a structured studio practice. Students will be asked to identify a conceptual theme for the semester that they will explore through research, development and execution in a series of installation works. The course will introduce and expand on contemporary media and methods not covered in Sculpture I and II. Verbal analysis and articulation of the final sculptural works will continue to be stressed.

ARTS.4550 Thought Made Visible - Credits: 3

This seminar based studio course is designed to enable students to expand their research in the painting and sculpture disciplines through focused individual investigation. The course will involve theoretical readings, lectures, and critiques associated with contemporary studio artist practices. Two of the primary objectives of the course are: (1) for students to broaden the conceptual foundation of their work while continuing to develop their personal direction and (2) to begin to think independently and be critical of their work beyond an assignment based pedagogy.
ARTS.4600 The Entrepreneurial Hustle for Creatives - Credits: 3
This course explores how students can advance and maintain sustainable creative careers with a combination of freelance clients, developing business and entrepreneurship opportunities, how to grants and how to the public request for proposals process. Through class presentations, discussions, research, and related assignments, this course provides an overview as of the components needed to be successful in today's art market. Topics include the Artist and Designer as Entrepreneur, setting up our own business, Live/Work Income and Expenses, Reputation and Recognition, Goal Setting, Creating your own Opportunities, Specific Markets and Marketing skills, Legal &Contract Issues, and Fundraising.

ARTS.4610 Photography Workshop (formerly 70.461) - Credits: 3
An advanced course in photography that will blend seminar-style discussions and studio practice. An emphasis will be made on critical thinking, research and analysis alongside developing problem solving strategies that could be applied to creative practice. Students will produce a portfolio of creative work upon completion of the course.

ARTS.4710 Painting III (formerly 70.471) - Credits: 3
The focus of this class is to give individual students the opportunity to work in an independent manner, expand their ideas and develop the ability to articulate both conceptually and formally the needs of their own work. The class combines studio work, presentations, visiting lecturers and individual and group critiques, with an emphasis on understanding and embracing risk as a necessary component of a painter's studio practice. Critiques are designed to provide feedback, encourage, challenge, and nurture each student's vision. Assignments are given on an individual basis. Students are expected to support their work by research of both historical and contemporary art.

ARTS.4760 3D Animation II - Credits: 3
In this course, students will utilize industry standard 3D modeling and animation software to effectively animate 3D characters and bring them to life. With hands-on exercises and demonstrations, students will learn how to move 3D rigged characters using body mechanics, lip-synching animation, dialog between characters, acting, and motion capture technology.

ARTS.4811 Game Design II (formerly 70.381/ARTS.3811 Advanced Game Design) - Credits: 3
This advanced level course is designed for students who have completed Interactive Game Design and who are interested in exploring interactive game strategies and multilevel game design. Basic familiarity with Mac OS and/or Windows platforms required.

ARTS.4910 Advanced Studio (formerly 70.491) - Credits: 3
In order to enable students to expand expression in areas of their choice, they may repeat any studio course that is the most advanced offered in that given subject. They will be given more freedom within assignments and be expected to perform on a more advanced level.

ARTS.4920 Advanced Studio (formerly 70.492) - Credits: 3
In order to enable students to expand expression in areas of their choice, they may repeat any studio course that is the most advanced offered in that given subject. They will be given more freedom within assignments and be expected to perform on a more advanced level. Fall and Spring.

ARTS.4930 Senior Studio I (formerly 70.493) - Credits: 3
Senior Studio I is one of the two capstone courses of the Bachelor of Fine Arts program in the Art Department. Students are required to research, develop and produce a mature, coherent and substantial body of work representing 6 credits (in a two course sequence) that will be presented to the faculty for evaluation as well as exhibited to the public in the BFA Senior Studio exhibition. Enrollment restricted to majors in BFA program. Senior Studio k will focus on research, professional portfolio, resume and artist statement.

ARTS.4940 Directed Study (formerly 70.494) - Credits: 1-3
A special problem in studio art is investigated through conferences and studio work.

ARTS.4950 Advanced Tutorial (formerly 70.495) - Credits: 3
A program of directed studies which affords the advanced students an opportunity to pursue a previously explored problem in greater depth. The purpose is to sharpen and refine skill, content and presentation.

ARTS.4970 Senior Studio (formerly 70.497) - Credits: 6
This course is designed to culminate four years of art experience for the BFA studies. The development of personal approach to media and idea is emphasized. Each student will be responsible for developing a self-assigned thematic concern. No assignments will be made by the instructor who will act only as an advisor and coordinator. Course evaluation is by the Senior Studio Review Committee. Enrollment restricted to majors in BFA program. Fall and Spring. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL), Critical Thinking & Problem Solving (CTPS) and Information Literacy (IL).

ARTS.4980 Senior Studio II (formerly 70.498) -
Credits: 3

Senior Studio II is one of the two capstone courses of the Bachelor of Fine Arts program in the Art Department. Students are required to research, develop and produce a mature, coherent and substantial body of work representing 6 credits (in a two course sequence) that will be presented to the faculty for evaluation as well as exhibited to the public in the BFA Senior Studio exhibition. Enrollment restricted to majors in BFA program. Senior Studio II will focus on research, capstone project presentation and a process book.
College of Fine Arts, Humanities & Social Sciences

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A student's catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

American Studies

- General Option
  - fall 2015 and beyond
  - Thematic Option
    - fall 2021 and beyond

Art

- Animation & Interactive Media Concentration
  - fall 2017 and beyond
- Graphic Design Concentration
  - fall 2015 - spring 2020
- Studio Art Concentration
  - fall 2022 and beyond

Composition for New Media

- fall 2022 and beyond
- fall 2019 - spring 2022

Criminal Justice

- General Option
  - fall 2022 and beyond

Corrections Option

- fall 2016 and beyond
- Police Option
  - fall 2022 and beyond
- Homeland Security Option
  - fall 2016 and beyond
- Violence Option
  - fall 2016 and beyond
- Crime and Mental Health Option
Digital Media
- fall 2021 and beyond

Economics
- fall 2015 and beyond

English
- Literature Concentration
  fall 2021 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2021
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Journalism & Professional Writing Concentration
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Creative Writing Concentration
  fall 2018 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Theatre Arts Concentration
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Graphic Design
- fall 2021 and beyond
- fall 2020 - spring 2021
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

History
- fall 2020 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Liberal Arts
- fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Music Studies
- General Option fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Instrumental Option fall 2015 - spring 2018
  prior to fall 2015
- Voice Option fall 2015 - spring 2018
  prior to fall 2015

Music Performance
- Instrumental Option fall 2022 and beyond
  fall 2019 - spring 2022
  fall 2015 - spring 2019
  prior to fall 2015
- Voice Option fall 2022 and beyond
  fall 2019 - spring 2019
  prior to fall 2015

Music Business
- fall 2022 and beyond
- fall 2015 - spring 2022
- prior to fall 2015

Peace and Conflict Studies
- fall 2021 and beyond
- fall 2015 - spring 2021
Philosophy

- General Option
  fall 2015 and beyond

- Communications & Critical Thinking Option
  fall 2015 and beyond

- Philosophy & Religious Studies Option
  fall 2015 and beyond

Political Science

- American Politics Concentration fall 2020 and beyond
- International Relations and Comparative Politics Concentration fall 2020 and beyond
- Law and Politics Concentration fall 2020 and beyond
- Political Communication and Public Opinion Concentration fall 2020 and beyond
- Sustainability and Environmental Politics Concentration fall 2022 and beyond

Political Science (prior to fall 2020)

- fall 2015 - spring 2020
- fall 2013 - spring 2015

Psychology

- General Concentration
  fall 2022 and beyond

- Behavior Analysis Concentration
  fall 2022 and beyond

- Community Social Psychology Concentration
  fall 2022 and beyond

- Clinical Psychology Concentration
  fall 2022 and beyond

- Developmental Disabilities Concentration
  fall 2022 and beyond

- Health Psychology Concentration
  fall 2022 and beyond

Quantitative Economics

- fall 2022 and beyond

Sociology

- General Concentration fall 2016 and beyond
- Policy & Social Problems Concentration fall 2021 and beyond
beyondfall 2016 - spring 2021
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Racial Equity and Inclusion Concentration fall 2021 and beyond

Sound Recording Technology
- fall 2022 and beyond
- fall 2019 - spring 2022
- fall 2015 - spring 2019
- prior to fall 2015

World Languages and Cultures
- French Option
  fall 2018 and beyondfall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- French/Spanish Option fall 2018 and beyondfall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Italian/Spanish Option
  fall 2018 and beyondfall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Spanish Option
  fall 2018 and beyondfall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
ARHI.1010 Art Appreciation (Formerly 58.101) - Credits: 3

The course introduces the student to the technical, aesthetic and historical aspects of architecture, sculpture, and painting. An analysis of the visual elements used in fine arts such as color, line, shape, texture, and principles of design are developed through slide lectures, museum visits and assigned readings. In addition, students investigate the purposes of art and visual communication and develop a heightened sense of critical thinking that allows them to investigate successfully different modes of representation, styles and media in a multicultural society.

ARHI.1050 Comparative Arts (Formerly 58.105) - Credits: 3

This course studies the aesthetic, artistic and intellectual similarities between art history and music history. Discussion of the arts focuses on the development in examining the human creativity and expression through the arts: from ancient times as art and morality followed in the Renaissance as art and sciences continued in the Enlightenment as art and society contrasted in the nineteenth century as art and entertainment. Furthermore, this course surveys some of the fundamental aspects of music and art, such as the nature of aesthetic judgment, the task of art and music criticism, including formalist, representational, and contemporary theories on viewing, analyzing, and interpreting the arts. In addition, with a comparative analysis between the modes of visual and aural representation, visual and aural perception, this course analyzes the principal forms and genres of the visual and aural elements of art history and music history, providing an understanding for human creativity and expression. Spring, alternate years.

ARHI.2030 History of Art I: Prehistoric to Medieval Art (Formerly 58.203) - Credits: 3

A survey of the origins of painting, sculpture, and architecture from the prehistoric period through approximately 1300 CE. Works of art are discussed in their historical, cultural, and artistic contexts.

ARHI.2040 History of Art II: Renaissance to Modern Art (Formerly 58.204) - Credits: 3

A survey of the origins and development of painting, sculpture, and architecture from Renaissance times to the Modern period. Emphasis is placed on representative works of art from the Renaissance, Baroque, Rococo, Nineteenth Century Movements-Neoclassicism, Romanticism, Impressionism, Cubism, Dadaism, Surrealism and Abstract Art. The aim of the course is to introduce the student to basic critical and art historical methods as well as the analysis of style and content within sequential cultural contexts.

ARHI.2110 Nineteenth Century Art (Formerly 58.211) - Credits: 3

A study of the major artists and artistic movements of the 19th century. This course examines major cultural, social and political forces (e.g. class struggles, racial and gender inequalities, industrialization, scientific discoveries, emancipation, education reform, the influence of early "social media," etc.) through the lens of the visual arts and pays particular attention to how these forces impacted the way art was produced, viewed, and understood.

ARHI.2210 Twentieth Century Art (Formerly 58.221) - Credits: 3

A study of developments in painting, sculpture, performance, media arts, conceptual art, architecture, and design after 1900. This course encompasses modernisms in Europe, the Americas, Asia and the global south.

ARHI.2310 Greek and Roman Art (Formerly 58.231) - Credits: 3

A study of Greek painting, sculpture, and architecture from the Cycladic to the Hellenistic period, and an examination of Roman Art from the Etruscan age to the beginning of Christian art. Emphasis is placed on the Greek Classical period and the Roman Empire.

ARHI.3000 Art History, Music and Culture (Formerly 58.300) - Credits: 3

This course is a historical and critical examination of the aesthetic and intellectual similarities between art history, music history, literature and culture from Ancient Egypt to contemporary Art. Emphasis is placed on an in-depth exploration of western cultures. In addition, this course provides an understanding of human creativity and expression through a comparative analysis of visual art and music.

ARHI.3020 Studies In World Art (Formerly 58.302) - Credits: 3

Historical and critical examination of regions works of art from China, Asia, the Islamic world, India, Africa, North America, Latin America, Native American Art and Mexico. Topics vary from year to year. Course may be repeated.

ARHI.3130 American Art (Formerly 58.313) - Credits: 3
This course centers on the study of American painting, sculpture, and decorative arts from the period of first contact up through the mid-twentieth century. One of the central questions of American art remains its definition: when does it start? What sources does it draw upon? In this class we will discuss American art through its ties to the peoples, events, institutions, and landscape that shaped it.

ARHI.3151 Islamic Art and Contemporary Society
(Formerly as 59.315) - Credits: 3

This course introduces students to Islamic art through a survey of works across the broad reach of the Islamic world including Saudi Arabia, Northern and Saharan Africa, Spain, the former Ottoman Empire surrounding Turkey and the Greater Middle East. The last unit of the course looks at Islamic art in the diaspora. The course highlights works form c. 500 CE to the present, ending with the ultra modern city of Dubai.

ARHI.3210 Italian Renaissance Art (Formerly 58.321) - Credits: 3

A study of painting, sculpture, and architecture in the major artistic centers of Italy (Florence, Rome, Venice, Milan and the Northern Courts) during the 15th and 16th centuries. In addition to examining artworks by some of the most important artists of the period - Leonard da Vinci, Michelangelo, titian - this course considers larger themes raised by these works and gives attention to the conditions within which the works were originally produced and viewed.

ARHI.3230 Northern Renaissance Art (Formerly 58.323) - Credits: 3

A study of 15th and 16th century painting and sculpture north of the Alps including artists such as Jan van Eyck, Hieronymus Bosch, Jean Fouquet and Albrecht Drer. This course considers how social forces (politics, race, religion, gender etc.) influenced the manner in which Northern renaissance art was produced, viewed, and understood, as well as how these forces led to the creation of some of the most startling, strange and enigmatic images of any period in the history of art.

ARHI.3250 Studies in Latin American Art (Formerly 58.325) - Credits: 3

An introduction to the art and architecture of ancient, colonial, and modern Latin America. The course provides a framework by which students consider the complex intersections--of vision, power, history, and artistic production--in Latin American art within both local and global contexts.

ARHI.3300 Italian Mannerism (Formerly 58.330) - Credits: 3

A study on the impact of the High Renaissance in the sixteenth century, the subsequent development of early Mannerism in central Italy and the formation of the Proto-Baroque syle in Venice and Northern Italy, the establishment of the courtly Mannerist style. The role of representative artists such as Anguissola, Pontormo, Rosso, Parmigianino, Bronzino, Beccafumi, Fontana, Vasari, Veronese, Bandinelli, Cellini, Palladio, Peruzzi and Ammanati is emphasized.

ARHI.3310 Asian Art (Formerly 58.331) - Credits: 3

The purpose of this course is to provide a general overview of the art of the traditional cultures of Asia, China, India and Japan. This survey provides a critical and historical examination of these cultures.

ARHI.3320 Baroque Art (Formerly 58.332) - Credits: 3

This course surveys the drama and dynamism that infused painting and sculpture from 1550-1750. With its origins in Italy, Baroque art quickly spread throughout much of Europe (including Flanders, France, England, the Dutch republic, Spain, Portugal) and the New World. This course will explore the ways the arts were used to express political ambition, forge social and political alliances, as well as to create cultural identity and memory.

ARHI.3340 China's Forbidden City - Credits: 3

Beijing has served as the political and cultural capital in China since the 15th century. At its core lies the Forbidden City, the largest preserved ancient wooden palatial compound in the world. This course centers first on examining the formal features of the City's layout, spatial planning, decorative schemes, and technical innovations, as well as the integration of the arts within the City. It then investigates how these features supported the profound socio-political symbolism of the empire and its cultural significance both historically and in the 20th century after the establishment of Communist China in 1949. A careful study of the Forbidden City allows us to engage with critical questions about the past and our own position as recipients of such a rare legacy of world civilization.

ARHI.3350 The Golden Age of Spanish Art - Credits: 3

This course is a survey of art in Spain from the discovery of the Americas in 1492 through the mid-seventeenth. This roughly 150-year period, known as the Spanish Golden Age or Siglo de Oro, witnessed the expansion of the Spanish empire across the Atlantic and Asia and gave rise to many of Spain's greatest artistic achievements. This course will survey the unprecedented contributions of Spanish painters, sculptors and architects; the patrons and political forces contributing to this Golden Age of artistic production; and the place of the Spanish
golden Age within broader European and global contexts.

ARHI.3360 Arts of Sub-Saharan Africa - Credits: 3
This course surveys the arts of Sub-Saharan Africa from the 12th century to the present day. It will situate works of art firmly in the history, aesthetics, values, and motivations of the cultures that created it. Students will discover that each culture has its own unique relationship with art and history. The course will also address the process of ambiguities of living and making art in global, post-colonial world. Students will gain not only a strong foundation of art historical knowledge but also how that knowledge affects our current interactions with African art through museum exhibitions and collections.

ARHI.3400 Women and Art (Formerly 58.340) - Credits: 3
An introduction to key issues and theoretical approaches to the study of women and art. This course examines women as makers of art, as subjects of art, and as interpreters of art. The class will explore the ways artists have represented the intersections of gender identities, sexual orientation, power, race, class and nationality in their works and the socio-cultural conditions in which specific artists have been excluded or marginalized in art practice, exhibition, collecting and critical discourse.

ARHI.3410 Medieval Art (Formerly 58.241) - Credits: 3
This course examines the rich cross-cultural artistic heritage of the medieval world from the Late Antique period (third century CE) through the Gothic period (fourteenth century CE). The course includes the study of paintings, sculpture, illuminated manuscripts, mosaics and architecture. It will explore materials and technique, the relationship of images to sacred texts and rituals, and the controversies regarding image production. Drawing examples for the eastern Mediterranean to the rocky coast of Ireland, the course will draw out the way works of art reflected relationships between the Jewish, Christian, and Islamic religions.

ARHI.3470 French Impressionism and Post-Impressionism - Credits: 3
This course surveys the artists and artistic movements associated with impressionism and Post-Impressionism in France. The course will begin with an examination of the arts just prior to the last quarter of the nineteenth century and will continue through the beginning of the twentieth century. Readings, lectures and assignments will engage students in a close study of French artists and France itself as the art-making capital of the West during this period. In this capacity, the course will investigate how social forces (politics, gender, race, religion, etc.) influenced the manner in which "modern" art was produced, viewed, and understood.

ARHI.3500 Post Modernism (Formerly 58.350) - Credits: 3
Following the Second World War, artists transformed the avant-garde tradition of their European predecessors to establish a dialogue with the mass media and consumer culture that has resulted in a wide array of artistic movements. Issues ranging from multiculturalism and gender to modernism and postmodernism will be addressed through the movements of abstract expressionism, pop, minimalism, neo-expressionism and appropriate in the diverse media of video, performance and photography, as well as painting and sculpture.

ARHI.3520 Contemporary Art and Culture (Formerly 58.352) - Credits: 3
Examination of issues of content, theory, and criticism in contemporary art. Current exhibitions and criticism are integral to the course. Topics vary from year to year. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ARHI.3530 History of Public Art in the Modern Era (Formerly 58.353) - Credits: 3
This course serves as an introduction to the history of public art in the modern and contemporary world. The history of public art is examined in relation to such concerns as the definition of public space, community involvement in the creative process, the institutional and economic support system for the arts, the modern understanding of memorial sculpture, and the use of the visual arts to foster public dialogue and cultural exchange.

ARHI.3600 Museum Issues (Formerly 58.360) - Credits: 3
The art museum in the United States is a unique social institution because of its blend of public and private support and its intricate involvement with artists, art historians, collectors, the art market, and the government. This course will study the art museums history and status in our society today. Special consideration will be given to financial, legal and ethical issues that face art museums in our time. Short papers, oral reports and visits with directors, curators and other museum officials in nearby museums will be included along with a detailed study of a topic of ones choice.

ARHI.3650 Art and Environment (Formerly ARHI.2300) - Credits: 3
This course surveys developments in land, environmental, and ecological art. Some of the most compelling artists today engage with the politics of land use, including the conditions of the global economy, climate change, environmental justice, sustainability, sovereignty and land claims, uneven geographies and expanding megacities, and the privatization of public space.

ARHI.4900 Art History Seminar (Formerly 58.490) - Credits: 3
Study of particular artist, style or selected art historical problem. Topics to be announced. Course may be repeated.

ARHI.4910 Art History Seminar (Formerly 58.491) - Credits: 3
Study of particular artist, style or selected art historical problem. Topics to be announced. Course may be repeated.

ARHI.4940 Directed Study in Art History (Formerly 58.494) - Credits: 1-4
An individual supervised research project relating to stylistic, thematic or methodological issues in Art History, the result to be presented in a significant paper.

ARHI.4950 Advanced Tutorial in Art History (Formerly 58.495) - Credits: 3
A program of directed study affords the advanced student with an additional opportunity to pursue a previously explored problem in greater depth or to initiate and investigate an additional problem. The purpose is to sharpen and refine skills for scholarly research and presentation.

ARHI.4960 Practicum Experience in Art History (Formerly 58.496) - Credits: 3
A program of on-campus and/or off-campus experiences for Art History students only. Specific requirements will vary depending upon department policies and the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural or artistic area and for applying techniques of problem solving and/or credits. Students will be graded satisfactory or unsatisfactory.
Degree Pathways

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university.

Digital Media

- fall 2021 and beyond

Digital Media

The interdisciplinary Digital Media program prepares students for a career in the ever-changing field of dynamic and rapidly expanding media market. The rigorous curriculum and hands-on client-based projects emphasize a creative approach to content production and are designed to equip students with skills necessary to navigate the field of communications shaped by convergent media. Courses provide theoretical and practical knowledge combining historical and critical inquiry with vocational skills. Instruction in writing, broadcasting journalism, editing, pre-production, and production offer students many approaches to short and long-format video and audio content for a variety of platforms including social media. The programs interdisciplinary format emphasizes strategies for integrating technical and conceptual skills into the creative process.

The University of Massachusetts Lowell offers a Bachelor of Arts degree with a major in Digital Media and a minor in Digital Media. The students can also select the Digital Media Concentration in the Bachelor of Liberal Arts major.

For additional information, visit the Digital Media website.

Major

The University of Massachusetts Lowell offers a Bachelor of Arts degree with a major in Digital Media. The program provides opportunities for students who see their talents and passion best applied in a diverse and rapidly expanding field of media production. Built on a rigorous curriculum and prioritizing real-life client experiences, this program offers many courses in video, film, sound production, editing, motion graphics, broadcasting, and screenwriting instructed by industry experts. The interdisciplinary structure of the program is built on close collaborations with other programs and departments offering options for students to further their theoretical and practical knowledge of the field.

Classes mix theory and hands-on learning, so students develop...
DGMD.1000 Introduction to Digital Media (Formerly JMS 100/DGMD 100) - Credits: 3

This foundational course that surveys the history and current state of digital and web-based media from a variety of perspectives: cultural and ethical, as well as the production and monetization of media. Students engage with and become critical consumers of media, learning how we use it to disseminate, market, entertain, influence and disrupt.

DGMD.1100 Introduction to Digital Media Production - Credits: 3

This is a foundational production-level course in the Digital Media program. The course is designed for students to learn the principles of video production and post-production. Students will be introduced to a variety of video equipment and will learn the basics of editing software, using Adobe Premiere Pro. Likewise, students should expect to gain foundational level skills with sound recording, lighting, and production etiquette. A significant portion of the course is dedicated to in-the-field and in-the-studio hands-on experience. Upon completion of the course, students will be able to create short-format projects using a single camera and will be ready to move onto the production of portfolio-level non-fiction and narrative-based films. No prior experience with the medium is necessary.

DGMD.1210 Introduction to Audio Production - Credits: 3

This introductory-level production course is designed to engage students in learning techniques and principles of audio production and integration of sound into media storytelling including digital film, commercial media applications, internet production, and many more. Students will learn basic workflows of digital sound recording, processing, editing, and mixing. Likewise, students will be introduced to the aesthetic properties of sound and discuss various applications and form through the study of existing works. A significant portion of the course is dedicated to in-the-field and in-the-studio hands-on experience (both individual and in-group). No prior experience with the medium is necessary. The course is required for Digital Media BA majors but is open to anyone.

DGMD.2120 Media History and Culture I - Credits: 3

This course is the first in a sequence of a two-semester expose to media history and culture in the US and worldwide. The course will trace and analyze some of the most significant developments in media technology, industry, and the role they play in the process of shaping the human experience affecting society, politics, and culture. The emphasis will be made on the visual media including film and broadcast, but the broader context will be considered.

DGMD.2200 Screenwriting - Credits: 3

In this class students will be immersed in the art and craft of creating compelling stories for the screen in both fiction and nonfiction genres. As it has been said many times about media making, the story is the heart of media production. Students will develop screenwriting abilities through gaining knowledge of and experience with story conception and development: character development; story structure; dramatic action; dialogue; scene/sequence construction and writing for emotional impact.

DGMD.2310 Media, Law and Ethics (Formerly 41.237/DGMD 231) - Credits: 3

This course explores key legal issues likely to confront journalists, mass media professionals or students interested in learning more about the relationships between law, media and ethics in this global community. Nonetheless, students are challenged to think critically about the applicability of those issues to individuals and to media institutions that transmit information via spoken communications, writing, traditional media, mobile messages, social network sites, or e-mail messages.

DGMD.2400 Introduction to Digital Editing - Credits: 3

This is an introductory course in digital editing. Students are going to be introduced to the basics of digital editing, the aesthetics and technical skills of digital editing for film and video.

DGMD.2450 Social Media Management - Credits: 3

The course is designed to equip students with the necessary skills and strategies for content creation and management on social media. Likewise, students will explore various components of social media use including psychology, ethics, and economics behind various existing formats. The course does not aim to prepare students for specific platforms but focuses on general strategies including social responsibility, storytelling methodologies, content creation and promotion, communication fluidity, data analytics and metrics, and understanding and growing of audiences. Through lectures, presentations, readings, formal exercises, case studies, and discussions the students will develop a solid practice in social media creation and management. Foundational skill in design are desired but not a requirement.

DGMD.2510 Video Production for Digital Media - Credits: 3

In this course students are going to understand the theory and practice of video production using a single digital camera for
digital media through a mix of heavy hands-on practice and lectures. Students will be expected to understand; full digital camera operation and settings, audio control, basic directing, basic lighting, and basic editing intended for digital production. Students will also be expected to learn the terminology of video production/post-production intended for digital media.

DGMD.3000 Multimedia Storytelling (Formerly JMS 300/DGMD 300) - Credits: 3

This course will facilitate a deeper understanding of the uses of online and multimedia communication technologies in a democratic society and the impact of such technologies on the way we communicate. The course will provide students with the opportunity to develop professional knowledge and skills with the tools used in online and multimedia creation. Students will develop a critical understanding of multiplatform and multimedia technologies and will learn how to use video, digital photography, audio, video, social networking and other new technologies.

DGMD.3100 Advanced Editing for Digital Media - Credits: 3

This class is dedicated to the practice of non-linear editing of media for films, television, or the web. Instruction will focus on the development of formal and conceptual post-production practices needed for creating compelling visual stories. Students will consolidate their post-production skills developed in previous courses and further improve in areas of editing picture and sound, color grading and effects. Emphasis will be made on developing necessary software skills, post-production workflow, and aesthetic approaches.

DGMD.3300 Digital Cinematography - Credits: 3

This course emphasizes the concepts needed to control the quality of images created, including such techniques as varying the frame rate, shutter speed, exposure, camera filters and color temperature. Topics covered will include camera operation, composition, framing, lens choice, camera movement, collaboration, blocking, continuity and all aspects of visual storytelling.

DGMD.3400 Lighting Principles (Formerly JMS 340/DGMD 340) - Credits: 3

In this course students are going to understand the principles of lighting, its nature, its physical characteristics, and its artistic role in media production. Class will have significant hands-on assignments and demonstrations beside theoretical background lectures. The concept will be developed based on a one-camera setting only. Students will work with light meters to guide their lighting schemes.

DGMD.3502 Production Management for Film - Credits: 3

In this course students are going to be introduced to the process of film production management from preproduction through production and screening. Students will learn budget management, crewing requirements, location needs, equipment rentals, and associated production costs.

DGMD.3701 Visual Motion Effects - Credits: 3

In this course, students are going to use After Effects as a tool to help them achieve a successful and visually convincing effect after going through idea generation process. Students will work on masking, cloning, and three-dimensional space with the aim of producing short productions. Familiarity with Photoshop is preferred.

DGMD.4000 Directed Study in Digital Media (Formerly JMS 400/DGMD 400) - Credits: 1-6

Through frequent consultation with the instructor, the student carries out the investigation of a particularly specialized area of interest. This course may be repeated for up to a total of 6 credits.

DGMD.4100 TV Studio Production (Formerly JMS 410/DGMD 410) - Credits: 3

This course will offer you the opportunity to produce different types of live programs using digital technology. Plan, organise and direct TV studio-based broadcasting. Work effectively as part of a group. It provides a working knowledge of compositional, personal and organizational production skills in relation to the making of a live broadcast program using at least three cameras having in mind that you will cut/edit form a camera to another without stopping. It requires collaboration, teamwork and strict, organized structures. In most cases, it requires leadership. But for everybody, personal qualities such as determination, enthusiasm and persistence are almost essential. So too is engaged participation.

DGMD.4103 TV Sport Broadcasting - Credits: 3

In this course, students are going to learn the techniques and theory behind mobile TV production in regards to the professional sports industry. A look into the major sports of American culture and production techniques utilized to produce each. Environmental factors governing outdoor TV production as well as state and community government issues regarding the broadcast of each sport. In this course, students will be working in collaboration with UMass Lowell Athletic Department and will be involved with the Tsongas Arena sports activities through its Audio/Video department.
DGMD.4110 Titles in Motion (Formerly DGMD 411) - Credits: 3

The course aims to provide students with an understanding of the creative, visual and formal aspects of time-based communication and motion graphic design from both a contextual and technical point of view. Designers, with their comprehension of the principles of graphic design, typography and theories of visual communication will develop a knowledge and understanding of processes and techniques involved in creating time-based media including title sequence design. Projects introduce students to time-based visual communication environments. Unique conditions influencing the roles of storyboarding, planning, typography, graphics, symbolic systems, narrative, sound and time.

DGMD.4200 Podcasting - Credits: 3

In this class, students will create audio segments in the style of a Podcast, each executed with increasing complexity. Students will use the language of cinema, television, print, and the web. They will conduct research, scriptwriting, producing, location scouting, and organize scheduling. Students will use current technology to record a location-based audio program.

DGMD.4300 Directing for Film - Credits: 3

In this course, student will work on spatial exploration, mise en scene, and directing the actor. Students will learn methods in scene study and improvisation beside rehearsal techniques, script breakdown and analysis. Students will have first hand experience of the role of director on set and beyond. Leadership and decision making are two qualities and major factors that play a crucial role in the progress of this class.

DGMD.4750 Internship in Digital Media - Credits: 3

This course is a semester long internship with one of Digital Media community partners. Students in this course will be practicing media as it is being produced on the ground today through direct hands-on experience.

DGMD.4980 Digital Media Capstone I - Credits: 3

The first section of the capstone course is designed for guided self-designated projects by seniors in the Digital Media BA program. The course is a part of a sequence of two courses and is designed to be intense engagement that should manifest in a significant project taken from concept through production. Students can work individually and collaboratively under the close supervision of the faculty. The end result of the course should be the completion of a significant project; the final step should result in a public screening. DGMD.4980 needs to be completed for student to qualify for the course.

DGMD.4991 Digital Media Capstone II - Credits: 3

This is the second part of capstone course sequence and is designed for guided self-designated projects by seniors in the Digital Media BA program. The course is a part of a sequence of two courses and is designed to be intense engagement that should manifest in a significant project taken from concept through production. Students work individually and collaboratively under the close supervision of the faculty. The end result of the course should be the completion of a significant project; the final step should result in a public screening. DGMD.4980 needs to be completed for student to qualify for the course.
Economics Department

Mission Statement

The Department of Economics at the University of Massachusetts Lowell aims to generate innovations in knowledge through the rigorous work of its research faculty, to disseminate this knowledge, and to create synergies between high-quality academic research, teaching activities and community engagement. In doing so, we are committed to the highest quality of teaching excellence and student support. We provide students with the skills necessary to make sense of everyday real-world events, as well as the technical abilities needed to be successful in a wide range of demanding career paths and also in graduate studies in a broad set of fields. Moreover, we seek to foster an environment with diverse backgrounds and perspectives as well as the inclusion of traditionally underrepresented groups in the discipline of Economics, all of which we believe are critical in generating a vibrant academic community.

Overview/Description

The Economics Department provides students with the conceptual and analytical tools needed to make efficient choices in a world of finite resources and infinite wants. Students learn the principles of economics in our introductory courses. In our upper division courses, students apply those principles to decision making problems faced by families, firms, and government agencies in a global market-based economy. All of our courses emphasize the development of critical thinking skills necessary to be world ready and work ready.

The Economics Department offers Bachelor of Arts in Economics, Bachelor of Science in Quantitative Economics and a minor area of studies.

For additional information, visit the Department of Economics website.

Majors

The Department of Economics offers a Bachelor of Arts in Economics and a Bachelor of Science in Quantitative Economics.

Economics Major

The BA program provides rigorous training in economic theories and their applications. Students trained in this program are expected to use economic tools from a wide range of fields to evaluate, understand, and address economic and societal problems.

Quantitative Economics Major

The BS program is a STEM program that focuses on a systematic study of mathematical and statistical analyses in economics. Students trained in this program are expected to master economic modeling and data analyses and conduct independent investigations.

View all the complete Degree Pathways.

For more information, contact the Department of Economics.

College of Fine Arts, Humanities & Social Sciences

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A students catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

American Studies

- General Option
  - fall 2015 and beyond
  - fall 2012 - spring 2015

- Thematic Option
  - fall 2015 - spring 2020

Art

- Animation & Interactive Media Concentration
  - fall 2017 and beyond

- Graphic Design Concentration
  - fall 2015 - spring 2020
• Studio Art Concentration  
  fall 2022 and beyond  
  fall 2015 - spring 2022

Composition for New Media

• fall 2022 and beyond  
• fall 2019 - spring 2022

Criminal Justice

• General Option  
  fall 2022 and beyond  
  fall 2016 - spring 2022  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)  
  fall 2015 - spring 2016  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)  
  fall 2012 - spring 2015  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Corrections Option  
  fall 2016 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)  
  fall 2015 - spring 2016  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)  
  fall 2012 - spring 2015  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Police Option  
  fall 2022 and beyond  
  fall 2016 - spring 2022  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)  
  fall 2015 - spring 2016  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)  
  fall 2012 - spring 2015  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Homeland Security Option  
  fall 2022 and beyond  
  fall 2016 - spring 2022  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)  
  fall 2015 - spring 2016  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)  
  fall 2012 - spring 2015  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Violence Option  
  fall 2016 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)  
  fall 2015 - spring 2016  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)  
  fall 2012 - spring 2015  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Crime and Mental Health Option  
  fall 2022 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)  
  fall 2016 - spring 2022  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)  
  fall 2015 - spring 2016  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Digital Media

• Digital Media  
  fall 2021 and beyond

Economics

• Economics  
  fall 2015 and beyond

English

• Literature Concentration  
  fall 2021 and beyond  
  fall 2015 - spring 2021  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)  
  fall 2010 - spring 2015  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Journalism & Professional Writing Concentration  
  fall 2015 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)  
  fall 2014 - spring 2015  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Creative Writing Concentration  
  fall 2018 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)  
  fall 2015 - spring 2015  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Theatre Arts Concentration
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Graphic Design
  fall 2021 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• History
  fall 2020 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Liberal Arts
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Music Studies
  General Option fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  Instrumental Option fall 2015 - spring 2018prior to fall 2015
  Voice Option fall 2015 - spring 2018prior to fall 2015

• Music Performance
  Instrumental Option fall 2022 and beyond
  fall 2015 - spring 2019prior to fall 2015

• Voice Option fall 2022 and beyond
  fall 2015 - spring 2019prior to fall 2015

• Music Business
  fall 2022 and beyond
  fall 2015 - spring 2022
  prior to fall 2015

• Peace and Conflict Studies
  fall 2021 and beyond
  fall 2015 - spring 2021
  prior to fall 2015

• Philosophy
  General Option
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  Communications &Critical Thinking Option
  fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Political Science
  American Politics Concentration fall 2020 and beyond
• International Relations and Comparative Politics Concentration fall 2020 and beyond
• Law and Politics Concentration fall 2020 and beyond
• Political Communication and Public Opinion Concentration fall 2020 and beyond
• Sustainability and Environmental Politics Concentration fall 2022 and beyond

Political Science (prior to fall 2020)
• fall 2015 - spring 2020
• fall 2013 - spring 2015

Psychology
• General Concentration fall 2022 and beyond fall 2017 - spring 2022 fall 2015 - spring 2017
• Behavior Analysis Concentration fall 2022 and beyond fall 2018 - spring 2022 fall 2017 - spring 2018
• Community Social Psychology Concentration fall 2022 and beyond fall 2018 - spring 2022 fall 2017 - spring 2018
• Clinical Psychology Concentration fall 2022 and beyond fall 2018 - spring 2022 fall 2017 - spring 2018
• Developmental Disabilities Concentration fall 2022 and beyond fall 2018 - spring 2022 fall 2017 - spring 2018
• Health Psychology Concentration fall 2022 and beyond fall 2018 - spring 2022 fall 2017 - spring 2018

Quantitative Economics
• fall 2022 and beyond

Sociology
• General Concentration fall 2016 and beyond
• Policy & Social Problems Concentration fall 2021 and beyond fall 2016 - spring 2021
• Racial Equity and Inclusion Concentration fall 2021 and beyond

Sound Recording Technology
• fall 2022 and beyond
• fall 2019 - spring 2022
• fall 2015 - spring 2019
• prior to fall 2015

World Languages and Cultures
• French Option fall 2018 and beyond fall 2015 - spring 2018
• French/Spanish Option fall 2018 and beyond fall 2015 - spring 2018
• Italian/Spanish Option fall 2018 and beyond fall 2015 - spring 2018
• Spanish Option fall 2018 and beyond fall 2015 - spring 2018
Degree Pathways

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university.

Economics

- fall 2015 and beyond

Quantitative Economics

- fall 2022 and beyond

Sample Degree Pathway for Economics

For students who entered fall 2015 and beyond

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
</tr>
<tr>
<td>HONR.1100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECON.2010</td>
<td>Principles of Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>FAHS.1090</td>
<td>First Year Seminar2</td>
<td>1</td>
</tr>
<tr>
<td>MATH.1210</td>
<td>Pre-calculus or any other STEM Persp. course (STEM)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Social Science Persp. (SS)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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Spring Semester

<table>
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<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>ECON.2110</td>
<td>Principles of Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Science with Lab Persp. (SCL)</td>
<td>3/4</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
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Sophomore Year

Fall Semester

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<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>ECON.3030</td>
<td>Microeconomic Theory (AIL), (QL)</td>
<td>3</td>
</tr>
<tr>
<td>ECON.2110</td>
<td>Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
<td>3</td>
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<td>Science with Lab Persp. (SCL)</td>
<td>3/4</td>
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Spring Semester

<table>
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<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON.3040</td>
<td>Macroeconomic Theory (CTPS)</td>
<td>3</td>
</tr>
<tr>
<td>ECON.2120</td>
<td>Statistics II (IL), (WOC)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Econ. Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Econ. Free Elective</td>
<td>3</td>
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### Junior Year

#### Fall Semester

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<th>Cr.</th>
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<tr>
<td>ECON.3/4xxx</td>
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<tr>
<td>ECON.3/4xxx</td>
<td>Econ. Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
</tr>
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<td>xxxx.xxx</td>
<td>Free Elective (DCA)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
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<td><strong>Total</strong></td>
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#### Spring Semester

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<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON.3/4xxx</td>
<td>Econ. Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>ECON.3/4xxx</td>
<td>Econ. Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxx</td>
<td>Free Elective (SRE)</td>
<td>3</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
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<tr>
<td><strong>Total</strong></td>
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### Senior Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>xxxx.xxxx</td>
<td>Econ. or Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Econ. or Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Econ. or Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxx</td>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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<td><strong>15</strong></td>
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#### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>xxxx.xxxx</td>
<td>Econ. or Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Econ. or Free Elective</td>
<td>3</td>
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</tbody>
</table>

### Total Minimum Credits = 120

1Economics majors are required to complete specific Calculus math courses. This math requirement can be satisfied through the following options:

- MATH.1210
  (https://www.uml.edu/catalog/courses/MATH/1210) and MATH.1220
  (https://www.uml.edu/catalog/courses/MATH/1220)
- MATH.1280
  (https://www.uml.edu/catalog/courses/MATH/1280) and MATH.1290
  (https://www.uml.edu/catalog/courses/MATH/1290)
- MATH.1220
  (https://www.uml.edu/catalog/courses/MATH/1220) or any higher level Calculus course

Economics majors who satisfy this math requirement are exempted from meeting the World Language requirement.

2Required for entering freshmen in the College of Fine Arts, Humanities & Social Sciences.

3/4Core Curriculum Essential Learning Outcomes in the major are met as follows:

- Diversity and Cultural Awareness (DCA) is met by taking ECON.3020
  (https://www.uml.edu/catalog/courses/ECON/3020) or any other DCA course
- Information Literacy (IL) is met by taking ECON.2120
  (https://www.uml.edu/catalog/courses/ECON/2120)
- Social Responsibility and Ethics (SRE) is met by taking ECON.3450
  (https://www.uml.edu/catalog/courses/ECON/3450) or any other SRE course
• Written and Oral Communication (emphasizing Writing in the Discipline) (WOC) is met by taking ECON.2120 (https://www.uml.edu/catalog/courses/ECON/2120)
• Critical Thinking and Problem Solving (CTPS) is met by taking ECON.3040 (https://www.uml.edu/catalog/courses/ECON/3040)
• Applied and Integrative Learning (AIL) is met by taking ECON.3030 (https://www.uml.edu/catalog/courses/ECON/3030)
• Quantitative Literacy (QL) is met by taking ECON.2010 (https://www.uml.edu/catalog/courses/ECON/2010) or ECON.3030 (https://www.uml.edu/catalog/courses/ECON/3030).

A major in Economics consists of 36-54 Economics credits with at least 18 credits at the 3000 level or higher. Students transferring to the college and wishing to major in Economics must make individual arrangements with the department chairperson regarding satisfaction of major course requirements.

For students who entered prior to fall 2018:
Students majoring in Economics must maintain at least a 2.0 grade point average (GPA) overall and at least a 2.0 GPA in their Economics courses.

For students who entered fall 2018 and beyond:
Students majoring in Economics must maintain at least a 2.2 grade point average (GPA) overall and at least a 2.0 GPA in their Economics courses.

• Major Requirements

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the CoreCurriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS (http://www.uml.edu/Enrollment/sis/default.aspx). If you need assistance, please contact your advisor.

Restriction on off-campus study:
Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last updated: 2/16/2019

Sample Degree Pathway for Quantitative Economics

For students who entered fall 2022 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
</tr>
<tr>
<td>(<a href="https://www.uml.edu/catalog/courses/ENGL/1010">https://www.uml.edu/catalog/courses/ENGL/1010</a>)</td>
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<tr>
<td>HONR.1100</td>
<td>First Year Experience Seminar</td>
<td>1</td>
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<tr>
<td>(<a href="https://www.uml.edu/catalog/courses/HONR/1100">https://www.uml.edu/catalog/courses/HONR/1100</a>)</td>
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<td></td>
</tr>
<tr>
<td>ECON.2010</td>
<td>Principles of Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>(<a href="https://www.uml.edu/catalog/courses/ECON/2010">https://www.uml.edu/catalog/courses/ECON/2010</a>)</td>
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<tr>
<td>FAHS.1090</td>
<td>Social Science Persp. (SS)</td>
<td>3</td>
</tr>
<tr>
<td>(<a href="https://www.uml.edu/catalog/courses/FAHS/1090">https://www.uml.edu/catalog/courses/FAHS/1090</a>)</td>
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<tr>
<td>MATH.1230</td>
<td>Precalculus Mathematics II (MATH)</td>
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<td>(<a href="https://www.uml.edu/catalog/courses/MATH/1230">https://www.uml.edu/catalog/courses/MATH/1230</a>)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
</tr>
<tr>
<td>(<a href="https://www.uml.edu/catalog/courses/xxx/xxx">https://www.uml.edu/catalog/courses/xxx/xxx</a>)</td>
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Spring Semester

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<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
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<tr>
<td>(<a href="https://www.uml.edu/catalog/courses/ENGL/1020">https://www.uml.edu/catalog/courses/ENGL/1020</a>)</td>
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<tr>
<td>ECON.2020</td>
<td>Principles of Microeconomics</td>
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<tr>
<td>(<a href="https://www.uml.edu/catalog/courses/ECON/2020">https://www.uml.edu/catalog/courses/ECON/2020</a>)</td>
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### Sophomore Year

#### Fall Semester

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<tbody>
<tr>
<td>MATH.1310</td>
<td>Calculus I (STEM)</td>
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<td>Arts and Hum. Persp. (AH)</td>
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#### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>ECON.3030</td>
<td>Microeconomic Theory (AIL), (QL)</td>
<td>3</td>
</tr>
<tr>
<td>ECON.2110</td>
<td>Statistics for Business and Economics I</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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### Senior Year

#### Fall Semester

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<th>Course Name</th>
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<tbody>
<tr>
<td>ECON.4300</td>
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#### Spring Semester

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<tr>
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<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
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<td>Free Elective</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
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<tr>
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</tr>
<tr>
<td>Total</td>
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<td>3</td>
</tr>
</tbody>
</table>
Total Minimum Credits = 120

1 Required for entering freshmen in the College of Fine Arts, Humanities & Social Sciences.

2 The required sequence of math courses (MATH.1230 and MATH.1310) assumes an ALEKS score between 61 and 75. If the ALEKS score is 76 or above, the student can take MATH.1310 directly. If the ALEKS score is 60 or below the student must first take MATH.1200. The ALEKS exam will be proctored. Students are encouraged to take additional courses such as MATH.1320, MATH.2210, MATH.2340, and COMP.1005.

3 Core Curriculum Essential Learning Outcomes in the major are met as follows:

- Critical Thinking and Problem Solving (CTPS) is met by taking ECON.3040
- Applied and Integrative Learning (AIL) is met by taking ECON.3030
- Quantitative Literacy (QL) is met by taking ECON.2010 or ECON.3030.

A major in Quantitative Economics consists of 42-54 economics credits with at least 18 credits at the 3000 level or above. Students transferring to the college and wishing to major in Quantitative Economics must make individual arrangements with the department chairperson regarding satisfaction of major course requirements. Students majoring in Quantitative Economics must maintain at least a 2.2 grade point average (GPA) overall and at least a 2.2 GPA in their economics courses.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS. If you need assistance, please contact your advisor.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

Last updated: 4/11/2022
ECON.1010 The Economics of Social Issues (Formerly 49.101) - Credits: 3

Social Issues in Economics will take economic theory and apply it to public policy decisions. Topics that will be covered in the course are; Economics of crime, Should we legalize drugs, is it more economical to imprison someone for life or seek the death penalty and did the Supreme Court decision in Roe v Wade (the legalization of abortion) contribute to the declining crime rate that began in the 90,s: The economics of unintended consequences will explore how well meaning public policy sometimes backfires and has the reverse effect; health economics will look at the rising cost of healthcare and the effect of Obamacare; Taxes and poverty, is there a natural rate of poverty (does minimum wage increases actually contribute to a higher rate) and does taxing the rich less actually help the economy; Energy &Environmental economics, what is the effect of global warming, or is it global cooling, and what is the best energy mix for the 21st century and lastly, who has it right, New Keynesians or Neo-Classicals.

ECON.2010 Principles of Microeconomics (Formerly 49.201) - Credits: 3

Studies the principles of production and exchange. An introduction to demand, supply, pricing, and output under alternative market structures. Derived demand and resource markets are introduced. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

ECON.2020 Principles of Macroeconomics (Formerly 49.202) - Credits: 3

This course studies national accounts, inflation, and aggregate unemployment, as well as the driving forces behind business cycles and long-run growth in the context of aggregate demand and aggregate supply. In addition, it examines monetary and fiscal policy, the Federal reserve, and select additional topics, such as an introduction to open-economy macroeconomics.

ECON.2060 Economic Inequality - Credits: 3

Economic growth has led to rising living standards around the world, but the gains have not always been shared equitably or led to improvements in individual well-being. This course introduces students to the types of economic inequality that exist, to data sources and methods used to measure growth and inequality, and to basic economic models used to understand forces driving growth and inequality today. Both the consequences (positive and negative) of this inequality and debates over policies to address it will be covered. The course is designed for students with no background in economics who are interested in learning about how economists approach issues of social and economic justice. This makes it well suited as an elective for students in the Bachelor of Liberal Arts program and Peace and Conflict Studies.

ECON.2110 Statistics for Business and Economics I (Formerly 49.211) - Credits: 3

Presents descriptive statistics, sophisticated counting techniques and other components of probability, simple random variables and their distribution, bivariate functions, sampling theory properties of estimators.

ECON.2120 Statistics for Business and Economics II (Formerly 49.212) - Credits: 3

Discusses interval estimation, hypothesis testing, analysis of variance, applied regression theory, correlation analysis, and other selected topics.

ECON.3020 Labor Economics (Formerly 49.302) - Credits: 3

An introduction to the economic analysis of behaviors and institutions in the labor market: labor supply and participation, labor demand by firms, wage determination under different institutional settings, and gender, race or ethnicity as determinants of different labor market outcomes. The course presents microeconomic models, empirical findings and their public policy implications on topics such as minimum wage, affirmative action, social insurance programs, workplace safety, and subsidized day care.

ECON.3030 Microeconomic Theory (Formerly 49.303) - Credits: 3

Provides an advanced examination of price and production theory and the theory of the consumer and the firm.

ECON.3040 Macroeconomic Theory (Formerly 49.304) - Credits: 3

Building on Principles of Macroeconomics (ECON.2020), this course studies goods markets and money markets in further detail. Emphasis is placed on aggregate labor markets and also on the relationship between inflation, unemployment, and aggregate output. These topics are contextualized in order to examine aggregate economic developments in the short, medium, and long run. Optimal monetary and fiscal policies are examined against this background. Select additional topics are covered, such as the basics of open-economy macroeconomics. This course meets the Essential Learning Outcome of Critical Thinking and Problem Solving (CTPS) as defined under the Core Curriculum requirements.

ECON.3060 Urban Economics (Formerly 49.306) -
Credits: 3

More than half of the world population now lives in cities. Therefore, grasping the economic dynamics of cities is a key to understanding modern economic systems. Urban economics is the economic study of cities. This course covers (I) the theories underlying cities functioning, growth and development, (II) the methods useful for examining city economies, and (II) the public policies targeting metropolitan problems. Skills in using Geographic Information System (GIS) software are also trained in this course.

ECON.3100 Development Economics (Formerly 49.310) - Credits: 3

Development Economics provides an introduction to the importance of political and market institutions in shaping the economic performance in the context of understanding economic role of institutions; theories of income distribution and distributional inequalities; effect of social conflict and class conflict on development; political economic determinants of policies; causes and consequences of corruption; and importance of financial markets. The course utilizes both theoretical and empirical approaches in its analysis of economic development.

ECON.3110 Mathematical Economics - Credits: 3

Since the late nineteen century, economics as a discipline has chosen mathematics as the main language of choice to describe the problems, hypothesis, theoretical explanation and tests it wants to study. This course aims to strengthen students' "translation skills" so that they can become more comfortable in applying mathematical concepts to their study of economics problems. Two distinct features set this course apart from a typical upper-level economics course of a pure mathematics course. First, this course will not only sharpen students' technical skills but will mainly emphasize on the connections between those skills and economic intuitions. Second, students will learn those mathematical tools in a more organized and intensive way, with ample economic applications.

ECON.3120 Managerial Economics (Formerly 49.312) - Credits: 3

Applies the economic theory and statistical methods to business decision making. Estimation of demand, production, cost functions and accompanying elasticity estimates, pricing and output decisions, value maximization problems, and capital budgeting.

ECON.3160 Investments: Instruments and Strategies (Formerly 49.316) - Credits: 3

In this course we will look at different types of investments, from stocks, bonds and real estate to mutual funds, hedge funds and derivatives exploring how and when to use them. Students will create a diversified investment portfolio using an online trading program that incorporates products covered in class. In addition we will look at how different exchanges operate and the role of financial investments in real capital accumulation and rising living standards.

ECON.3170 Capital Markets (Formerly 49.317) - Credits: 3


ECON.3180 Financial Markets and Monetary Policy (Formerly 49.318) - Credits: 3

This course studies the formal role of money, interest rates, interest rate determination, and financial markets within the context of aggregate economic activity. These topics are related to central banks, with a focus on the Federal Reserve, and linked to money supply and the tools of monetary policy. Formal theories and practical implementation of strategies and tactics of monetary policy are addressed, as well as their implications for aggregate economic activity. This course meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Written &Oral Communication (WOC).

ECON.3190 Public Finance (Formerly 49.319) - Credits: 3

The economics of the public sector. Principles of public expenditure, taxation, and the public debt applied to federal, state, and local governments.

ECON.3250 United States Economic History (Formerly 49.325) - Credits: 3

The evolution of institutions and their functions, and sources of economic development. The contributions of railroads, agricultural population growth, immigration, capital formation and technological progress to economic development. Other areas addressed: rapid industrialization and antitrust laws; evolution of financial institutions, the creation of the Federal Reserve System, crash of 1929, the depression of the 1930s, the New Deal and various banking acts, the labor movement, the growth of international trade.

ECON.3450 Health Economics (Formerly 49.345) - Credits: 3
An introduction to the economic analysis of health care market. The course presents microeconomic models, empirical findings and public policies referring to the following topics: the production and demand for health (the investment/consumption aspects of health and the relationship between socio economic status and health status), the issues of moral hazard and adverse selection in the insurance market, the role of information in the physician-patient relationship, the different regulation and payment systems for providers, the Medicare and Medicaid programs, and the comparisons between the US system and the health systems of other western economies and developing countries. This class aims to help students becoming more informed future citizens and consumers or producers of healthcare. Prerequisites: 49.201 or instructor’s approval. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Social Responsibility & Ethics (SRE).

ECON.4010 Special Topics in Economics (Formerly 49.401) - Credits: 3

Special Topics in Economics is a course for advanced undergraduates in Economics. The content will vary from semester to semester depending on the research interests of the Faculty member teaching the course.

ECON.4020 Industrial Organization (Formerly 49.402) - Credits: 3

The field of Industrial Organization studies the behaviors of firms in imperfectly competitive markets. Its importance is best illustrated by understanding limitations of perfect competition. By definition, a perfectly competitive firm takes the market determined price as given and therefore has absolutely no control on price. Consequently, there is no room for any pricing strategy, not room for advertisement, and the firm has little incentive to conduct R&D or merge with other firms. All these business practices that we see every day must be discussed and analyzed in a setting of imperfect competition - the main focus of Industrial Organization.

ECON.4030 International Trade (Formerly 49.403) - Credits: 3

This course is devoted to the study of why countries trade the products they do and the attendant benefits and costs of trade. The course covers both the main theories of international trade, and their empirical applications.

ECON.4060 International Macroeconomics - Credits: 3

This course is part of the two sub-disciplines that compose the overall discipline of International Economics, with the other sub-discipline being International Trade. As such, International Macroeconomics is complementary to International Trade, but neither course is a prerequisite for the other. This course provides an overview of open economy macroeconomics, and international financial markets and policies. The focus is on exchange rate determination, the importance of the balance of payments for both the domestic economy and the economies of other countries, international capital flows, the impact of internal debt on the balance of trade, and the interaction and potential conflicts between domestic and international economic policy objectives.

ECON.4070 Econometrics (Formerly 49.407) - Credits: 3

This course covers regression analysis including ordinary least squares, bivariate and multiple regression. In addition to basic regression technique and inference issues, specific topics related to OLS, such as interaction terms and quadratic forms together with more advanced techniques such as panel data and instrumental variables will be covered. This course will be held in a teaching lab using the STATA software package widely used by economists and other social scientists. You will learn how to use STATA for the following: importing data from an external source into STATA; inspecting and becoming familiar with the dataset; producing the main descriptive statistics for the dataset (e.g., mean, median, standard deviation and scatter diagrams); analyzing the data to test hypotheses of interest.

ECON.4090 Innovation and Development - Credits: 3

This course integrates ideas from the history of economics with national development experiences to construct a theory of development. Fundamental to economic development is the innovation process through which business enterprises, situated in particular nations, generate productivity. The first part of the course focuses on the advanced nations, particularly Britain, United States, and Japan. Then we look at the emerging economies of South Korea, Taiwan, Singapore and Hong Kong, followed by the emerging economies of China and India. We explore why Russia is lacking in innovative enterprise. We conclude by asking how the integration of the theory and history of economic development can inform strategies to promote economic development characterized by stable and equitable growth.

ECON.4100 Economic Growth and Development (Formerly 49.410) - Credits: 3

In this course, we try to solve the puzzles of why some countries are so rich and some are so poor and why some countries grow so quickly and some grow so slowly. After introducing the basic analytical framework, we will investigate various possible reasons in explaining the observed country differences. Those possible explanations include differences in countries’ investment rates, population growth rates, human
capital accumulation rates, production technologies, openness to international trade, and government policies. Issues of income inequality and their effect on economic growth will also be addressed. This course is designed for Economics majors or minors who have fulfilled the following prerequisites, and master level students from other departments, such as the Regional Economic and Social Development Department. Pre-req: 49.201 Economics I (Microeconomics) 49.202 Economics II (Macroeconomics)

ECON.4130 Climate Change Economics - Credits: 3
Climate change affects populations around the world, underscoring the need to reduce global greenhouse gas emissions. Many disciplines are needed for innovative solutions to climate change, and economics plays a key role. Economists provide assumptions for models of current and future impacts. Economic models permit to predict how incentives can modify individual and group behavior. Economists also use real-world data to obtain empirical estimates of the wide range of climate change effects. With this research, economists inform local and global climate policy. This course introduces concepts to understand how economists approach the development of climate policies. With this foundation and from the lens of an economist, students evaluate climate change impacts and policy solutions. Students also gain the skills to engage in active discussions of articles and other media related to these topics from a multifaceted perspective.

ECON.4150 Introduction to Environmental Economics (Formerly 49.315/415) - Credits: 3
This course provides an introduction to the field of environmental and natural resource economics. It is designed to give students an overview of how economic principles can be applied to environmental management and policy. Topic areas and applications include evaluation of environmental policies, valuation of environmental goods and services, climate change, and management of renewable and non-renewable resources. Students will learn to critique articles and other media and have intelligent discussions related to the topics listed above.

ECON.4160 Experimental and Behavioral Economics - Credits: 3
This course will introduce students to the experimental economics methodology. Experimental economics utilizes lab and natural experiments to investigate decision-making and motivations for observed behavior. After an overview of the method, the course will explore several specific topics where experimental economics has made particular contributions to the discipline. Experimental results often motivate theories of behavior that incorporate concepts such as altruism, reciprocity, and inequality aversion. Such, non-traditional, models of behavior were once considered to be solely the realm of psychology. As a result, this course will also serve as an introduction to behavioral economics - the incorporation of motivations other than self-interest into one’s utility function.

ECON.4170 Game Theory - Credits: 3
Game theory looks a decision making in a social context where the outcomes are influenced by both our decisions and by the decisions of others. The tools of Game Theory can be used to better understand decision making in a broad range situations. This class will take examples from a variety of contexts including employee compensation, legal ramifications of crime, pricing strategies for firms, advertising, ranked choice voting, and social action. Studying game theory will not make it so we always "win" but it will improve our decisions and help us understand the world we live in.

ECON.4200 Advanced Software for Economics - Credits: 3
This course is a "survey" of software used by professional economists and professionals in other disciplines to study empirical phenomena. The course is a "survey" because we will not be going into each software to deeply. Instead, the idea is that students become sufficiently familiar with the software we study so that: they are later comfortable getting into more complex operationalizations themselves and as needed given their professional trajectory; they understand similarities and differences between the software; and they develop a hands-on sense of which software may be best suited for any one application.

ECON.4300 Analytical Economics - Credits: 3
This course exposes students to advanced economic models and empirical techniques. Particular emphasis is given to the interplay between theory and empirical applications. Students in the course will learn how economic models are used to motivate empirical work in economics. They will also learn to interpret empirical work in light of the motivating theory. Finally, they will be able to evaluate to what extent and empirical application provides a good test of a theory and whether either the data or the empirical methods have any limitations in this regard.

ECON.4850 Internship in Economics (Formerly 49.485) - Credits: 1-3
Economics majors who locate an internship experience in a public or private, profit or non-profit organization which provides an opportunity to observe and apply Economics concepts to decision making and processes in the production of goods or services may with permission of the Economics Department chair receive three credits for satisfactory completion of the experience. Students are expected to have completed over 20 credits of economics classes before undertaking the internship. A five-page paper describing what
was learned in the internship together with a note from the student's supervisor indicating hours worked and satisfactory completion of assigned work is required.

**ECON.4991 Independent Studies (Formerly 49.499)** - Credits: 1-3

A course to permit the advanced student to do research in topics of special interest in economics under faculty supervision. This course also may be utilized to offer topics to individual students where there are insufficient number of registrants for a regular class. Restricted to Economics majors.
Sample Degree Pathway for Education - Elementary and Moderate Disabilities Option
For students who entered fall 2019 to spring 2022.

Freshman Year

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<td>Life Science I / Global Environmental Studies (SCL)</td>
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<td>PSYC.1010</td>
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<td>EDUC.1100</td>
<td>Introduction to Teaching in Inclusive Classrooms</td>
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Total 16

Sophomore Year

Fall Semester

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Spring Semester

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<td>Elementary Math for Teaching: Geometry and Measurement (STEM)</td>
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<td>HIST.1120</td>
<td>United States History since 1877 (DCA)</td>
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<td>ENGL.2980</td>
<td>Children’s Literature (AH)</td>
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<td>Teaching Elementary Social Studies in the Inclusive</td>
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<td>EDUC.3200</td>
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Total 15

Spring Semester

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<td>MATH.1080</td>
<td>Elementary Math for Teachers: Algebra and Data Analysis</td>
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<td>EDUC.3600</td>
<td>Teaching Science through Inquiry in the Inclusive (IL), (WOC)</td>
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**Fall Semester**

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<td>EDUC.4200</td>
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<td>ENGL.3/4xxx</td>
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<td>EDUC.3000</td>
<td>Understanding Family and Community Engagement</td>
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<td>EDUC.2200</td>
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**Spring Semester**

**Total Minimum Credits = 120**

1. Literature Focus
2. Language Focus

The BA Ed. degree pathway shows the courses that are required to complete the degree. The semester in which some courses are offered, may differ and accommodations will be made. Courses with higher numbers (3000 and above) are generally taken in the junior and senior years. The education courses are highly field based and often require additional hours of field work in schools to better prepare you for your career.

**Notes:**

- All EDUC courses are required.
- All courses with prefixes MATH, ENGL, HIST, PSYC are required. If a course is not available in a timely fashion, exceptions may be made providing a course which meets similar subject matter knowledge is taken. This change...
can only be made with approval of the program coordinator.

- CHEM.1010 may be replaced by other physical science course with a lab such as PHYS.1210 / PHYS.1210L
  - The three MATH courses (1070, 2270, 1080) may be taken in any sequence.
  - The third Social Science elective may not be in Psychology.

GPA and MTEL

Teacher candidates must have an undergraduate GPA of 2.75 or better in order to proceed to the final practicum, they must also have passed the appropriate Massachusetts Tests for Educator Licensure (MTEL) for the two teacher licenses (01 Communications and Literacy Reading and Writing) (03 General Curriculum Multi-Subject Test and Math Test) (90 Foundations of Reading). See MTEL website for more information.

- Foundations of Reading should be taken immediately after taking EDUC.2000
- Communications and Literacy must be passed by the end of the sophomore year.
- General Curriculum Multi Subject Test and Math Test must be taken during the junior year.

Field Experience and Practicum Requirements

Many courses have field experiences in local schools which may requires completion of hours beyond course meeting times. Teacher candidates, when required, must submit materials for criminal background checks and must provide fingerprints. Program coordinators will supply information on these processes.

In order to work in schools during field experiences and the practicum, the teacher candidate must exhibit professional dispositions and behaviors and be of sound moral character. The candidate at all times must exhibit good judgment, personal integrity, and exemplary behavior. Candidates must demonstrate that they understand their professional responsibilities and have the integrity to work in schools where they will be responsible for the education and welfare of minors. Further, they must know how to engage in collaborative and collegial professional work with fellow teachers and staff.

Graduation Requirements

In order to graduate with a BA Ed. degree and teacher license, candidates must complete the approved program including both practica (600 hours in total). The practicum candidate is assessed using the Department of Elementary and Secondary Education Candidate Assessment of Performance (CAP) instrument and process. Candidates must demonstrate that they have met the Professional Standards for Teaching and are proficient in their ability to:

- Develop well-structured lessons.
- Adjust practice based on student assessment data.
- Meet diverse needs.
- Create a safe learning environment for all students.
- Hold high expectations for student learning.
- Demonstrate reflective practice.

Breadth of Knowledge

The UMass Lowell Core includes requirements designed to familiarize students with multiple perspectives regarding diverse areas of knowledge and modes of inquiry outside of their major discipline. Students gain insights into these perspectives by taking courses outside of their major discipline. The BA Ed. degree is structured for students to meet this requirement. See Breadth of Knowledge for more information.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should be using their Advisement Report in SiS. If you need assistance, please contact your adviser.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

Last updated: 12/02/2021
Sample Degree Pathway for Education - Disability Studies for Educational and Community Organizations Option

For students who entered fall 2020 and beyond.

### Freshman Year

#### Fall Semester

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#### Spring Semester

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<td>Applied Chemistry for Non-Scientists (SCL)</td>
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### Sophomore Year

#### Fall Semester

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<tr>
<td>EDUC.2500 (<a href="https://www.uml.edu/catalog/courses/EDUC/2500">https://www.uml.edu/catalog/courses/EDUC/2500</a>)</td>
<td>Teaching Elementary Social Studies in the Inclusive</td>
<td>3</td>
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</tr>
<tr>
<td>EDUC.3200 (<a href="https://www.uml.edu/catalog/courses/EDUC/3200">https://www.uml.edu/catalog/courses/EDUC/3200</a>)</td>
<td>Methods of Teaching Students with Moderate Disabilities</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1</td>
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</table>

### Spring Semester

#### Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>C.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.1020 (<a href="https://www.uml.edu/catalog/courses/ENGL/1020">https://www.uml.edu/catalog/courses/ENGL/1020</a>)</td>
<td>College Writing II (CW)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>HIST.1110 (<a href="https://www.uml.edu/catalog/courses/HIST/1110">https://www.uml.edu/catalog/courses/HIST/1110</a>)</td>
<td>United States History to 1877</td>
<td>3</td>
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</tr>
<tr>
<td>MATH.1070 (<a href="https://www.uml.edu/catalog/courses/MATH/1070">https://www.uml.edu/catalog/courses/MATH/1070</a>)</td>
<td>Elementary Math for Teaching: Numbers and Operations (MATH)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PSYC.2600</td>
<td>Child and Adolescent</td>
<td>3</td>
<td></td>
</tr>
<tr>
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<td>5</td>
</tr>
</tbody>
</table>

### Junior Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>C.</th>
<th>Total</th>
</tr>
</thead>
</table>

---
### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.2xxx</td>
<td>Language Focus</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.4100</td>
<td>Pre-practicum (AIL)</td>
<td>1</td>
</tr>
<tr>
<td>EDUC.3400</td>
<td>Mathematics and Problem Solving in the Inclusive E (CTPS), (QL)</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.2200</td>
<td>Education Assessment of Students with Moderate D1</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

### Total Minimum Credits = 120

1 Expect to do an additional 10-15 hours over semester visiting schools in both semesters.

2 Alternative SRE course can be taken with the approval of advisor

The BA Ed. degree Disability Studies for Educational and Community Organizations Option pathway shows the courses that are required to complete the degree. The semester in which some courses are offered, may differ and accommodations will be made. Courses with higher numbers (3000 and above) are generally taken in the junior and senior years. The education courses are highly field based and often require additional hours of field work in schools to better prepare you for your career.

### Notes:
- All EDUC courses are required.
- All courses with prefixes MATH, ENGL, HIST, PSYC are required. If a course is not available in a timely fashion, exceptions may be made providing a course which meets similar subject matter knowledge is taken. This change can only be made with approval of the program coordinator.
- CHEM.1010 may be replaced by other physical science course with a
lab such as PHYS.1210 (https://www.uml.edu/catalog/courses/PHYS/1210) / PHYS.1210L (https://www.uml.edu/catalog/courses/PHYS/1210L)

- The three MATH courses (1070, 2270, 1080) may be taken in any sequence.
- The third Social Science elective may not be in Psychology.

Field Experience

Many courses have field experiences in local schools and community organizations which may require completion of hours beyond course meeting times. When required, you may have to submit materials for criminal background checks and must provide fingerprints. Program coordinators will supply information on these processes.

In order to work in schools and communities during field experiences, the student must exhibit professional dispositions and behaviors. The student, at all times must exhibit good judgment, personal integrity and exemplary behavior. Students must demonstrate that they understand their professional responsibilities and have the integrity to work in schools and community organizations where they will be responsible for the education and welfare of minors. Further, they must know how to engage in collaborative and collegial professional work with fellow educators and staff.

Breadth of Knowledge

The UMass Lowell Core includes requirements designed to familiarize students with multiple perspectives regarding diverse areas of knowledge and modes of inquiry outside of their major discipline. Students gain insights into these perspectives by taking courses outside of their major discipline. The BA Ed. degree is structured for students to meet this requirement. See Breadth of Knowledge for more information.

No more than two Breadth of Knowledge courses can be taken with the same prefix. Refer to the Core Curriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should be using their Advisement Report in SIS (https://www.uml.edu/Enrollment/SiS/default.aspx). If you need assistance, please contact your adviser.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last updated: 1/21/2022

Sample Degree Pathway for Education - Elementary and Moderate Disabilities Option

For students who entered fall 2022 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
</tr>
<tr>
<td>HONR.1100</td>
<td>Introduction to Teaching in Inclusive Classrooms</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.1100</td>
<td>Western Civilization I (AH), (DCA)</td>
<td>3</td>
</tr>
<tr>
<td>HIST.1050</td>
<td>Introduction to Psychological Science (SS)</td>
<td>3</td>
</tr>
<tr>
<td>SCIE.2200</td>
<td>Integrated Sciences: Biology, Ecology, and Earth Systems (SCL)</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
</tr>
<tr>
<td>HONR.1100</td>
<td>Introduction to Teaching in Inclusive Classrooms</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.1100</td>
<td>Western Civilization I (AH), (DCA)</td>
<td>3</td>
</tr>
<tr>
<td>HIST.1050</td>
<td>Introduction to Psychological Science (SS)</td>
<td>3</td>
</tr>
<tr>
<td>SCIE.2200</td>
<td>Integrated Sciences: Biology, Ecology, and Earth Systems (SCL)</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>
### Sophomore Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST.1080 (<a href="https://www.uml.edu/catalog/courses/HIST/1080">https://www.uml.edu/catalog/courses/HIST/1080</a>)</td>
<td>World Civilizations Since 1500 (DCA)</td>
<td>3</td>
</tr>
<tr>
<td>ENGL.xxxx (<a href="https://www.uml.edu/catalog/courses/ENGL">https://www.uml.edu/catalog/courses/ENGL</a>)</td>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.2100 (<a href="https://www.uml.edu/catalog/courses/EDUC/2100">https://www.uml.edu/catalog/courses/EDUC/2100</a>)</td>
<td>Introduction to Moderate Disabilities</td>
<td>3</td>
</tr>
<tr>
<td>SCIE.2400 (<a href="https://www.uml.edu/catalog/courses/SCIE/2400">https://www.uml.edu/catalog/courses/SCIE/2400</a>)</td>
<td>Integrated Sciences: Astronomy, Physics, and Technology (SCL)</td>
<td>4</td>
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</tbody>
</table>

**Total** 15

#### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST.1120 (<a href="https://www.uml.edu/catalog/courses/HIST/1120">https://www.uml.edu/catalog/courses/HIST/1120</a>)</td>
<td>United States History since 1877 (DCA)</td>
<td>3</td>
</tr>
<tr>
<td>ENGL.2980 (<a href="https://www.uml.edu/catalog/courses/ENGL/2980">https://www.uml.edu/catalog/courses/ENGL/2980</a>)</td>
<td>Children’s Literature (AH)</td>
<td>3</td>
</tr>
<tr>
<td>ENGL. 2 / 3 / 4 xxx (<a href="https://www.uml.edu/catalog/courses/ENGL">https://www.uml.edu/catalog/courses/ENGL</a>)</td>
<td>Elective</td>
<td>3</td>
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</table>

**Total** 8

### Junior Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC.3500 (<a href="https://www.uml.edu/catalog/courses/EDUC/3500">https://www.uml.edu/catalog/courses/EDUC/3500</a>)</td>
<td>Language and Writing Development</td>
<td>3</td>
</tr>
<tr>
<td>HIST.3/4xxx (<a href="https://www.uml.edu/catalog/courses/HIST">https://www.uml.edu/catalog/courses/HIST</a>)</td>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>ENGL.2/3/4xxx (<a href="https://www.uml.edu/catalog/courses/ENGL">https://www.uml.edu/catalog/courses/ENGL</a>)</td>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.3600 (<a href="https://www.uml.edu/catalog/courses/EDUC/3600">https://www.uml.edu/catalog/courses/EDUC/3600</a>)</td>
<td>Teaching Science through Inquiry in the Inclusive (II), (WOC)</td>
<td>3</td>
</tr>
<tr>
<td>MATH.2270 (<a href="https://www.uml.edu/catalog/courses/MATH/2270">https://www.uml.edu/catalog/courses/MATH/2270</a>)</td>
<td>Elementary Math for Teaching: Geometry (STEM)</td>
<td>3</td>
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</table>

**Total** 18

#### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC.4100 (<a href="https://www.uml.edu/catalog/courses/EDUC/4100">https://www.uml.edu/catalog/courses/EDUC/4100</a>)</td>
<td>Pre-practicum</td>
<td>2</td>
</tr>
<tr>
<td>EDUC.3400 (<a href="https://www.uml.edu/catalog/courses/EDUC/3400">https://www.uml.edu/catalog/courses/EDUC/3400</a>)</td>
<td>Mathematics and Problem Solving in the Inclusive E (CTPS), (QL)</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.2200 (<a href="https://www.uml.edu/catalog/courses/EDUC/2200">https://www.uml.edu/catalog/courses/EDUC/2200</a>)</td>
<td>Education Assessment of Students with Moderate D</td>
<td>3</td>
</tr>
<tr>
<td>ENGL.3/4xxx (<a href="https://www.uml.edu/catalog/courses/ENGL">https://www.uml.edu/catalog/courses/ENGL</a>)</td>
<td>Elective</td>
<td>3</td>
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**Total** 11
Senior Year

Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC.3000</td>
<td>Understanding Family and Community Engagement</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.4110</td>
<td>Elementary Education Practicum and Seminar / Special Education Practicum and Seminar</td>
<td>9</td>
</tr>
<tr>
<td>EDUC.4120</td>
<td></td>
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</tr>
<tr>
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Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC.4000</td>
<td>Sheltered English Instruction</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.4110</td>
<td>Elementary Education Practicum and Seminar / Special Education Practicum and Seminar</td>
<td>9</td>
</tr>
<tr>
<td>EDUC.4120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

Total Minimum Credits = 120

1Language Focus

2Literature Focus

The BA Ed. degree pathway shows the courses that are required to complete the degree. The semester in which some courses are offered may differ and accommodations will be made. Courses with higher numbers (3000 and above) are generally taken in the junior and senior years. The education courses are highly field based and often require additional hours of field work in schools to better prepare you for your career.

Notes:

- All EDUC courses are required.
- All courses with prefixes MATH, ENGL, HIST, PSYC are required. If a course is not available in a timely fashion, exceptions may be made providing a course which meets similar subject matter knowledge is taken. This change can only be made with approval of the program coordinator.
- HIST, ENGL, and SCIE courses can be taken in any order.

GPA and MTEL

Teacher candidates must maintain an undergraduate GPA of 2.75 or better.

To receive their teaching licenses, they must also have passed the appropriate Massachusetts Tests for Educator Licensure (MTEL) for the two teacher licenses (Communication and Literacy Reading and Writing, General Curriculum Multi-Subject Test and Math Test, Foundations of Reading). See MTEL website (https://www.mtel.nesinc.com/) for more information.

Consult your advisor on the best timing for completing each MTEL and for test preparation resources.

Field Experience and Practicum Requirements

Many courses have field experiences in local schools which may require completion of hours beyond course meeting times. Teacher candidates, when required, must submit materials for criminal background checks and must provide fingerprints. Program coordinators will supply information on these processes.

In order to work in schools during field experiences and the practicum, the teacher candidate must exhibit professional dispositions and behaviors and be of sound moral character. The candidate at all times must exhibit good judgment, personal integrity, and exemplary behavior. Candidates must demonstrate that they understand their professional responsibilities and have the integrity to work in schools where they will be responsible for the education and welfare of minors. Further, they must know how to engage in collaborative and collegial professional work with fellow teachers and staff.

Students enrolled in practicum courses EDUC.4110 (https://www.uml.edu/catalog/courses/EDUC/4110) and EDUC.4120 (https://www.uml.edu/catalog/courses/EDUC/4120) should expect to be in their school placements five full days per week.

Graduation Requirements

In order to graduate with a BA Ed. degree and teacher license, candidates must complete the approved program including both practica (600 hours in total). The practicum candidate is
assessed using the Department of Elementary and Secondary Education Candidate Assessment of Performance (CAP) instrument and process. Candidates must demonstrate that they have met the Professional Standards for Teaching and are proficient in their ability to:

- Develop well-structured lessons.
- Adjust practice based on student assessment data.
- Meet diverse needs.
- Create a safe learning environment for all students.
- Hold high expectations for student learning.
- Demonstrate reflective practice.

**Breadth of Knowledge**

The UMass Lowell Core includes requirements designed to familiarize students with multiple perspectives regarding diverse areas of knowledge and modes of inquiry outside of their major discipline. Students gain insights into these perspectives by taking courses outside of their major discipline. The BA Ed. degree is structured for students to meet this requirement. See Breadth of Knowledge for more information.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should be using their Advisement Report in SiS. If you need assistance, please contact your adviser.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

Last updated: 3/08/2022

**American Studies**

- General Option
  - fall 2015 and beyond
  - fall 2012 - spring 2015

- Thematic Option
  - fall 2021 and beyond
  - fall 2015 - spring 2021
  - fall 2012 - spring 2015

**Art**

- Animation & Interactive Media Concentration
  - fall 2017 and beyond

- Graphic Design Concentration
  - fall 2015 - spring 2020

- Studio Art Concentration
  - fall 2022 and beyond

**Composition for New Media**

- fall 2022 and beyond
- fall 2019 - spring 2022

**Criminal Justice**

- General Option
  - fall 2022 and beyond
  - fall 2016 - spring 2022
  - fall 2012 - spring 2015

**College of Fine Arts, Humanities & Social Sciences**

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A students catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.
• Corrections Option
  fall 2016 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Police Option
  fall 2022 and beyond fall 2016 - spring 2022
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Homeland Security Option
  fall 2022 and beyond fall 2016 - spring 2022
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Violence Option
  fall 2016 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Crime and Mental Health Option
  fall 2022 and beyond fall 2016 - spring 2022
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Digital Media
  fall 2021 and beyond

• Economics
  fall 2015 and beyond

• English
  • Literature Concentration
    fall 2021 and beyond fall 2015 - spring 2021
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  • Journalism & Professional Writing Concentration
    fall 2015 and beyond
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  • Creative Writing Concentration
    fall 2018 and beyond
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) fall 2015 - spring 2018
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  • Theatre Arts Concentration
    fall 2015 and beyond
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Graphic Design
  • fall 2021 and beyond
  • fall 2020 - spring 2021
History

- fall 2020 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Liberal Arts

- fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Music Studies

- General Option fall 2022 and beyondfall 2018 - spring 2022
- Instrumental Option fall 2015 - spring 2018prior to fall 2015
- Voice Option fall 2015 - spring 2018prior to fall 2015

Music Performance

- Instrumental Option fall 2022 and beyondfall 2019 - spring 2022fall 2015 - spring 2019prior to fall 2015
- Voice Option fall 2022 and beyondfall 2019 - spring 2022fall 2015 - spring 2019prior to fall 2015

Music Business

- fall 2022 and beyond
- fall 2015 - spring 2022
- prior to fall 2015

Peace and Conflict Studies

- fall 2021 and beyond
- fall 2015 - spring 2021
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- prior to fall 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Philosophy

- General Option fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Critical Thinking Option fall 2015 and beyond
- Philosophy & Religious Studies Option fall 2015 and beyond

Political Science

- American Politics Concentration fall 2020 and beyond
- International Relations and Comparative Politics Concentration fall 2020 and beyond
- Law and Politics Concentration fall 2020 and beyond
- Political Communication and Public Opinion Concentration fall 2020 and beyond
- Sustainability and Environmental Politics Concentration fall 2022 and beyond

Political Science (prior to fall 2020)

- fall 2015 - spring 2020
- fall 2013 - spring 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Psychology

- General Concentration fall 2022 and beyondfall 2017 - spring 2022fall 2015 -
Behavior Analysis Concentration
fall 2022 and beyond
fall 2018 - spring 2022
fall 2017 - spring 2018

Community Social Psychology Concentration
fall 2022 and beyond
fall 2018 - spring 2022
fall 2017 - spring 2018

Clinical Psychology Concentration
fall 2022 and beyond
fall 2018 - spring 2022
fall 2017 - spring 2018

Developmental Disabilities Concentration
fall 2022 and beyond
fall 2018 - spring 2022
fall 2017 - spring 2018

Health Psychology Concentration
fall 2022 and beyond
fall 2018 - spring 2022
fall 2017 - spring 2018

Quantitative Economics
fall 2022 and beyond

Sociology

General Concentration
fall 2016 and beyond

Policy & Social Problems Concentration
fall 2021 and beyond
fall 2016 - spring 2021

Racial Equity and Inclusion Concentration
fall 2021 and beyond

Sound Recording Technology
fall 2022 and beyond
fall 2019 - spring 2022
fall 2015 - spring 2019
prior to fall 2015

World Languages and Cultures

French Option
fall 2018 and beyond
fall 2015 - spring 2018

French/Spanish Option
fall 2018 and beyond
fall 2015 - spring 2018

Italian/Spanish Option
fall 2018 and beyond
fall 2015 - spring 2018

Spanish Option
fall 2018 and beyond
fall 2015 - spring 2018

Degree Pathway - Doctor of Philosophy in Global Studies

All students are required to take 12 credits of core coursework, 12 credits of research methods courses, 27 credits of elective courses (a maximum of 21 credits of which can be transferred from a MA/MS degree program with program director approval) and a minimum of 9 dissertation credits.

<table>
<thead>
<tr>
<th>Core Courses</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLST.7010</td>
<td>Contemporary Global Studies</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7011</td>
<td>Seminar in Interdisciplinary Education &amp; Research</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7012</td>
<td>Conflict, Cooperation, Security and Human Rights</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7017</td>
<td>International Political</td>
<td>3</td>
</tr>
<tr>
<td>Course #</td>
<td>Course Name</td>
<td>Cr.</td>
</tr>
<tr>
<td>----------</td>
<td>--------------------------------------</td>
<td>-----</td>
</tr>
<tr>
<td>GLST.7030</td>
<td>Global Research and Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7031</td>
<td>Quantitative Approaches to Research in Global Studies</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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</table>

Research Methods and Data Analysis Electives (chooses 2 courses)

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC.6423</td>
<td>Program Evaluation</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.6600</td>
<td>Ethnographic Inquiry</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.7040</td>
<td>Qualitative Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.7050</td>
<td>Survey Research</td>
<td>3</td>
</tr>
<tr>
<td>PUBH.6740</td>
<td>Applied Biostatistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>PUBH.6800</td>
<td>Intro to SAS</td>
<td>3</td>
</tr>
<tr>
<td>PUBH.6890</td>
<td>Advanced Regression Modeling</td>
<td>3</td>
</tr>
<tr>
<td>PSYC.6110</td>
<td>Program Evaluation</td>
<td>3</td>
</tr>
<tr>
<td>ECON.7310</td>
<td>Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>ECON.7330</td>
<td>Econometrics I</td>
<td>3</td>
</tr>
<tr>
<td>ECON.7340</td>
<td>Econometrics II</td>
<td>3</td>
</tr>
<tr>
<td>ECON.7350</td>
<td>Cost-Benefit Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.6900</td>
<td>Advanced Regression Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.6910</td>
<td>Advanced Research Design</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>

Though students are encouraged to take courses in all of the following three areas, students must select 2 of these 3 areas in which to focus, and take 2 (3 credit) electives in each focus area. After meeting the methodology course requirement (described above), students can take additional advanced research methods courses as electives. The lists below present a sample of relevant elective courses across campus, but these lists are subject to change and availability every semester.

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLST.6600</td>
<td>International Perspectives on Crime and Justice</td>
<td>3</td>
</tr>
<tr>
<td>GLST.6610</td>
<td>Comparative Criminal Justice</td>
<td>3</td>
</tr>
<tr>
<td>GLST.6620</td>
<td>Global Issues and Human Rights and Justice</td>
<td>3</td>
</tr>
<tr>
<td>GLST.6630</td>
<td>Prisons: A Global Perspective on Punishment and Rehabilitation</td>
<td>3</td>
</tr>
<tr>
<td>GLST.6640</td>
<td>Weapons of Mass Destruction</td>
<td>3</td>
</tr>
<tr>
<td>GLST.6650</td>
<td>Seminar on Global Trafficking and Criminal Networks</td>
<td>3</td>
</tr>
<tr>
<td>GLST.6660</td>
<td>Terrorist Networks: Al Qaeda and Affiliated Groups</td>
<td>3</td>
</tr>
<tr>
<td>GLST.6670</td>
<td>Seminar on Security Studies</td>
<td>3</td>
</tr>
<tr>
<td>GLST.6680</td>
<td>Scientific and Technological</td>
<td>3</td>
</tr>
</tbody>
</table>
### International Political Economy, Trade and Development Concentration

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON.7300</td>
<td>Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECON.7330</td>
<td>Econometrics I</td>
<td>3</td>
</tr>
<tr>
<td>ECON.7340</td>
<td>Econometrics II</td>
<td>3</td>
</tr>
<tr>
<td>GLST.6530</td>
<td>Globalization, Work and Health</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7100</td>
<td>Directed Study</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7110</td>
<td>The World of Things: Consumer Culture in Historical Perspective</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7150</td>
<td>International Migration</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7170</td>
<td>Development Economics</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7180</td>
<td>International Economics</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7190</td>
<td>Human Capital and Employment in a Global Economy</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7200</td>
<td>The Role of Government in a Global Economy</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7280</td>
<td>Organizational Theory</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7300</td>
<td>Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7310</td>
<td>Seminar on Global Environmental Issues</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7320</td>
<td>Seminar on poverty, discrimination and public</td>
<td>3</td>
</tr>
</tbody>
</table>

Total: N/A

### Theory in Global Studies Concentration

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLST.7020</td>
<td>Theoretical Paradigms in Global Studies</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7140</td>
<td>Globalization, Feminism, &amp; Liberalism</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7160</td>
<td>Advanced Seminar in Global History, Politics and Theory</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7100</td>
<td>Directed Study</td>
<td>3</td>
</tr>
</tbody>
</table>

Total: N/A

### Dissertation (minimum 9 credits)

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLST.7530</td>
<td>Doctoral Dissertation/Global Studies</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7560</td>
<td>Doctoral Dissertation/Global Studies</td>
<td>3</td>
</tr>
<tr>
<td>GLST.7590</td>
<td>Doctoral Dissertation/Global Studies</td>
<td>3</td>
</tr>
</tbody>
</table>

Total: 9

---

**Sample Degree Pathway for Master of Arts - Public Administration - Spring 2022 and Beyond**

All programs are 39 credits, consisting of 6 required courses, 2 courses from the flexible core, and 6 courses within a specialized option.

### Required Courses

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPAD.5010</td>
<td>Foundations for Public Administration</td>
<td>3</td>
</tr>
<tr>
<td>MPAD.5020</td>
<td>Public &amp; Non Profit Budgeting and Financial Management</td>
<td>2</td>
</tr>
<tr>
<td>MPAD.5030</td>
<td>Public &amp; Non Profit Management &amp; Leadership</td>
<td>3</td>
</tr>
<tr>
<td>MPAD.5040</td>
<td>Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MPAD.5400</td>
<td>Public Finance</td>
<td>3</td>
</tr>
</tbody>
</table>
### Required Courses for Human Service Management

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCI.5010 (<a href="https://www.uml.edu/catalog/courses/SOCI/5010">https://www.uml.edu/catalog/courses/SOCI/5010</a>)</td>
<td>Social Policy and Inequalities</td>
<td>3</td>
</tr>
<tr>
<td>SOCI.5020 (<a href="https://www.uml.edu/catalog/courses/SOCI/5020">https://www.uml.edu/catalog/courses/SOCI/5020</a>)</td>
<td>Human Service Management</td>
<td>3</td>
</tr>
<tr>
<td>MPAD.6010 (<a href="https://www.uml.edu/catalog/courses/MPAD/6010">https://www.uml.edu/catalog/courses/MPAD/6010</a>)</td>
<td>Capstone Experience</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>9</strong></td>
</tr>
</tbody>
</table>

### Elective Courses for Human Services Management (pick 3)

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCI.5100 (<a href="https://www.uml.edu/catalog/courses/SOCI/5100">https://www.uml.edu/catalog/courses/SOCI/5100</a>)</td>
<td>Refugee and Asylum Policy</td>
<td>3</td>
</tr>
<tr>
<td>SOCI.5110 (<a href="https://www.uml.edu/catalog/courses/SOCI/5110">https://www.uml.edu/catalog/courses/SOCI/5110</a>)</td>
<td>Immigration Policy</td>
<td>3</td>
</tr>
<tr>
<td>PSYC.5270 (<a href="https://www.uml.edu/catalog/courses/PSYC/5270">https://www.uml.edu/catalog/courses/PSYC/5270</a>)</td>
<td>Immigrant Psychology &amp; Communities</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>

### Required Courses for Justice Administration

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRIM.5200 (<a href="https://www.uml.edu/catalog/courses/CRIM/5200">https://www.uml.edu/catalog/courses/CRIM/5200</a>)</td>
<td>Administration of Justice</td>
<td>3</td>
</tr>
<tr>
<td>MPAD.6010 (<a href="https://www.uml.edu/catalog/courses/MPAD/6010">https://www.uml.edu/catalog/courses/MPAD/6010</a>)</td>
<td>Capstone Experience</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>9</strong></td>
</tr>
</tbody>
</table>

### Required for Justice Administration (pick 2)

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>

### Elective Courses for Justice Administration (pick 3)

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRIM.5220 (<a href="https://www.uml.edu/catalog/courses/CRIM/5220">https://www.uml.edu/catalog/courses/CRIM/5220</a>)</td>
<td>Issues in Policing</td>
<td>3</td>
</tr>
</tbody>
</table>
CRIM.5230 (https://www.uml.edu/catalog/courses/CRIM/5230)  Courts and Sentencing  3
CRIM.5240 (https://www.uml.edu/catalog/courses/CRIM/5240)  Issues in Corrections  3
CRIM.5270 (https://www.uml.edu/catalog/courses/CRIM/5270)  Management & Administration of the Courts  3
CRIM.5920 (https://www.uml.edu/catalog/courses/CRIM/5920)  Justice Information Systems  3
CRIM.6500 (https://www.uml.edu/catalog/courses/CRIM/6500)  Violence in America  3
CRIM.6800 (https://www.uml.edu/catalog/courses/CRIM/6800)  Selected Topics (Access to Justice, Alternative Dispute Resolution, Specialty Courts)  3
Total  9

Other electives may be selected with approval of the graduate coordinator.

Total Credits = 39

Last updated: 1/10/2019

Degree Pathway for the Doctor of Philosophy in Biomedical Engineering

Students must satisfy the following doctoral core requirement:

<table>
<thead>
<tr>
<th>Core Courses</th>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMEN.5200 (<a href="https://www.uml.edu/catalog/courses/BMEN/5200">https://www.uml.edu/catalog/courses/BMEN/5200</a>)</td>
<td>Bioinstrumentation</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMEN.5020 (<a href="https://www.uml.edu/catalog/courses/BMEN/5020">https://www.uml.edu/catalog/courses/BMEN/5020</a>)</td>
<td>Fundamentals of Biomaterials</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMEN.5305 (<a href="https://www.uml.edu/catalog/courses/BMEN/5305">https://www.uml.edu/catalog/courses/BMEN/5305</a>)</td>
<td>Biomechanics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMEN.5210 (<a href="https://www.uml.edu/catalog/courses/BMEN/5210">https://www.uml.edu/catalog/courses/BMEN/5210</a>)</td>
<td>Quantitative Physiology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>XXXX.XXXX</td>
<td>Advanced Mathematics Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMEN.5900 (<a href="https://www.uml.edu/catalog/courses/BMEN/5900">https://www.uml.edu/catalog/courses/BMEN/5900</a>)</td>
<td>BME Doctoral Seminar</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Track

Four (4) courses from one of the following tracks.

See tracks below

Elective

The remaining three required course credits can be selected in conjunction with the research advisor to add breadth to the program. This course can be an appropriate engineering, math, or science course.
**Courses # | Course name | Credits**
-------|-------------|--------
XXXX.XXXX | Elective | 3

**Dissertation Research**

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMEN.7590</td>
<td>Doctoral Dissertation/Biomedical Engineering</td>
<td>21</td>
</tr>
</tbody>
</table>

**Tracks**

Choose one track:

*: Biomechanics, Medical Device Design or Cellular &Tissue.

<table>
<thead>
<tr>
<th>Courses for the Biomechanics Track (choose 4)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course #</strong></td>
<td><strong>Course Name</strong></td>
</tr>
<tr>
<td>BMEN.5300</td>
<td>Ergonomics and Work</td>
</tr>
<tr>
<td>BMEN.5310</td>
<td>Occupational Biomechanics</td>
</tr>
<tr>
<td>BMEN.5315</td>
<td>Biomechanics II</td>
</tr>
<tr>
<td>BMEN.5320</td>
<td>Biofluid Mechanics</td>
</tr>
<tr>
<td>BMEN.5350</td>
<td>Respiratory Dynamics and Devices</td>
</tr>
<tr>
<td>BMEN.5380</td>
<td>Computational Biomechanics</td>
</tr>
<tr>
<td>BMEN.5390</td>
<td>Computer Aided Design for Biomedical Engineering</td>
</tr>
<tr>
<td>BMEN.6390</td>
<td>Research Models in Biomechanics</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Courses for the Cellular &amp;Tissue Track (choose 4)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course #</strong></td>
<td><strong>Course Name</strong></td>
</tr>
<tr>
<td>PLAS.5020</td>
<td>Fundamentals of Medical Device Regulation</td>
</tr>
<tr>
<td>BMEN.5110</td>
<td>Tissue Engineering</td>
</tr>
<tr>
<td>BMEN.5115</td>
<td>Advanced Tissue Engineering</td>
</tr>
<tr>
<td>BMEN.5120L</td>
<td>Cell and Tissue Engineering Lab</td>
</tr>
<tr>
<td>BMEN.5130</td>
<td>Neural Engineering</td>
</tr>
<tr>
<td>BMEN.5610</td>
<td>Drug Delivery</td>
</tr>
<tr>
<td>BMEN.6190</td>
<td>Research Methods in Cellular &amp;Tissue Engineering</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Total Credits = 63**

All MSE degree candidates must satisfy each of the following four requirements. No course can count towards more than one requirement:
### Core Courses (4 three-credit courses)

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IENG.5010 <a href="https://www.uml.edu/catalog/courses/IENG/5010">https://www.uml.edu/catalog/courses/IENG/5010</a></td>
<td>Advanced Deterministic Modeling &amp; Analysis</td>
<td>3</td>
</tr>
<tr>
<td>IENG.5020 <a href="https://www.uml.edu/catalog/courses/IENG/5020">https://www.uml.edu/catalog/courses/IENG/5020</a></td>
<td>Advanced Stochastic Modeling &amp; Analysis</td>
<td>3</td>
</tr>
<tr>
<td>IENG.5050 <a href="https://www.uml.edu/catalog/courses/IENG/5050">https://www.uml.edu/catalog/courses/IENG/5050</a></td>
<td>Industrial Automation</td>
<td>3</td>
</tr>
<tr>
<td>BMEN.5310 <a href="https://www.uml.edu/catalog/courses/BMEN/5310">https://www.uml.edu/catalog/courses/BMEN/5310</a></td>
<td>Occupational Biomechanics</td>
<td>3</td>
</tr>
</tbody>
</table>

### Details

1. **Thesis Track**
   - M.S Students on the thesis track will design a student-specific curriculum sequence of 12 credit hours of coursework (in consultation with the thesis advisor and approved in writing by the student and their thesis advisor) within the first semester of graduate study. The contact will be sent to the graduate coordinator and to the Registrar’s office.

2. **Non-Thesis Track**
   - In their first year students on a non-thesis track must submit a plan of study to the graduate coordinator and obtain his/her approval. Any change to the submitted plan requires the approval of the graduate coordinator.

### Total Credit Hours

- 9 credit hours of thesis research, 9 credit hours of coursework approved by the thesis advisor, and at least one semester of the 0 credit research seminar (MECH.5010 [https://www.uml.edu/catalog/courses/MECH/5010](https://www.uml.edu/catalog/courses/MECH/5010)).
- 6 credit hours of coursework in an Industrial Engineering concentration and 12 credit hours of coursework approved by the graduate coordinator.

### Analytics and Operations Concentration Courses

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IENG.5040 <a href="https://www.uml.edu/catalog/courses/IENG/5040">https://www.uml.edu/catalog/courses/IENG/5040</a></td>
<td>Manufacturing Systems</td>
<td>3</td>
</tr>
<tr>
<td>IENG.5030 <a href="https://www.uml.edu/catalog/courses/IENG/5030">https://www.uml.edu/catalog/courses/IENG/5030</a></td>
<td>Advanced Manufacturing Processes</td>
<td>3</td>
</tr>
<tr>
<td>IENG.5070 <a href="https://www.uml.edu/catalog/courses/IENG/5070">https://www.uml.edu/catalog/courses/IENG/5070</a></td>
<td>Facilities Planning &amp; Material Handling</td>
<td>3</td>
</tr>
<tr>
<td>IENG.5060 <a href="https://www.uml.edu/catalog/courses/IENG/5060">https://www.uml.edu/catalog/courses/IENG/5060</a></td>
<td>Simulation</td>
<td>3</td>
</tr>
<tr>
<td>IENG.5080 <a href="https://www.uml.edu/catalog/courses/IENG/5080">https://www.uml.edu/catalog/courses/IENG/5080</a></td>
<td>Advanced Human-Machine Systems Design</td>
<td>3</td>
</tr>
</tbody>
</table>

### Tracts Details

**1. Thesis Track**
- M.S Students on the thesis track will design a student-specific curriculum sequence of 12 credit hours of coursework (in consultation with the thesis advisor and approved in writing by the student and their thesis advisor) within the first semester of graduate study. The contact will be sent to the graduate coordinator and to the Registrar’s office.

**2. Non-Thesis Track**
- In their first year students on a non-thesis track must submit a plan of study to the graduate coordinator and obtain his/her approval. Any change to the submitted plan requires the approval of the graduate coordinator.

---

**Analytics and Operations Concentration Courses**

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IENG.5090 <a href="https://www.uml.edu/catalog/courses/IENG/5090">https://www.uml.edu/catalog/courses/IENG/5090</a></td>
<td>Directed Study</td>
<td>1-3</td>
</tr>
<tr>
<td>IENG.7410 <a href="https://www.uml.edu/catalog/courses/IENG/7410">https://www.uml.edu/catalog/courses/IENG/7410</a></td>
<td>Master’s Thesis Industrial Engineering</td>
<td>9</td>
</tr>
<tr>
<td>IENG.7510 <a href="https://www.uml.edu/catalog/courses/IENG/7510">https://www.uml.edu/catalog/courses/IENG/7510</a></td>
<td>Advanced Projects in Industrial Engineering</td>
<td>3</td>
</tr>
<tr>
<td>BMEN.5300 <a href="https://www.uml.edu/catalog/courses/BMEN/5300">https://www.uml.edu/catalog/courses/BMEN/5300</a></td>
<td>Ergonomics and Work</td>
<td>3</td>
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### Health System Engineering Concentration Courses

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### Manufacturing and Automation Courses

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Degree Pathway for the Doctor of Philosophy in Industrial Engineering

Students must satisfy the following doctoral core requirement:

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Concentration

Six (6) courses from the following area of concentration. See below.

Doctoral Dissertation

- IENG.7530: Doctoral Dissertation/Industrial Engineering (3 credits)
- IENG.7550: Doctoral Dissertation/Industrial Engineering (3 credits)
- IENG.7590: Doctoral Dissertation/Industrial Engineering (3 credits)

Degree Pathway for Doctor of Philosophy - Earth System Science

This is a 54-credit program.

Core Required Courses

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<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVI.6000/7000</td>
<td>Data Analysis in Earth System Science</td>
<td>3</td>
</tr>
<tr>
<td>ENVI.6100/7100</td>
<td>Professional Communication in Earth System Science</td>
<td>3</td>
</tr>
<tr>
<td>ENVI.6200/7200</td>
<td>Professional Communication in Science and Technology</td>
<td>3</td>
</tr>
<tr>
<td>ENVI.7320</td>
<td>Graduate Research Seminar</td>
<td>1</td>
</tr>
<tr>
<td>ENVI.7400</td>
<td>Dissertation Research in Earth System Science</td>
<td>M in</td>
</tr>
</tbody>
</table>

Total: 3 credits
Elective Courses

A requirement of the Ph.D. program is that every student will have multiple types of experiential learning experiences and systems thinking skills. These requirements are structured into three core groups of experiences that students will meet via at least one required elective course taken in each core:

i. A course in computer modeling, industry software, or numerical models.

ii. A course with a focus on field research or analytical laboratory measurements.

iii. A course with dynamic simulation and systems thinking content.

### Experiential Learning Experiences and Systems Thinking

#### i. Graduate-level courses that Utilize the Computer Workstations and Technical Software (Choose 1)

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATMO.5010</td>
<td>Boundary Layer Meteorology</td>
<td>3</td>
</tr>
<tr>
<td>ATMO.5020</td>
<td>Advanced Synoptic Meteorology</td>
<td>3</td>
</tr>
<tr>
<td>ATMO.5050</td>
<td>Atmospheric Measurement and Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ATMO.5080</td>
<td>The Climate System</td>
<td>3</td>
</tr>
<tr>
<td>ATMO.5230</td>
<td>Air Pollution Control</td>
<td>3</td>
</tr>
<tr>
<td>ATMO.5500</td>
<td>Satellite and radar Meteorology</td>
<td>3</td>
</tr>
<tr>
<td>ATMO.5710</td>
<td>Air Pollution Phenomenology</td>
<td>3</td>
</tr>
<tr>
<td>ENVI.5040</td>
<td>GIS in Earth and Environmental Sciences</td>
<td>3</td>
</tr>
<tr>
<td>GEOL.5010</td>
<td>Paleoclimatology</td>
<td>3</td>
</tr>
<tr>
<td>GEOL.5020</td>
<td>Quantitative Geomorphology</td>
<td>3</td>
</tr>
<tr>
<td>GEOL.5100</td>
<td>Geology of New England</td>
<td>3</td>
</tr>
<tr>
<td>GEOL.5150</td>
<td>Topics in Environmental Geochemistry</td>
<td>3</td>
</tr>
<tr>
<td>GEOL.5200</td>
<td>Structural Geology</td>
<td>3</td>
</tr>
<tr>
<td>GEOL.5310</td>
<td>Isotopes in Environmental and Geosciences</td>
<td>3</td>
</tr>
<tr>
<td>GEOL.5560</td>
<td>Applied Geophysics</td>
<td>3</td>
</tr>
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</table>

**Total**

#### ii. Graduate-level courses that provide training in analytical techniques and hands-on field experiences via field excursions and field work (Choose 1)

<table>
<thead>
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<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
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<td>Atmospheric Measurement and Data Analysis</td>
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<td>ATMO.5080</td>
<td>The Climate System</td>
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<tr>
<td>ATMO.5230</td>
<td>Air Pollution Control</td>
<td>3</td>
</tr>
<tr>
<td>ATMO.5500</td>
<td>Satellite and radar Meteorology</td>
<td>3</td>
</tr>
<tr>
<td>ATMO.5710</td>
<td>Air Pollution Phenomenology</td>
<td>3</td>
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<td>ENVI.5100</td>
<td>Environmental Pollution</td>
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<tr>
<td>ENVI.65720</td>
<td>Energy and Environment</td>
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<td>Paleoclimatology</td>
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</tr>
<tr>
<td>GEOL.5020</td>
<td>Quantitative Geomorphology</td>
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</tr>
<tr>
<td>GEOL.5100</td>
<td>Geology of New England</td>
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<tr>
<td>GEOL.5150</td>
<td>Topics in Environmental Geochemistry</td>
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<td>GEOL.5200</td>
<td>Structural Geology</td>
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<tr>
<td>GEOL.5310</td>
<td>Isotopes in Environmental and Geosciences</td>
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<td>GEOL.5560</td>
<td>Applied Geophysics</td>
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**Total**

#### iii. Graduate-level courses that provide Training in Systems Thinking Approaches (Choose 1)

<table>
<thead>
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<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>ENVI.6000/7000</td>
<td>Data Analysis in</td>
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</tbody>
</table>
Sample Degree Pathway for a Doctorate in Physics

Entering with Bachelor of Science in Physics

This is ONE possible 4-year sequence of courses for students entering the program with a B.S. in Physics leading to M.S. and Ph.D degrees. This sequence assumes the entering student has adequate preparation in undergraduate Mechanics, Electricity and Magnetism, and Quantum Mechanics but not Statistical Mechanics. Most students take additional semesters to complete their dissertation research.

<table>
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<tr>
<td>ENVI.5160</td>
<td>Climate Change: Science, Communication, and Solutions</td>
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<tr>
<td>ENVI.5170L</td>
<td>Climate Change: Science, Communication, Solutions Lab</td>
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<tr>
<td>ENVI.6000/7000</td>
<td>Data Analysis in Earth System Science</td>
<td>3</td>
</tr>
<tr>
<td>ENVI.6100/7100</td>
<td>Professional Communication in Earth System Science</td>
<td>3</td>
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<tr>
<td>GEOL.5100</td>
<td>Paleoclimatology</td>
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Credits = 54

Dissertation Research in Earth System Science (minimum of 24 credits)

Elective Courses or Dissertation research in Earth System Science (minimum of 6 credits)

Ph.D. Comprehensive Exam.

<table>
<thead>
<tr>
<th>Year 1, Semester 1 (Fall)</th>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>PHYS.6070</td>
<td>Mathematical Methods of Physics</td>
<td>3</td>
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<tr>
<td>PHYS.6170</td>
<td>Electromagnetic Theory I</td>
<td>3</td>
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<tr>
<td>PHYS.5210</td>
<td>Statistics Thermodynamics</td>
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<td>PHYS.7110</td>
<td>Graduate Seminar in Physics</td>
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Year 1, Semester 2 (Spring)

<table>
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<tr>
<td>PHYS.5630</td>
<td>Computational Physics</td>
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<td>PHYS.XXXXX</td>
<td>Elective2</td>
<td>3</td>
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<tr>
<td>PHYS.7460</td>
<td>Master’s Thesis Research Physics</td>
<td>3</td>
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<tr>
<td>PHYS.7XXX</td>
<td>Seminar</td>
<td>0</td>
<td></td>
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<td>PHYS.7010</td>
<td>Physics Colloquium</td>
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Year 2, Semester 4 (Spring)

<table>
<thead>
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<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>PHYS.XXXXX</td>
<td>Elective</td>
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<tr>
<td>PHYS.XXXXX</td>
<td>Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PHYS.7460</td>
<td>Master’s Thesis Research Physics</td>
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<tr>
<td>PHYS.7XXX</td>
<td>Seminar</td>
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<tr>
<td>Total</td>
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</table>
### Sample Degree Pathway for Doctorate in Physics

#### - Medical Physics Option

**Entering with BS in Physics**

This sequence assumes the entering student has adequate preparation in undergraduate Mechanics, Electricity and Magnetism, Quantum Mechanics and Statistical Mechanics; therefore no physics remedial courses (PHYS.5000) level are necessary. Note that the actual degree pathway depends on the particular preparation of the student, therefore this example may not be applicable to everyone.

### Year 3, Semester 5 (Fall)

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>PHYS.XXXX (<a href="https://www.uml.edu/catalog/courses/PHYS">https://www.uml.edu/catalog/courses/PHYS</a>)</td>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>PHYS.7XXX (<a href="https://www.uml.edu/catalog/courses/PHYS">https://www.uml.edu/catalog/courses/PHYS</a>)</td>
<td>Seminar</td>
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</tr>
<tr>
<td>PHYS.7010 (<a href="https://www.uml.edu/catalog/courses/PHYS/7010">https://www.uml.edu/catalog/courses/PHYS/7010</a>)</td>
<td>Physics Colloquium</td>
<td>1</td>
</tr>
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</table>

### Year 3, Semester 6 (Spring)

<table>
<thead>
<tr>
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<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS.XXXX (<a href="https://www.uml.edu/catalog/courses/PHYS">https://www.uml.edu/catalog/courses/PHYS</a>)</td>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>PHYS.7XXX (<a href="https://www.uml.edu/catalog/courses/PHYS">https://www.uml.edu/catalog/courses/PHYS</a>)</td>
<td>Seminar</td>
<td>1</td>
</tr>
<tr>
<td>PHYS.7020 (<a href="https://www.uml.edu/catalog/courses/PHYS/7020">https://www.uml.edu/catalog/courses/PHYS/7020</a>)</td>
<td>Physics Colloquium</td>
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### Year 4, Semester 7 (Fall)

<table>
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<tr>
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<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>PHYS.7XXX (<a href="https://www.uml.edu/catalog/courses/PHYS">https://www.uml.edu/catalog/courses/PHYS</a>)</td>
<td>Seminar</td>
<td>0</td>
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<tr>
<td>PHYS.7010 (<a href="https://www.uml.edu/catalog/courses/PHYS/7010">https://www.uml.edu/catalog/courses/PHYS/7010</a>)</td>
<td>Physics Colloquium</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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### Year 4, Semester 8 (Spring)

### Year 1, Semester 1 (Fall)

<table>
<thead>
<tr>
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<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>RADI.3010 (<a href="https://www.uml.edu/catalog/courses/RADI/3010">https://www.uml.edu/catalog/courses/RADI/3010</a>)</td>
<td>Radiation Safety and Control I</td>
<td>3</td>
</tr>
<tr>
<td>RADI.3090 (<a href="https://www.uml.edu/catalog/courses/RADI/3090">https://www.uml.edu/catalog/courses/RADI/3090</a>)</td>
<td>Nuclear Instrumentation</td>
<td>3</td>
</tr>
<tr>
<td>PHYS.6570 (<a href="https://www.uml.edu/catalog/courses/PHYS/6570">https://www.uml.edu/catalog/courses/PHYS/6570</a>)</td>
<td>Electromagnetic Theory I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS.7200</td>
<td>Medical Physics</td>
<td>0</td>
</tr>
</tbody>
</table>

---

1. 9 credits constitute a full-time load. Full-time students must register for Seminar and Colloquium (0 or 1 credit) every semester. At most 3 credits for Seminar/Colloquium may be counted towards degree requirements.

2. A least one elective must be a 6xxx-level course.

**Last updated: 4/28/2021**
### Year 1, Semester 2 (Spring)

<table>
<thead>
<tr>
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<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>RADI.5980</td>
<td>Medical Imaging I</td>
<td>3</td>
</tr>
<tr>
<td>RADI.5620</td>
<td>Radiation Biology</td>
<td>3</td>
</tr>
<tr>
<td>PHYS.6580</td>
<td>Electromagnetic Theory II</td>
<td>3</td>
</tr>
<tr>
<td>PHYS.7200</td>
<td>Medical Physics Seminar</td>
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</tr>
<tr>
<td>PHYS.7021</td>
<td>Physics Colloquium</td>
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### Year 1, Summer Trimester

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<th>Cr.</th>
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<tbody>
<tr>
<td>DPTH.6510</td>
<td>Sectional Human Anatomy (or equivalent, if needed)</td>
<td>3</td>
</tr>
<tr>
<td>DPTH.6590L</td>
<td>Sectional Human Anatomy Lab (or equivalent, if needed)</td>
<td>3</td>
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<tr>
<td><strong>Total</strong></td>
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</table>

Target date for Comprehensive Doctoral Examination.

### Year 2, Semester 2 (Spring)

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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
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<td>RADI.6980</td>
<td>Medical Imaging II</td>
<td>3</td>
</tr>
<tr>
<td>RADI.6050</td>
<td>Radiation Interactions &amp; Transport</td>
<td>3</td>
</tr>
<tr>
<td>RADI.5330</td>
<td>External Dosimetry and Shielding</td>
<td>3</td>
</tr>
<tr>
<td>PHYS.7200</td>
<td>Medical Physics Seminar</td>
<td>0</td>
</tr>
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<td>PHYS.7021</td>
<td>Physics Colloquium</td>
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### Year 2, Semester 4 (Spring)

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<tbody>
<tr>
<td>RADI.5650</td>
<td>Radiation Therapy Physics</td>
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<tr>
<td>RADI.6060</td>
<td>Monte Carlo Simulation of Radiation Transport</td>
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</tr>
<tr>
<td>PHYS.6110</td>
<td>Classical Mechanics or other approved elective</td>
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</tr>
<tr>
<td>XXXX.XXXX</td>
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</tr>
<tr>
<td>PHYS.7200</td>
<td>Medical Physics Seminar</td>
<td>0</td>
</tr>
<tr>
<td>PHYS.7020</td>
<td>Physics Colloquium</td>
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Target date for start of research.

### Year 3, Semester 5 (Fall)

<table>
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<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>PHYS.5630</td>
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<tr>
<td>XXXX.XXXX</td>
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<tr>
<td>RADI.6760</td>
<td>Advanced Project</td>
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<tr>
<td>PHYS.7310</td>
<td>Graduate Seminar in Radiological Sciences</td>
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<tr>
<td>BMBT.5200</td>
<td>Ethical Issues in Biomedical Research</td>
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<td>PHYS.7200</td>
<td>Medical Physics Seminar</td>
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### Year 3, Semester 6 (Spring)

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</thead>
<tbody>
<tr>
<td>RADI.6650</td>
<td>Advanced Radiation Therapy Physics</td>
<td>3</td>
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</table>

Target date for start of research.
### Sample Degree Pathway for Doctorate in Physics - Medical Physics Option

#### Entering with MS in Medical Physics

This sequence assumes the entering student has an MS Degree with thesis in Medical Physics from a CAMPEP-accredited institution, including clinical rotation, but has no advanced preparation in the core Physics courses. It is further assumed that the prior MS Degree involved a total of 30 credits beyond the baccalaureate degree. The Advanced Project may be waived, as done in this example, if the appropriate conditions are met. Note that the actual degree pathway depends on the particular preparation of the student, therefore this example may not be applicable to everyone.

#### Year 1, Semester 1 (Fall)

<table>
<thead>
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<th>Cr.</th>
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<tbody>
<tr>
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<td>Nuclear Physics I</td>
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<td>PHYS.6570</td>
<td>Electromagnetic Theory I</td>
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<tr>
<td>RADI/PHYS.XXXX</td>
<td>Approved Elective</td>
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</tr>
<tr>
<td>PHYS.7200</td>
<td>Doctoral Dissertation - Physics</td>
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Target date for dissertation defense.

**Last updated: 1/26/2021**

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### Year 4, Semester 7 (Fall)

<table>
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</tr>
<tr>
<td>PHYS.7010</td>
<td>Physics Colloquium</td>
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### Year 4, Semester 8 (Spring)

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</tr>
<tr>
<td>PHYS/RADI.7560</td>
<td>Doctoral Dissertation - Physics</td>
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</tr>
<tr>
<td>PHYS.7200</td>
<td>Medical Physics Seminar</td>
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</tr>
<tr>
<td>PHYS.7010</td>
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### Year 5, Semester 9 (Fall)

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<tr>
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<tbody>
<tr>
<td>PHYS/RADI.7560</td>
<td>Doctoral Dissertation - Physics</td>
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</tr>
<tr>
<td>PHYS.7200</td>
<td>Medical Physics Seminar</td>
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</tr>
<tr>
<td>PHYS.7010</td>
<td>Physics Colloquium</td>
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---

Target date for graduate research admissions exam and formation of thesis committee. Recommended date for taking ABR Part I examination.

---

### Target date for dissertation defense.
### Year 1, Semester 2 (Spring)

<table>
<thead>
<tr>
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<tr>
<td>PHYS.6580</td>
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<td>PHYS.6620</td>
<td>Nuclear Physics II</td>
<td>3</td>
</tr>
<tr>
<td>PHYS.6110</td>
<td>Classical Mechanics or Approved Elective</td>
<td>3</td>
</tr>
<tr>
<td>or</td>
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<td>PHYS.7200</td>
<td>Medical Physics Seminar</td>
<td>0</td>
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<td>PHYS.7020</td>
<td>Physics Colloquium</td>
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</table>

Target date for comprehensive examination.

### Year 2, Semester 3 (Fall)

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<tbody>
<tr>
<td>PHYS.5630</td>
<td>Computational Methods in Physics or Approved elective</td>
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</tr>
<tr>
<td>or</td>
<td>XXXX.XXXX</td>
<td></td>
</tr>
<tr>
<td>RADI.6050</td>
<td>Radiation Interactions and Transport</td>
<td>3</td>
</tr>
<tr>
<td>PHYS/RADI/7560</td>
<td>Ph.D. Dissertation Research</td>
<td>3</td>
</tr>
<tr>
<td>PHYS.7200</td>
<td>Medical Physics Seminar</td>
<td>0</td>
</tr>
<tr>
<td>PHYS.7010</td>
<td>Physics Colloquium</td>
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</table>

Target date for graduate research admission exam.

### Year 2, Semester 4 (Spring)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>RADI.6060</td>
<td>Monte Carlo Simulation of radiation Transport</td>
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</tr>
<tr>
<td>PHYS/RADI/7560</td>
<td>Ph.D. Dissertation Research</td>
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<td>PHYS.7200</td>
<td>Medical Physics Seminar</td>
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<td>PHYS.7020</td>
<td>Physics Colloquium</td>
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</table>

Recommended date for taking Part I examination if not already taken.

### Year 3, Semester 5 (Fall)

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<th>Cr.</th>
</tr>
</thead>
<tbody>
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<td>RADI.7560</td>
<td>Ph.D. Dissertation Research</td>
<td>6</td>
</tr>
<tr>
<td>PHYS.7200</td>
<td>Medical Physics Seminar</td>
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<td>PHYS.7010</td>
<td>Physics Colloquium</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
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</tr>
</tbody>
</table>

The schedule in Semester 5 may be continued in subsequent semesters, as appropriate within the time limit set by the University and the Department, depending on the progress of the students research.

Target date for dissertation defense.

Last updated: 1/28/2021

Degree Pathway for Master of Science, Advanced Practice Registered Nurse (APRN), Full-time

A minimum of 42 credits of course work is required for graduation with an MS for all students.

### Year 1

**Fall**

<table>
<thead>
<tr>
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<tbody>
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</table>
### Year 2

#### Fall

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>NURS.6522</td>
<td>APRN Women's health Across the Lifespan (FNP &amp;AGNP)</td>
<td>3</td>
</tr>
<tr>
<td>NURS.6521</td>
<td>APRN Care of Children and Adolescents (FNP track)</td>
<td>3</td>
</tr>
<tr>
<td>OR</td>
<td>NURS.6523</td>
<td>APRN care of Older Adults (AGNP track)</td>
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</table>

#### Spring

<table>
<thead>
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<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>NURS.6512</td>
<td>APRN Practicum 2 (off-campus, 250 hours)</td>
<td>3</td>
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</table>

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS.6513</td>
<td>APRN Practicum 3 (off-campus, 250 hours)</td>
<td>3</td>
</tr>
<tr>
<td>NURS.6524</td>
<td>APRN Role Transition (FNP &amp;AGNP)</td>
<td>1</td>
</tr>
<tr>
<td>NURS.6010</td>
<td>Research for Evidence-Based Practice (online)</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXXXXX XXXX</td>
<td>Elective</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits = 42

- Online nursing courses are generally offered in Fall and Spring.
- Advanced Health Assessment and Specialty courses (APRN designation) are offered in a planned sequence and have a co-requisite practicum course. Offered in blended format. Practicums are 250 hours - off campus.
- Full time program can be completed in 2 years (4 semesters).
- Part time program can be completed in 3-5 years. Progression of courses are coordinated with your academic advisor.

### Important Prerequisites and Co-requisites

<table>
<thead>
<tr>
<th>Course</th>
<th>Conditions for Sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSCI.5510</td>
<td>Pre or Co requisite for NURS.6510 (<a href="https://www.uml.edu/catalog/courses/NURS/6510">https://www.uml.edu/catalog/courses/NURS/6510</a>) Advanced Health Assessment</td>
</tr>
<tr>
<td>NURS.5530</td>
<td>Pre or Co requisite for NURS.6000 (<a href="https://www.uml.edu/catalog/courses/NURS/6000">https://www.uml.edu/catalog/courses/NURS/6000</a>), NURS.5520 (<a href="https://www.uml.edu/catalog/courses/NURS/5520">https://www.uml.edu/catalog/courses/NURS/5520</a>), must be taken at UML.</td>
</tr>
<tr>
<td>NURS.6010</td>
<td>Pre or Co requisite for NURS.6010 (<a href="https://www.uml.edu/catalog/courses/NURS/6010">https://www.uml.edu/catalog/courses/NURS/6010</a>) Research for Evidence Based Practice</td>
</tr>
</tbody>
</table>
Core courses or Epidemiology courses taken in the Master of Public Health program can be waived, but students must meet credit requirements.

See List B of Electives

Degree requirements include at least 16 credit hours of courses beyond the master's degree plus at least 12 credits of dissertation research for a total of 36 post-master's credit hours beyond any previous graduate degree.

Total Course Credits must be at least 16 credits.

Total credits = 36 (must be at least 36 post-master credits)

Last updated 4/7/2022
Degree requirements include at least 16 credit hours of courses beyond the master’s degree plus at least 12 credits of dissertation research for a total of 36 post-master’s credit hours beyond any previous graduate degree.

Total credits = 36 (must be at least 36 post-master credits)

Last updated 8/10/2020
Interventions
NUTR.6040 Nutrition Epidemiology 3

Total 12

Public Health Practice Courses
Course # Course Name Cr.
PUBH.6660 MPH Practicum 3
PUBH.6670 Integrated Practical learning 3
Total 6

Electives
Course # Course Name Cr.
XXXX.XXXX Elective 3
XXXX.XXXX Elective 3
XXXX.XXXX Elective 3
Total 9

1Core Public Health Courses are typically offered every semester. Courses are usually face-to-face but are occasionally offered in online format.

2PUBH.5750 is a prerequisite for PUBH.6040 and is typically taken in the first semester of the program.

3Nutrition Specialization Courses are typically offered once per year or every other year in a face-to-face format. NUTR.6040 is offered in Spring of odd numbered years. NUTR.6010 is offered in Fall of odd numbered years.

4If possible, Public Health Nutrition Practice is a Fall course, and Community Based Interventions is a spring course.

5PUBH.5750 Epidemiology and Biostatistics should be taken before NUTR.6040. NUTR.6040 is offered in Spring of odd numbered years. NUTR.6010 is offered in Fall of odd numbered years.

6Practicum courses are meant to be taken sequentially. A student typically takes PUBH.6660 in the next-to-last semester of program and takes PUBH.6670 in the last semester before graduation.

7Students must take 9 credits of electives in Public Health, Nutrition, or a field relevant to their academic program. These courses are typically selected in collaboration with an academic advisor or graduate program coordinator.

NOTE: This program can accompany both Part-time and Full-time plans of study. The program can begin in the fall or spring semester. Students may transfer to other MPH options, including the Dietetics option, if qualified. Please discuss with your advisor and graduate coordinator if you are considering transferring to another MPH option.

Total Credits = 42

Last updated: 8/10/2020
CRIM.5760 is a prerequisite for PUBH.6820 and is typically taken in the first semester of the program.

3Epidemiology Specialization Courses are typically offered once per year in a face-to-face format.

4PUBH.5760 exposes students to statistical software packages and should be taken as early in the program as possible.

5PUBH.5770 is a prerequisite for PUBH.6870 and PUBH.6890.

6Practicum courses are meant to be taken sequentially. A student typically takes PUBH.6660 in the next-to-last semester of the program and takes PUBH.6670 in the last semester before graduation.

7Students must take 6 credits of elective courses in Public Health or a field relevant to their academic program. These courses are typically selected in collaboration with an academic advisor or graduate program coordinator.

NOTE: This program can accompany both Part-Time and Full-Time plans of study. The program can begin in the fall or spring semester.

Total Credits = 42

Last updated: 8/10/2020

List A - Required Research Methods Courses

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>BMIB.5130</td>
<td>Biomedical Analytics and Informatics</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.5910</td>
<td>Research Design</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.6900</td>
<td>Advanced Regression Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.6910</td>
<td>Advanced Research Design</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.6920</td>
<td>Qualitative Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.6930</td>
<td>Survey Methods</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.7100</td>
<td>Advanced Research in Terrorism</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.7900</td>
<td>Categorical and Limited Dependent Variables</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.7910</td>
<td>Structural Equation Modeling</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.7920</td>
<td>Survival Analysis and Longitudinal Data</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.7930</td>
<td>Data Reduction and factor Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.7950</td>
<td>Advanced Qualitative Methods</td>
<td>3</td>
</tr>
<tr>
<td>DPTH.6160</td>
<td>Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.7000</td>
<td>Introduction to Research Design and Methods</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.7020</td>
<td>Research Methods and Design</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.7040</td>
<td>Qualitative Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.7050</td>
<td>Survey Research</td>
<td>3</td>
</tr>
<tr>
<td>EDUC.7101</td>
<td>Qualitative Research: Advanced Topics in Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MATH.5090</td>
<td>Probability and Mathematical Statistics</td>
<td>3</td>
</tr>
<tr>
<td>MATH.5750</td>
<td>Applied Statistics with R</td>
<td>3</td>
</tr>
<tr>
<td>MATH.5760</td>
<td>Statistical Programming UsingSAS</td>
<td>3</td>
</tr>
<tr>
<td>MATH.5780</td>
<td>Statistical Inference and Data Mining</td>
<td>3</td>
</tr>
<tr>
<td>MATH.5910</td>
<td>Linear Statistics ModelingRegression</td>
<td>3</td>
</tr>
<tr>
<td>MATH.5920</td>
<td>Multivariate Statistics</td>
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</tr>
<tr>
<td>MATH.5930</td>
<td>Experimental Design</td>
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</table>
### Sample Degree Pathway for English - Literature Concentration

**For students who entered fall 2021 and beyond.**

#### Freshman Year

**Fall Semester**

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>PUBH.5750</td>
<td>Epidemiology and Biostatistics</td>
<td>3</td>
</tr>
<tr>
<td>PUBH.5760</td>
<td>Biostatistical Programming</td>
<td>3</td>
</tr>
<tr>
<td>PUBH.5770</td>
<td>Biostatistics for Health Data</td>
<td>3</td>
</tr>
<tr>
<td>PUBH.6050</td>
<td>Advanced Research Methods in Work Environment</td>
<td>3</td>
</tr>
<tr>
<td>PUBH.6160</td>
<td>Exposure and Risk Assessment</td>
<td>3</td>
</tr>
<tr>
<td>PUBH.6191</td>
<td>Measurement of Chemical Exposure</td>
<td>3</td>
</tr>
<tr>
<td>PUBH.6800</td>
<td>Introduction to SAS</td>
<td>3</td>
</tr>
<tr>
<td>PUBH.6820</td>
<td>Applied Epidemiology Methods</td>
<td>3</td>
</tr>
<tr>
<td>PUBH.6850</td>
<td>Applied Public Health Research and Practice</td>
<td>3</td>
</tr>
<tr>
<td>PUBH.6870</td>
<td>Quantitative Models for Public Health</td>
<td>3</td>
</tr>
<tr>
<td>PUBH.6890</td>
<td>Advanced Regression Modeling</td>
<td>3</td>
</tr>
<tr>
<td>PUBH.7250</td>
<td>Epidemiological Theory</td>
<td>3</td>
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<tr>
<td>PUBH.7280</td>
<td>Selected Topics in Epidemiology</td>
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**Last updated 4/7/2022**
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<tbody>
<tr>
<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
<td>3</td>
</tr>
<tr>
<td>ENGL.2810</td>
<td>British Literary Traditions2</td>
<td>3</td>
</tr>
<tr>
<td>WLxxxx</td>
<td>Language 2 &amp;Culture</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
<td>3</td>
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<td>xxxx.xxxx</td>
<td>Free Elective</td>
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### Spring Semester

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<td>Literature Elective4 (DCA), (SRE)</td>
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<tr>
<td>ENGL.3/4xxx</td>
<td>Literature Elective4</td>
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</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Language 4 &amp;Culture or World Ready Elective3</td>
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### Junior Year

#### Fall Semester

<table>
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<tbody>
<tr>
<td>ENGL.3/4xxx</td>
<td>Theory/Composition/Language (AIL)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>STEM Persp. (STEM)</td>
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<td>xxxx.xxxx</td>
<td>World Ready Elective3 or Free Elective</td>
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### Spring Semester

<table>
<thead>
<tr>
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<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>ENGL.3/4xxx</td>
<td>Literature Elective4</td>
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</tr>
<tr>
<td>ENGL.3/4xxx</td>
<td>Literature Elective4</td>
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</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
<td>3</td>
</tr>
</tbody>
</table>

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**Note:** The above table includes courses from the College Writing I / FYSH (CW) and Math Perspectives (MATH) series, as well as language and social sciences perspectives. The courses are part of the undergraduate curriculum at the University of Massachusetts Lowell, as indicated by the course codes and links provided.
(depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements in the undergraduate catalog.

4See requirements for period electives, Theory/Composition/Language, and capstone below. Some students may satisfy the Diverse Traditions requirement with a 2000 level course and should consult with their advisors to be sure that they will also satisfy both the DCA &SRE ELOs.

A minimum of 36 credits, appropriately distributed, is required in English department courses. Students may not exceed the maximum of 54 credits of English department courses (not counting College Writing I &II) within the first 120 credits presented toward graduation. At least 66 credits must be earned outside of the major.

- In order to graduate, students must earn a cumulative 2.2 grade point average for all English department courses, with the exception of College Writing I and II.
- All English majors must take at least two courses that satisfy the Diverse Literary Traditions requirement. These courses explore authors and texts through the historically under-represented perspectives of race, ethnicity, gender, disability, post-coloniality, and sexuality. Certain diversity courses may also significantly address non-western literary traditions. Courses satisfying this requirement take as their main focus literary traditions that respond to and represent voices outside the traditional canon, providing students with an opportunity to consider the complex power dynamics that influence literature and the academic field of literary study and to consider the way literary texts can engage and influence these same power dynamics. Students should consult the AR in SIS for the department’s list of approved courses.

1Quantitative Literacy (QL) is fulfilled outside the English major. The department recommends that all majors take MATH.1110 which fulfills both the Math Breadth of Knowledge requirement and the Quantitative Literacy ELO. See QL course listing for a full list of classes that fulfill this requirement.

2These three foundations courses may be taken in any order: Critical Methods, British Literary Traditions, and American Literary Traditions. They will introduce you to essential approaches to literary study and to the literary history that will ground your further studies. We strongly encourage you to take these courses before moving on to upper-level English courses.

3World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language

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| Total | 1 5 |

## Senior Year

### Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.3/4xxx</td>
<td>Literature Elective*</td>
</tr>
<tr>
<td>ENGL.3/4xxx</td>
<td>Literature Elective*</td>
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<td>xxxx.3/4xxx</td>
<td>Free Elective</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
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### Spring Semester

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<tr>
<td>ENGL.4xxx</td>
<td>Capstone: 4000-level Literature Elective (WOC)</td>
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| Total | 1 5 |

**Total Minimum Credits = 120**

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Current UMass Lowell students should be using their Advisement Report in SIS (http://www.uml.edu/enrollment/sis/default.aspx). If you need assistance, please contact your advisor.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

**Required Courses**

Each of the following 2000 level foundation courses is required (9 credits):

- ENGL.2000
- ENGL.2810
  (https://www.uml.edu/catalog/courses/ENGL/2810) British Literary Traditions
- ENGL.2820
  (https://www.uml.edu/catalog/courses/ENGL/2820) American Literary Traditions

Six approved English literature electives are required (18 credits):

Students take six literature electives. One of these may be at the 2000 level (but can be 3000/4000 level). Five of the electives must be at the 3000/4000 level. Courses must also meet the literary period distribution requirements listed below (lists of approved courses for period categories may be found in the Literature AR on SIS (http://www.uml.edu/Enrollment/sis/default.aspx)):

- ENGL.2/3/4xxx
  (https://www.uml.edu/catalog/courses/ENGL) any literature course
- ENGL.3/4xxx
  (https://www.uml.edu/catalog/courses/ENGL) Pre-1700 literature course
- ENGL.3/4xxx
  (https://www.uml.edu/catalog/courses/ENGL) 1700-1900 literature course
- ENGL.3/4xxx
  (https://www.uml.edu/catalog/courses/ENGL) Post-1900 literature course
- ENGL.3/4xxx
  (https://www.uml.edu/catalog/courses/ENGL) any upper-division literature course
- ENGL.3/4xxx
  (https://www.uml.edu/catalog/courses/ENGL) any upper-division literature course

One of the following Theory/Composition/Language courses is required (3 credits):

- ENGL.3070
  (https://www.uml.edu/catalog/courses/ENGL/3070) History of the English Language
- ENGL.3080
  (https://www.uml.edu/catalog/courses/ENGL/3080) Structure and Variation of the English Language
- ENGL.3150
  (https://www.uml.edu/catalog/courses/ENGL/3150) Old English Language and Literature
- ENGL.3770
  (https://www.uml.edu/catalog/courses/ENGL/3770) Theories of Rhetoric and Composition
- ENGL.3880
  (https://www.uml.edu/catalog/courses/ENGL/3880) Undergraduate Seminar on the Teaching of Writing
- ENGL.3920
  (https://www.uml.edu/catalog/courses/ENGL/3920) Visual Rhetoric
- ENGL.4290
  (https://www.uml.edu/catalog/courses/ENGL/4290) Introduction to Literary Theory
The capstone will provide a culminating opportunity to complete a substantial learning project. Students should discuss their interests with their academic advisor to plan ahead for the capstone. Choose one of the following, depending on student goals and interests:

- An Individually-Designed Research Project ENGL.4xxx
- Literary Research & Methods Seminar ENGL.4910
- Directed Study in Literature
- Experiential Learning ENGL.4960
- Internship I ENGL.4970
- Practicum
- A 4000-level Literature course (including single-author studies, upper-level thematic/period study, and advanced theory/methods courses) ENGL.4010
- Selected Authors ENGL.4230
- Shakespeare ENGL.4240
- Shakespeare II ENGL.4270
- Virginia Woolf ENGL.4280
- The Harlem Renaissance ENGL.4290
- Introduction to Literary Theory ENGL.4320
- Introduction to Digital Humanities ENGL.4790
- Literature Seminar

Optional: An additional six English electives may be taken (0-18 credits):

Additional English courses (up to six courses within the 54 credit limit) may be taken in literature, theatre, or writing. For students contemplating graduate school in the discipline, additional 3000 or 4000 level literature courses are recommended. Students are encouraged in the spring of junior year or fall of senior year to seek an experiential learning opportunity such as the Practicum (Internship) or Community Writing 1 or 2, depending on the student’s career goals and interests. Students planning a career in secondary teaching should consider the Undergraduate Seminar on the Teaching of Writing.

Note: Literature students are not required to take a minor, but they are encouraged to do so. Depending on the student’s career goals and interests, several different minors may be appropriate. All students are encouraged to discuss possible minors with their academic advisors.

Last updated: 7/14/2021
ENGL.1010 College Writing I (Formerly 42.101) - Credits: 3

A workshop course that thoroughly explores the writing process from pre-writing to revision, with an emphasis on critical thinking, sound essay structure, mechanics, and academic integrity. Students will read, conduct rhetorical analyses, and practice the skills required for participation in academic discourse. Students will write expository essays throughout the semester, producing a minimum of four formal essays.

ENGL.1010S College Writing Studio - Credits: 4

A workshop course that thoroughly explores the writing process from prewriting to revision, with an emphasis on critical reading, essay structure, mechanics, and academic integrity. Students will read, conduct rhetorical analyses, and practice the skills required for participation in academic discourse. Students will write expository essays throughout the semester, producing a minimum of four formal essays. This 4-credit version of the course provides extra time and guidance each week for critical reading, sentence-level work, and revision. Anti Req for ENGL.1011 and ENGL.1010. Placement test score determines enrollment.

ENGL.1010SI Intensive Writing Lab - Supplemental Instruction (Formerly 42.101SI) - Credits: 1

Taken simultaneously with College Writing I, the Intensive Writing Lab offers students supplemental instruction to complement their work in that course. Students who place into the Writing Lab will receive extensive training in grammar, mechanics, and the use of Standard English. The once-per-week lab encourages students' success in College Writing I and in their other classes. The course credit cannot be used to satisfy the credits required for graduation, but may be used to satisfy credits required for full time student status.

ENGL.1020 College Writing II (Formerly 42.102) - Credits: 3

A workshop course that thoroughly explores the academic research writing process with an emphasis on entering into academic conversation. Building on the skills acquired in College Writing I, students will learn to write extensively with source material. Key skills addressed include finding, assessing, and integrating primary and secondary sources, and using proper documentation to ensure academic integrity. Students will produce analytical writing throughout the semester, including a minimum of four formal, researched essays.

ENGL.1100 College Writing Workshop (Formerly 42.110) - Credits: 3

A workshop course that provides a thorough review of the basics of essay writing in preparation for success in College Writing I, with a focus on the particular needs of multilingual students. Students placed into this course will use the writing process to strengthen the fundamental skills necessary for clear academic writing in English, including the basic rules of grammar and principles of rhetoric. Credit for both 42.100/ENGL.1000 and 42.110/ENGL.1100 will not be granted.

ENGL.1100SI College Writing A ESL Supplemental Instruction - Credits: 1

College Writing A ESL Supplemental Instruction.

ENGL.1110 College Writing I ESL (formerly 42.103/111) - Credits: 3

Satisfies the first half of the first-year writing requirement, equivalent to 42.101 College Writing I, with a focus on the particular needs of multilingual students. Credit for both 42.101 and 42.111 will not be granted, nor credit for both 42.101 and 42.103.

ENGL.1110SI Supplemental Instruction for College Writing I ESL (Formerly 42.111SI) - Credits: 1

Supplemental Instruction for College Writing I ESL.

ENGL.1120 College Writing II ESL (formerly 42.104/112) - Credits: 3

Satisfies the second half of the first-year writing requirement, equivalent to 42.102 College Writing II, with a focus on the particular needs of multilingual students. Credit for both 42.102 and 42.112 will not be granted, nor credit for both 42.102 and 42.104.

ENGL.1120SI College Writing II ESL Supplemental Instruction (Formerly 42.112SI) - Credits: 1

College Writing II ESL Supplemental Instruction

ENGL.1810 Introduction to Literature - Credits: 3

This course, as the name implies, serves as an introduction to literature. We will read and discuss works in the main genres of the short story, short novel, poetry, and drama. In addition to presenting the conventions and development of each of these genres, the course will provide opportunities to strengthen skills in close reading and critical thinking.

ENGL.2000 Critical Methods of Literary Inquiry
(Formerly 42.200) - Credits: 3
Examination of diverse critical and theoretical approaches to literature in the development of literary analysis.

ENGL.2010 Classical Mythology (Formerly 42.201) - Credits: 3
This course takes a literary approach to the mythology of Ancient Greece and Rome. We will explore stories of creation of the world, the fall of Troy, the travels of Odysseus and Theseus, the sins of Oedipus, and the rage of Medea. These texts examine some of the most disturbing and violent of human experiences, as well as some of the most moving: men and women’s encounters with community, family, war, death, and love. We will address how these narratives form ethical and social codes that underpin western culture, and devote some attention to how these texts are reinterpreted by later authors. Authors may include Homer, Hesiod, Ovid, Virgil, and the Greek tragedians.

ENGL.2011 Medieval Myth and Legend - Credits: 3
Explores myth and legend in the literatures of England, Europe, and the World in the Middle Ages (500-1500). Topics may include dragons, djinns, and King Arthur, as well as knights, chivalry, the storyteller Scheherazade, Dante’s walk through the Inferno, werewolves, and magic. We will discover how these fantastic tales negotiate cultural issues like genders, race, and ethnicity, political power, and the creation of art. All readings in modern English translation.

ENGL.2020 Great Books of the Modern Period (Formerly 42.202) - Credits: 3
Much of what we consider "contemporary" was born out of the modernist period, roughly 1900-1950, and was considered radical, even salacious, in its time. This course provides a sampling of modernist literature. Students will explore this period by examining exemplary texts, numerous historical and social events, and a few films.

ENGL.2070 English Studies in a Digital Environment (Formerly 42.207) - Credits: 3
Students build on skills acquired in College Writing to gain English Studies discipline-specific mastery of the writing conventions, research, and citation practices used in departments of English. In addition, students practice the digital skills that will support them as they join the online learning community of the UML Department of English.

ENGL.2100 Drama (Formerly 42.210) - Credits: 3
Presents a study of plays from the classical period to the present.

ENGL.2110 Poetry (Formerly 42.211) - Credits: 3
Studies selections from the Renaissance through contemporary periods.

ENGL.2120 The Short Story (Formerly 42.212) - Credits: 3
This course teaches students how to sharpen their critical reading skills by learning to think about the short story in terms of its evolution over the last 200 years and by studying its literary techniques and themes. Student practice close, active reading as they examine and express their reactions to authors’ works. Readings may include authors such as Alexie, Alvarez, Baldwin, Bambara, Chekhov, Diaz, Faulkner, Gilman, Hawthorne, Hemingway, Irving, LeGuin, Lispector, Marquez, O’Connor, Poe, and Tolstoy.

ENGL.2160 Monsters, Apes & Nightmares (Formerly 42.216) - Credits: 3
This course examines literary responses to science in England and the United States from the early Nineteenth Century to the present. Readings include novels—Frankenstein, The Island of Doctor Moreau, Dr. Jekyll and Mr. Hyde, Jurassic Park—essays, and poems. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

ENGL.2170 The Horror Story (Formerly 42.217) - Credits: 3
Explores the genre from Poe to the present.

ENGL.2180 Comedy (Formerly 42.218) - Credits: 3
Presents the theory and practice of comedy from the Greeks to the present.

ENGL.2200 Oral & Written Communication for Computer Science (Formerly 42.220) - Credits: 3
The main goal of this course is to enhance the student’s understanding of the elements of effective communication, and to put that knowledge into practice in a supportive, co-operative, workshop environment. Limited to Computer Science majors.

ENGL.2220 Oral Communication (Formerly 42.222) - Credits: 3
Develops and applies the basic speaking skills that can be adapted to a variety of personal and professional contexts. Emphasis is placed on selection, analysis, organization and presentation of speech materials. Practice skills include listening, interviewing and the delivery and critique of extemporaneous speeches.

ENGL.2240 Business Writing (Formerly 42.224) - Credits: 3
Studies the theory and practice of writing letters, memoranda and reports on specific business and technical problems. Registration preference for students enrolled in Business programs.

ENGL.2260 Scientific and Technical Communication (Formerly 42.226) - Credits: 3
Studies the theory and practice of letters, memoranda, reports and oral presentations on specific scientific and technical problems.

ENGL.2270 Essay Writing for English Majors (Formerly 42.227) - Credits: 3
Analyzes and discusses the techniques and styles of selected professional essayists as well as the preparation of student essays. Emphasis will be placed on the writing process from prewriting through drafting and revising. English majors and minors only.

ENGL.2320 Turning Fiction into Film (Formerly 42.232) - Credits: 3
This course explores film adaptation by looking at how writing can be turned into the visual and auditory forms. Through reading novels and watching their film adaptations, students learn conventions of fiction and film, and draw on this knowledge to discover the implications of adapting a written story into a movie. By asking students to think about the different ways writers and filmmakers convey meaning to their audiences, this course attempts to answer the question of why the movie is never exactly like the book.

ENGL.2330 Play Analysis (Formerly 42.233) - Credits: 3
An introduction to the principles of play construction and the vocabulary and methods of interpreting play texts for theatrical production. Required of all theatre arts concentrators.

ENGL.2360 Science Fiction and Fantasy (Formerly 42.236) - Credits: 3
Designed to introduce students to understand science fiction and fantasy within the broader context of literature and literary theory. It attempts to develop and hone student’s skills of critical analysis as it supplies them with the tools to contextualize their reading experience - i.e., to understand the origins and politics of the books that they read.

ENGL.2380 Introduction to Creative Writing (Formerly 42.238) - Credits: 3
A course for aspiring creative writers among freshman and sophomores which offers an introduction to the craft of creative writing in its primary genres: poetry, fiction, drama, creative non-fiction (emphases will vary depending upon instructor). The focus of this course will be on learning the fundamentals of craft techniques and peer review.

ENGL.2381 Introduction to Creative Writing (All Majors) - Credits: 3
This course is an introductory level workshop in creative writing. Students will read and discuss works of poetry, fiction, and creative nonfiction by established writers, and practice craft in all three genres through short exercises and assignments. Students will have an opportunity to workshop their creative work, and critique peer works. Class time will be divided between brief lectures on specific aspects of writing, craft techniques, group discussions of assigned reading, in-class writing exercises, and discussion of student writing assignments. This course is open to all majors.

ENGL.2390 Introduction to Professional Writing (Formerly 42.239) - Credits: 3
This course offers an introduction to different types of professional writing, including journalism, technical writing, business writing, and other professional communication. Focus in the course will be on understanding the rhetorical situation, including the audience, purpose, and context of each communication task. Students will learn how to work effectively and ethically in a collaborative and professional environment. Students may not earn credit for both 42.227 and 42.239.

ENGL.2400 Literature and Women (Formerly 42.240) - Credits: 3
A survey of literary attitudes toward women from the Judaic and Hellenic periods through the present.

ENGL.2420 The Heroine in Modern Fiction (Formerly 42.242) - Credits: 3
Provides a study of selected short stories and novels which deal
sympathetically with the changing roles of women.

ENGL.2430 Contemporary Women Writers (Formerly 42.243) - Credits: 3

Contemporary Women Writers introduces students to American women writers of the last fifty years. We examine the historical, socio-cultural, political, and personal influences on these writers' work by studying trends and events in recent American history and themes reflected in the works. By studying contemporary women’s writing in this contextualized fashion, students can appreciate larger trends in our society, the role writing plays in examining such trends, and the value of literature as an exploration of human growth and struggle. Through discussion, group collaboration, critical analysis, and by designing their own graphic organizers, students gain a breadth of knowledge in the following areas: the themes and stylistic concerns of contemporary American women writers; the key historical events that influence contemporary American women's writing; the critical reading of literary texts. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2460 Gay & Lesbian Literature (Formerly 42.246) - Credits: 3

Explores the treatment of homoeroticism and homosexual love in literature from Antiquity to the present. Emphasis is given to texts reflecting the construction of a homosexual identity and recurring motifs among gay, lesbian, and bisexual writers. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2490 Literature on Technology and Human Values (Formerly 42.249) - Credits: 3

A study of the relationship between works of fiction, cultural attitudes toward technology, and social values. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

ENGL.2500 The Bible as Literature (Formerly 42.250) - Credits: 3

Presents a literary and historical analysis of selected Old and New Testament books.

ENGL.2510 War in Literature (Formerly 42.251) - Credits: 3

In "War in Literature" we will study conflict and human values in times of war, focusing on the literature of World War I, World War II, Vietnam, and the Gulf War. Content covered includes a selection of representative (and divergent) literary texts written throughout the 20th century in a variety of genres (poetry, essays, memoir, short story, novel, and hybrid forms like the "graphic novel"). Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

ENGL.2530 The Culture of American Sport (Formerly 42.253) - Credits: 3

An examination of the history, literature, sociology, and aesthetics of sport. Attention to corollary issues and values including racism, sexism, and violence.

ENGL.2570 The Family in American Literature (Formerly 42.257) - Credits: 3

A study of literary selections dealing with traditions of family life, the individual, and social change. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2580 Disability in Literature (Formerly 42.258) - Credits: 3

This course explores how texts -- including novels, short stories, poems, memoirs, essays, plays, and videos -- portray people with disabilities. We will consider the problematic stereotypes about disabilities that sometimes appear in popular culture and literary depictions, and read texts that provide insight into a diverse community of people with a range of disabilities.

ENGL.2670 Discovering Shakespeare (Formerly 42.267) - Credits: 3

This class introduces students to some of the Bard's most popular and accessible plays. We will learn to understand Shakespeare's language and see how the plays were produced in Renaissance England, as well as examine his living legacy, in theater, film, and popular culture, throughout the modern world today. No previous experience with Shakespeare needed. Old Title: Introduction to Shakespeare.

ENGL.2673 Robin Hood: From Outlaw to Icon - Credits: 3

From its medieval origins, the Robin Hood stories developed over centuries from violent rebel to aristocratic hero. This class will explore the English folk tale as it transitioned from stories of men in the forest, to commentary on the clergy and aristocracy, to tales of economic justice as Robin Hood stole the rich and gave to the poor. The larger part of the class will study the literary and cultural traditions from medieval to nineteenth-century depictions. The latter part will investigate how Robin Hood moved from England to America, and from
books to films, culminating in recent Hollywood blockbusters.

**ENGL.2675 Vikings - Credits: 3**

An introduction to Norse mythology, sagas, and culture. The class will read translations of medieval texts recalling traditions of the old Norse gods and their cults during the Viking Age (ca. 800-1050 AD), as these were preserved in 13th-century Icelandic texts, but also in Latin, Arabic, Old High German, Old Swedish and Old English manuscripts and runic inscriptions. Students will explore the worldview and value system of this unique culture, and examine relations, often violent but sometimes comic or friendly, between groups of highly intelligent, vulnerable beings, both living and dead, male and female, animal and human, god and giant - a crowded universe full of trolls, elves witches, dwarfs, valkyries, berserks, shapeshifters, and various social classes of human beings.

**ENGL.2720 Modern European Fiction (Formerly 42.272) - Credits: 3**

A study of selected fiction by major continental writers of the nineteenth and twentieth centuries.

**ENGL.2770 American Ethnic Literature (Formerly 42.277) - Credits: 3**

The course addresses the literature of America's immigrant and cultural groups and how it contributes to defining our national character. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**ENGL.2772 Introduction to Latinx Literature - Credits: 3**

Describing a wide range of racial and ethnic denominations, Latinx is a complicated term which this course will examine the trouble. This course emphasizes the historical and aesthetic networks established in the Latinx literary canon that continue into the present, while also exploring the relationship between genre and socio-historical issues. Reading from a diverse tradition that reflects the contested definition of "Latinx" and its shifting demographics in the U.S., this course investigates how U.S. Latinx literature speaks to and expands "American" literary traditions, and how unique ethnic identities such as the Mexican American, Dominican American, Cuban American, or mainland Puerto Rican offer different yet interconnecting representations of what it means to be Latinx in the U.S.

**ENGL.2810 British Literary Traditions (Formerly 42.281) - Credits: 3**

A survey of British Literary history from the medieval through the modernist periods.

**ENGL.2820 American Literary Traditions (Formerly 42.282) - Credits: 3**

A survey of American Literary history from early contact between Native American populations and European colonists through contemporary American writing.

**ENGL.2830 World Literature in Translation I - Credits: 3**

A survey of world literature (works outside British and American literary traditions) through 1660; all course readings are translated into English. Students will become familiar with conventions of different literary genres, including epic and lyric poetry, drama, fables and folktales, and religious and philosophical texts. The course also provides the major cultural, religious, and political contexts of the literary texts. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**ENGL.2840 World Literature in Translation II - Credits: 3**

A survey of world literature (works outside British and American literary traditions) since 1660; all course readings are translated into English. Students will become familiar with conventions of various literary genres, including short and long fiction, autobiography, lyric poetry, and drama. The course also provides the major cultural, religious, and political contexts of the literary texts.

**ENGL.2850 Crime in Literature (Formerly 42.285) - Credits: 3**

A study of how various authors use crime as a plotting device to study character, reveal social order, and critique social institutions. This course will focus particularly on detective and mystery fiction, sketching the history and development of these genres. Students might also study fiction and film outside these genres that explore significant questions of crime or criminality. Ultimately, students will think about how fictional representations of criminals, victims, policing, gender, and race relate to cultural assumptions and expectations. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**ENGL.2860 The Graphic Narrative: Comics in Context (Formerly 42.286) - Credits: 3**

While picture-images date as far back as the Egyptian tombs, or the caves of Lascaux, this course will consider the development of the modern comic in twentieth-and twenty-first century America. Readings will include not just comics, but also the history of comics, art and literary theory, a novel
about comics, and articles that consider the legal, political, and social issues surrounding comics. We will also look at traditional and contemporary comic strips and graphic novels to explore what we can learn from them about American Popular Culture. Comics are on the cutting edge of contemporary literature, and there are many avenues to pursue in the study of this narrative form. This course will include intensive reading and writing, and will ask students to engage with demanding theoretical works, in addition to incorporating a considerable amount of research. While the subject matter can be lighthearted the course takes these texts seriously, and asks for intellectual engagement with the issues and concerns of culture depicted in these words and pictures. (Full proposal and supplemental material available).

ENGL.2910 History of English Literature I (Formerly 42.291) - Credits: 3
A survey of representative writers and works from the Anglo-Saxon period to the mid-seventeenth century.

ENGL.2920 History of English Literature II (Formerly 42.292) - Credits: 3
A survey of representative writers and works from Milton into the twentieth century.

ENGL.2940 History of American Literature I (Formerly 42.294) - Credits: 3
Studies the historical development of American literature from the Colonial period to the Civil War. Selected works by representative authors from each period are studied.

ENGL.2950 History of American Literature II (Formerly 42.295) - Credits: 3
Studies the historical development of American literature from the Civil War to World War I.

ENGL.2980 Children's Literature (Formerly 42.298) - Credits: 3
A survey course covering traditional and contemporary children's literature. Texts are selected to represent different historical periods and a diversity of authorial perspectives. Attention is given to changing views of children and childhood as reflected in selected texts.

ENGL.3000 Intro to Journalism (Formerly 42.300) - Credits: 3
An introduction to techniques of writing for the news media.

ENGL.3020 Creative Writing: Fiction (Formerly 42.302) - Credits: 3
Studies the theory and practice of fiction. Conducted as a workshop with close analysis of student work.

ENGL.3030 Creative Writing: Poetry (Formerly 42.303) - Credits: 3
Discusses the theory and practice of poetry. Conducted as a workshop with close analysis of student work.

ENGL.3040 Creative Writing: Playwriting (Formerly 42.304) - Credits: 3
Studies the theory and practice of playwriting. Conducted as a workshop with close analysis of student work.

ENGL.3050 Reviewing the Arts (Formerly 42.305) - Credits: 3
Theory and practice of writing short, critical essays in a journalistic mode on the visual and performing arts. Special attention to theater, movie, and television criticism. Conducted as a workshop with close analysis of student work.

ENGL.3060 Intermediate Professional Writing (Formerly 42.306) - Credits: 3
This course develops more advanced skills in professional writing and communication. Students will focus on analyzing and responding to professional writing situations, in which they will consider purpose and audience. Students will work in a collaborative and professional environment. This course may include a service-learning component. Contact the instructor for more information.

ENGL.3070 History of the English Language (Formerly 42.307) - Credits: 3
Explores the origins and structure of the English language, tracing the ways that English has evolved from Old English through Middle English to the varieties of Modern English in England and its former colonies, including the United States. We will also examine the literary, social, and political implications of these developments, for instance the evolution of Standard English or the use of dialects. The course does not assume any knowledge of Old or Middle English.

ENGL.3080 Structure and Variation of the English Language - Credits: 3
This course introduces students to a variety of approaches to the contemporary English language, with a focus on both structure and variation. Students will explore how English works in terms of its sounds (phonetics and phonology), words (morphology), sentence structures (syntax), meanings (semantics), and uses (discourse). Areas of variation may include social and regional dialects, World Englishes, accents, pidgins, creoles, multilingualism, language acquisition, registers, style, literacy, media, power, and identity. The course will also address attitudes towards language (language ideology), and the implications of language issues for education, work, policy, and everyday life.

ENGL.3100 Writing Popular Fiction (Formerly 42.310) - Credits: 3

This course is designed for students who are interested in writing in one or more of the popular forms of genre fiction: the mystery, the horror story, science fiction, fantasy, romance, and the thriller. Class time will be spent discussing and work-shopping student writing. Some time will also be devoted each week to brief lectures on practical matters like choosing between the short story and the novel, finding ideas, constructing plots, building characters, pacing, generating suspense, and marketing one’s work. In addition, there will be assigned readings to illustrate the above.

ENGL.3110 The South in American Literature (Formerly 42.311) - Credits: 3

A study of the writers, movements, and social culture of the South, from both the nineteenth- and twentieth-centuries.

ENGL.3120 Literature of Colonial America (Formerly 42.312) - Credits: 3

This course will explore the literatures (including some selections in translation) written during America’s colonial era. The periods of exploration, first encounters, settlement, the rise of Anglo-America, the emergence of a national sensibility, and the years of transition in the new republic will be considered. The course will also treat a small selection of nineteenth century texts that present visions and re-visions of the colonial past.

ENGL.3125 Literature of New England Witch Trials - Credits: 3

This course focuses on accounts of witchcraft and witchcraft trials, including traditions imported from England and both little-known and infamous cases in the American colonies. We’ll read original court transcripts and non-fiction, fiction, and poetry about the trials created during the period and down through to the present day. Notable cases to be discussed include The Witches of Warboys, England (1593), Mary Parsons of Northampton, Massachusetts (1656, 1674), Mary Webster of Hadley, Massachusetts (1683), the Connecticut Witchcraft Trials (1647 to 1663), and the Salem Witch Trials (1692). Authors include Cotton Mather, Benjamin Franklin, Nathaniel Hawthorne, Elizabeth Gaskell, and Margaret Atwood. Students will write several short papers and develop a final project of their own design.

ENGL.3130 Realism and Naturalism American Fiction (Formerly 42.313) - Credits: 3

A study of realism and naturalism in fiction from the end of the Civil War to World War I.

ENGL.3150 Old English Language and Literature (Formerly 42.315) - Credits: 3

Students will acquire reading knowledge of the Old English Language, spending half the semester mastering grammar and vocabulary, and the second half translating texts such as The Wanderer, Dream of the Rood, and Beowulf. Attention will also be given to early medieval cultures in England.

ENGL.3154 Middle English: Literature and Language (1066-1500) - Credits: 3

England in the 11th century had a multi-lingual and diverse culture, with French, German, Scandinavian, and Latin speakers interacting daily. By 1500, England was English-speaking, with various dialects of Middle English emerging from this linguistic mix. In this class, students will learn to read and analyze the dialects of Middle English, translating text such as Sir Gawain and the Green Knight, the Harley Lyrics, the York Plays, and the Canterbury Tales from their original language. We will learn and apply the rules of grammar, pronunciation, and vocabulary. Students will analyze critically questions of creolization, dialect and social class, and the emergence of print culture.

ENGL.3170 British Literature of the Twentieth Century (Formerly 42.317) - Credits: 3

A study of twentieth-century British short stories, poetry, and drama.

ENGL.3200 Personal and Reflective Writing (Formerly 42.320) - Credits: 3

A workshop format encourages peer criticism of individual writings and discussion of models from various texts.

ENGL.3210 Community Writing I (Formerly 42.321) -
Credits: 3

Students work on various writing projects the professor brings into the classroom on behalf of local non-profit organizations. This service learning course provides opportunities for students to learn through thoughtful engagement with the community, applying knowledge of writing gained in the classroom to real world problems. The course will be held in a workshop format with strong emphasis on revision.

ENGL.3220 Creative Writing: Creative Non-fiction I (Formerly 42.322) - Credits: 3

An intermediate level creative writing workshop in nonfiction (personal essay, memoir, literary journalism, etc.).

ENGL.3240 Writing About Place (Formerly 42.324) - Credits: 3

Writers throughout time have been thoroughly grounded in place. Students in this course will read and write on a variety of topics: travel, cities, suburbs, dwelling places, nature, environmental issues, etc., in a variety of genres: creative non-fiction, essays, journalism, short stories, poetry, journals. This course will be held in a workshop format with strong emphasis on revision.

ENGL.3245 Writing About the Environment - Credits: 3

From John Muir to Rachel Carson to Bill McKibben, environmentalists have traditionally relied upon the power of their prose to transform the thoughts and behavior of their contemporaries. Stemming form the premise that writing is a form of environmental action, this course introduces students to a range of modes of writing in environmental studies. In the process of reading, discussing and practicing different kinds of environmental writing, students will develop a variety of writing skill in addition to an appreciation for writing as an important form of environmental action.

ENGL.3250 The Rise of the Novel (Formerly 42.325) - Credits: 3

A study of the British novel in the eighteenth century, as it increased significantly in publication, sales, and cultural prominence. We explore the relation between formal elements (narrative, dialogue, plotting), philosophical questions (the nature of the self, the good society), and cultural and historical contexts (industrialization, middle class culture, the sexual double standard). Along with canonical authors such as Defoe, Richardson, and Austen, students will read other popular novels form the period, as well as texts such as spiritual autobiographies, criminal profiles, and advertisements.

ENGL.3270 Victorian Fiction (Formerly 42.327) - Credits: 3

A study of fiction from 1837 through 1901. May include reading and writing about texts by Dickens, Collins, Gaskell, Bronte, Eliot, Thackeray, Trollope, Hardy, Wilde, and others.

ENGL.3280 Writing About Women (Formerly 42.328) - Credits: 3

Writing About Women

ENGL.3300 Twentieth Century British Novel (Formerly 42.330) - Credits: 3

A study of the novel from Conrad through Greene and others.

ENGL.3310 American Novels to 1900 (Formerly 42.331) - Credits: 3

with the emergence of novels labeled “American,” novelists explored the role of the frontier, the shift from an agricultural to an industrial society, the rise of social reform movements, the impact and legacy of slavery, the influence of science and technology, the debate over gender roles and expectations, and the role of the artist/writer within American culture. The novels in this course, all written before 1900, allow us to explore the issues that a selection of American novelists treat within their fiction as well as to consider the debates that occurred over the nature of narrative.

ENGL.3320 Twentieth Century American Novel - Credits: 3

A study of the American novel from 1900 to the present.

ENGL.3325 Banned Books - Credits: 3

This course examines novels that are among those most frequently challenged, censored, or banned from schools, colleges, and libraries in the United States. Many of these books are considered modern literary classics, and several of them have won prestigious awards. But these books also contain language and ideas that have sometimes been considered politically subversive, socially disruptive, sexually explicit, or offensive. In addition to the novels, course topics include the history of censorship and current debates about freedom of expression and literary value.

ENGL.3330 American Autobiography (Formerly 42.333) - Credits: 3

A Study of autobiographical writing from Colonial America to
the present. Works from the 17th to the 21st century will allow students to explore the genre of autobiography and related sub-genres, including the captivity narrative, the slave narrative, and the immigration narrative. Readings will also explore literary and political autobiographies. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3332 Autobiographies of Paris Modernism - Credits: 3

Students in this course study autobiographies of important figures of modernism in Paris and can expect to learn about the genre of autobiography and modernism as an artistic movement, particularly how modernist ideals manifested across several genres.

ENGL.3350 American Women Novelists (Formerly 42.335) - Credits: 3

A study of selected novels by American women. Focus on the female voice within the American tradition. Treatment of such issues as domesticity, education, and authorship. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3360 Beowulf and Heroic Literature (Formerly 42.336) - Credits: 3

We will read Beowulf in translation, and discuss contemporary approaches to the poem. We will also study other Old English works such as Judith, as well as Frankish and Old Norse-Icelandic literature in translation to gain a cultural context for Beowulf. May include discussion of how later works, such as those of J.R.R. Tolkien or modern fantasy writers have been influenced by these medieval epics.

ENGL.3370 The Gothic Tradition in Literature (Formerly 42.337) - Credits: 3

This course will consider works that fall under the very broad genre known as "The Gothic." As this genre is one of highly contested boundaries, we will consider how to define the Gothic, and what exactly constitutes this form. We will look at texts from both England and America, and spanning from the late 18th century to our own times. Our study will focus on the form of the novel, and the development and emergence of the gothic novel from its beginnings in England to its contemporary manifestations in the United States.

ENGL.3380 Medieval Women Writers (Formerly 42.338) - Credits: 3

Woman have always written and read and participated in culture. This class will explore writings on literary and non-literary genres by woman in the European Middle Ages (600-1500). Students will learn how different pre-modern cultural conditions affected the possibilities for women's authorship, readership, and patronage. We will also examine how women writers interacted with literary traditions and constructions of gender.

ENGL.3410 Studies in Film (Formerly 42.341) - Credits: 3

A rigorous examination of a topic of current interests in film studies organized by particular themes, genres or filmmakers.

ENGL.3411 International Cinema Studies: French New Wave - Credits: 3

This course will introduce students to the aesthetic and theoretical qualities that define the New Wave movement in French cinema, focusing on major directors, performers, and composers associated with the New Wave. Through the close intertextual comparison of a range of films contextualized through the historical lens of 1960s Paris, students will develop sophisticated analyses that combine elements of film theory and cultural studies. This semester, we will read contemporary criticism, manifestos, mid-century French philosophy, and secondary scholarly studies to ground our discussions and writing in appropriate historical and theoretical context.

ENGL.3420 Women Writers and the Past (Formerly 42.342) - Credits: 3

Women Writers and the Past. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3440 Women in Theatre (Formerly 42.344) - Credits: 3

A study of the significant contributions of women to the literature and art of the theatre in various periods and cultures. Topics may include: plays written by women, the progress of women in theater, the evolution of female roles, and the portrayal of feminism on the stage.

ENGL.3450 British Women Novelists (Formerly 42.345) - Credits: 3

Selected novels by writers such as Austen, the Brontes, Eliot, Woolf, Bowen, and Drabble. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>ENGL.3460</td>
<td>Homer’s Iliad and Odyssey (Formerly 42.346)</td>
<td>3</td>
<td>This class will explore the story of the ancient city of Troy from its origins in Homeric epic and classical drama to some of its many European iterations beginning with Vergil’s Aeneid. Students will examine how these Trojan texts encode narratives of gender, ethnicity, and welfare, and how they help create an occidental European identity.</td>
</tr>
<tr>
<td>ENGL.3480</td>
<td>Modern American Drama (Formerly 42.348)</td>
<td>3</td>
<td>A study of such playwrights as O’Neill, Odets, Wilder, Williams, and Miller.</td>
</tr>
<tr>
<td>ENGL.3490</td>
<td>Arthurian Literature (Formerly 42.349)</td>
<td>3</td>
<td>Will examine works in modern English translation from a variety of genres (romance, history, tragedy, epic) that tell stories of the mythical King Arthur and the knights and ladies of his courtly world. The course will focus primarily on texts of the medieval and renaissance periods, but will include attention to nineteenth- and twentieth-century versions in poetry, prose, art, music and film.</td>
</tr>
<tr>
<td>ENGL.3510</td>
<td>Literature of the Middle Ages (Formerly 42.351)</td>
<td>3</td>
<td>This course will examine a variety of medieval genres: epic, chanson de geste, romance, fable, lyric, and drama. We will analyze the circumstances under which the works were produced (orally and in manuscript) and imagine how they may have been read by men and women in their day. Texts are selected from the courtly pursuits of the aristocrats and from the popular, religious rituals and writings of the rising merchant class. We will also give some attention to medievalism, that is, how the middle ages have been perceived and transformed by contemporary cultures.</td>
</tr>
<tr>
<td>ENGL.3520</td>
<td>Renaissance Literature (Formerly 42.352)</td>
<td>3</td>
<td>A study of English prose and poetry of the period.</td>
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<tr>
<td>ENGL.3530</td>
<td>Literature of the Seventeenth Century (Formerly 42.353)</td>
<td>3</td>
<td>A study of English prose and poetry of the period excluding Milton.</td>
</tr>
<tr>
<td>ENGL.3550</td>
<td>Literature of the Romantic Period (Formerly 42.355)</td>
<td>3</td>
<td>A study of English prose and poetry from 1798-1832.</td>
</tr>
<tr>
<td>ENGL.3560</td>
<td>Literature of the Victorian Period (Formerly 42.356)</td>
<td>3</td>
<td>A study of British fiction, poetry, and prose from 1837 to 1901.</td>
</tr>
<tr>
<td>ENGL.3600</td>
<td>Medieval &amp; Renaissance Theater (Formerly 42.360)</td>
<td>3</td>
<td>A study of Medieval mystery cycles, morality plays, interludes, and other forms of popular and court theater.</td>
</tr>
<tr>
<td>ENGL.3610</td>
<td>Restoration Comedy (Formerly 42.361)</td>
<td>3</td>
<td>A study of comic plays from 1660 to the mid-eighteenth century. Focus on the works of Ethridge, Wycherley, Congreve, and Sheridan.</td>
</tr>
<tr>
<td>ENGL.3620</td>
<td>Modern Drama (Formerly 42.362)</td>
<td>3</td>
<td>A study of selected Continental, British and American plays of the late nineteenth century to the present.</td>
</tr>
<tr>
<td>ENGL.3630</td>
<td>English Renaissance Drama (Formerly 42.363)</td>
<td>3</td>
<td>A study of major dramatists of the Age of Shakespeare including Marlowe, Dekker, Webster, Jonson, Beaumont and Fletcher, Massinger, Ford and others.</td>
</tr>
<tr>
<td>ENGL.3640</td>
<td>African American Drama (Formerly 42.364)</td>
<td>3</td>
<td>A study of the history and development of African American drama, with emphasis on major aesthetic, political, and social movements in African American culture. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility &amp; Ethics (SRE).</td>
</tr>
<tr>
<td>ENGL.3660</td>
<td>Creative Writing: Poetry II (Formerly 42.366)</td>
<td>3</td>
<td>Combines discussion and critique of student poems with readings in contemporary poetry and poetics. The focus is on enabling students to develop their individual voices, forms, and</td>
</tr>
</tbody>
</table>
subjects.

ENGL.3680 Feature Writing (Formerly 42.368) - Credits: 3
This writing-oriented course will focus on learning how to write feature stories for newspapers, magazines, and the Internet.

ENGL.3685 Sports Writing - Credits: 3
This course will explore the practice, theory, and context of sports writing. In the course, students will write in a variety of sports related genres: the game story, the feature, and the column, as well as online related work, such as a blog. The course will also discuss the meaning of sports; Sports writing often covers subjects that range beyond its genre, which is why it can be so evocative, funny, sad and profound.

ENGL.3690 Reading and Writing New Media (Formerly 42.369) - Credits: 3
This course will focus on learning how to write for electronic media and understanding the changing world of journalism.

ENGL.3691 History and Theory of Media - Credits: 3
In this course, students will explore the history of media to better understand the relationship between technology and public discourse. Throughout the semester, students will examine online archives featuring material from a variety of new and old media. Class meetings will be devoted to the examination of several shared case studies to introduce students to primary source research. Throughout the semester, students will conduct a series of small investigative projects.

ENGL.3700 Contemporary American Fiction (Formerly 42.370) - Credits: 3
Discusses novels and short fiction from World War II to the present.

ENGL.3710 The Literature of the Beat Movement (Formerly 42.274/ENGL.2740) - Credits: 3
Explores both the writings and the personal lives of a loose confederation of poets, novelists, and essayist who emerged onto the American literary and cultural scene following World War II and who came to be known as the -Beat Generation+. The primary focus will be on the life and writings of Lowell native Jack Kerouac (1922-1969) with others of the -beat circle+ included as well, i.e., Allen Ginsberg, William Burroughs, Diana DiPrima, etc.

ENGL.3730 Modern Poetry (Formerly 42.373) - Credits: 3
A study of the development of British and American poetry from 1900 through World War II.

ENGL.3740 Contemporary Poetry (Formerly 42.374) - Credits: 3
A study of selected British and American Poets since World War II.

ENGL.3750 Modern Irish Literature (Formerly 42.375) - Credits: 3
Poetry, drama, and prose fiction from the Irish literary renaissance to the present. Writers will include Yeats, Joyce, O’Casey, Friel and Heaney.

ENGL.3760 African-American Literature (Formerly 42.376) - Credits: 3
A study of selected works by black American writers, such as Toomer, Wright, Ellison, Walker, and Morrison. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3765 Native American Renaissance - Credits: 3
Students in this course will examine and discuss fiction, poetry and autobiographical writings by four of the seminal figures of the Native American Renaissance: N.Scott Momaday, Leslie Marmon Silko, Joy Harjo and James Welch. Collectively, these writers helped restore modes of traditional cultural expression and historical perspective long imperiled by the histories of European and U.S. Colonialism in the Americas. Their work is also deeply imbued with concerns for the landscape and ecology, including in regards to conditions within the reservation system. Additionally, we’ll pay sizeable attention to critical assessments of the Native American Renaissance as offered in the work of figures such as Paula Gunn Allen, Louis Owens, Gerald Vizenor and others.

ENGL.3770 Theories of Rhetoric and Composition (Formerly 42.377) - Credits: 3
This course will examine the history and theories of composition and rhetoric, studying the field from its inception to more recent developments and challenges. We will also explore our own writing processes and literary practices. The course is furthermore grounded on the idea that literary practices are shaped by our culture. The course introduces
practical approaches to as well as theoretical frameworks beneficial for those interested in composition studies. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL).

**ENGL.3780 Asian American Literature (Formerly 42.378) - Credits: 3**

Asian Americans hold an intriguing place in the cultural imagination: as perpetual foreigners, as so-called 'model minorities' that serve to maintain hegemonic power relations, and as living embodiments of America’s memory of its involvement in recent wars. As artists, however, Asian Americans have contributed and impressive body of literary work, and we’ll examine some of the most enduring and provocative of these texts. We’ll explore themes such as trauma and the immigrant experience, issues of exile and dislocation, Asian Americans' embattled place in our country's history, and the intersections of race and ethnicity with gender and sexuality. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility &Ethics (SRE).

**ENGL.3790 Postcolonial Literature (Formerly 42.379) - Credits: 3**

When the peoples of Africa, India, the Caribbean, Ireland, and Canada finally gained, to a greater and lesser extent, independence from the British during the 20th century, they found that their national, cultural, and individual identities had been radically altered by the experience of colonization. In this course, we will examine how authors have related this postcolonial condition. We will examine a diverse body of texts--poetry which eloquently describe the heroic journey out of colonialism, drama which lays bare the conflicts of assimilation, and novels which fantastically present political struggle--as we determine how postcolonial theory and literature affects and possibly redefines all literature.

**ENGL.3795 Literature of the Americas - Credits: 3**

A course that introduces students to literary works across the hemisphere by considering their different, interrelated times, geographies, and languages. The course practices and up-to-date American literary study, one in which "America" signifies not just the United States, but, within and beyond the territorial boundaries of the U.S., other modalities of knowing, being, and collectivity in the hemisphere--and, indeed, the world.

**ENGL.3800 Travel Literature - Credits: 3**

We all yearn to travel. But why? In this course, we will investigate this question by not only studying works of travel writing (supposedly non-fiction travel accounts written by those who have done the journeying), but also other works of literature and culture in which travel is a significant theme. Our reading will cover a diversity of writers from around the globe and from different periods in history and we will pay particular attention to the interrelationship amongst the key issues of representation, power, and identity as we consider travel literature alongside interdisciplinary theories about travel and tourism.

**ENGL.3820 Theatre History I: Ancient Greece through the 18th Century (Formerly 42.382) - Credits: 3**

A survey of ancient to early modern theatre in its historical and social contexts, tracing changes and developments in acting styles, theatre architecture, scenic practices, dramatic literature, and the audience. The course examines how theatre both reflects and shapes the changing beliefs and priorities of a culture.

**ENGL.3830 Theatre History II: Nineteenth Century to the Present (Formerly 42.383) - Credits: 3**

A survey of theatre in its historical and social contexts from the 19th century to the present, focusing on innovations in design and technology, the advent of the director, the emergence of modern schools of acting, and the creation of new forms of theatre to suit the changing needs of a modern world.

**ENGL.3860 Editing: Grammar and Style (Formerly 42.386: The Science of Editing) - Credits: 3**

The course will examine the varied editing roles in a publishing company, from acquisitions to copy editing.

**ENGL.3870 Introduction to Editing and Publishing (Formerly 42.387) - Credits: 3**

Designed for students considering a career in book publishing, this course provides an overview of the publishing industry. You will examine the stages of the book publishing process from acquisition to bound book or e-book, using assignments and examples from school, college, and trade book publishing. You will also consider the specific responsibilities of an editor. The course includes class visits by authors, editors, or publishing executives, as well as a trip to a local printing company.

**ENGL.3880 Undergraduate Seminar on the Teaching of Writing (Formerly 42.388) - Credits: 3**

Training in writing theory for direct application in peer tutoring. Discussion supplemented by experimental exercises, class presentations, reading, and writing. Meets two hours each week. Students tutor four hours each week.
ENGL.3910 Writing on the Job (Formerly 42.391) - Credits: 3
A study of special problems of writing in business from memos and press releases through reports and proposals, including strategies for correspondence, presentation of complex information, and writing for diverse audiences. For English majors and minors.

ENGL.3920 Visual Rhetoric (Formerly 42.392) - Credits: 3
This course introduces students to the theory and practice of visual communication. Students will explore what scholars mean by terms such as visual rhetoric and visual literacy in order to think concretely about how these concepts apply to the communication practices they will engage in their academic, professional, and everyday life. Special attention will be paid to the ways in which visual representations communicate culturally-specific meanings about race, gender, class, sexuality, age, nationality, and difference. Assignments include contributions to a course blog, rhetorical analyses of visual texts, design modules, and a multimodal project.

ENGL.3925 Rhetorics of Social Movements - Credits: 3
This course examines the communication strategies used to build social movements and agitate for social change: What genres and persuasive tactics are used to identify social problems and attract people to participate in a social movement? What means of communication sustain the energy around and investment in social movements? How do people use language to silence or otherwise reject calls for social change? What role do journalists play in bringing attention to social movements? Students are introduced to social movement studies and analyze the rhetoric of historical movements in order to ultimately evaluate the persuasive strategies used in social movements happening today.

ENGL.3950 Special Topics in English (Formerly 42.395) - Credits: 3
This course focuses on the exploration of thematic or issue-oriented or timely topics of interest. The precise topics and methods of each section will vary. Barring duplication of topic, the course may be repeated for credit.

ENGL.3952 Topics in Latinx Literature and Culture - Credits: 3
This course focuses on thematic or issue-oriented topics in Latinx literature and culture. Topics and methods will vary each section, but topics might include: "Monsters, Hauntings, and the Nation," which examines Latinx horror to understand how the genre addresses the unique experience of Latinx people in the Americas. Reading from a wide variety of Latinx texts, students will gain a deeper understanding of the capacities of horror to depict the foundational yet spectral presence of Latinx people in the "American" imaginary.

ENGL.3953 Topics in Multiethnic Literature and Culture - Credits: 3
This course explores thematic or issue-oriented topics in multiethnic literature and culture. The precise topics and methods of each section will vary.

ENGL.4010 Selected Authors (Formerly 42.401) - Credits: 3
A study of selected works. Authors to be announced each semester.

ENGL.4020 Topics in Writing (Formerly 42.402) - Credits: 1-3
A study of issues and the practice of skills needed in specific areas of professional writing. Topics to be announced each semester.

ENGL.4060 Community Writing II (Formerly 42.406) - Credits: 3
Students work for a local non-profit for the semester completing a variety of writing tasks, depending on the placement. In class students apply the principles of rhetoric and use the tools of research and revision to write effectively for their community partner; to articulate in a public presentation a thoughtful, intelligent position on relevant social policy; and to become more active, engaged citizens.

ENGL.4065 Grant Writing - Credits: 3
Professionals in a number of careers need to be able to use writing to fund-raise their non-profit organization, business, school, governmental office, and creative enterprises. Students in this class will gain a solid understanding of how one writes a grant form start to finish. This is a hands-on, workshop class with a strong emphasis on process and reflection about learning and civic engagement.

ENGL.4070 Creative Writing Fiction II (Formerly 42.407) - Credits: 3
Creative Writing Fiction II
ENGL.4080 Principles of Technical Writing (Formerly 42.408) - Credits: 3
Provides the fundamental concepts and principles of technical writing, including technical description, audience analysis, editions, document specifications and outlines, graphics, definitions and revising documents. Writing assignments include preparing a document specification, editing and creating graphics.

ENGL.4130 Advanced Software Writing (Formerly 42.413) - Credits: 3
Introduces a range of advanced topics in software writing. Topics may include electronic publishing, hypertext, advanced graphics, document set components, and working in project teams. In this course, the student selects some aspect of the computer industry that interests him/her and documents it.

ENGL.4150 Young Adult Literature-Critical Methods (Formerly 42.415) - Credits: 3
Using young adult literature as a vehicle, this course considers traditional methods of interpretation and evaluation. Particular attention is given to the analytical, psychological and sociological approaches.

ENGL.4180 Creative Writing: Creative Non-fiction II (Formerly 42.418) - Credits: 3
An advanced creative writing workshop in nonfiction (personal essay, memoir, literary journalism, etc.).

ENGL.4230 Shakespeare I (Formerly 42.423) - Credits: 3
A study of selected histories, comedies, and tragedies. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Written &Oral Communication (WOC).

ENGL.4240 Shakespeare II (Formerly 42.424) - Credits: 3
A study of selected histories, comedies, and tragedies not covered in 42.243. Shakespeare I is not a prerequisite.

ENGL.4270 Virginia Woolf - Credits: 3
The purpose of this course is to explore a range of works by Virginia Woolf (1882-1941), one of British modernism’s most innovative writers of fiction and criticism, who also significantly shaped the contours of twentieth- and twenty-first-century English feminism. We will read selections from Woolf’s writings in several genres, as well as one important recent example of Wool-centric biofiction.

ENGL.4280 The Harlem Renaissance - Credits: 3
This course will introduce students to African-American fiction, drama, poetry, nonfiction, art, music, and film of the Harlem Renaissance. The Harlem Renaissance marks a seminal historical moment in which writers, musicians, and artists of the African Diaspora (particularly African-Americans, West Indians, and Africans) produced a complex body of written and visual text that drew upon the complexities of black life.

ENGL.4290 Introduction to Literary Theory (Formerly 42.429) - Credits: 3
A solid introduction to major trends in contemporary critical theory. Emphasis on producing a sample critical paper treating one or more current critical approaches to reading a literary text.

ENGL.4320 Introduction to Digital Humanities - Credits: 3
This course is an introduction to the field of digital humanities, which explores interpretive questions about history, culture, and meaning using computational analysis, data visualization, and the critical analysis of technology. We will focus on how computers and digital technologies are used to preserve, analyze, and create works of literature. Students will learn how to use different digital methods and will design and complete a digital project related to their own interests. No programming experience is required.

ENGL.4350 Literary Journalism (Formerly 42.435) - Credits: 3
This course looks at the genre of Literary Journalism, a largely American innovation in literature that developed in the late 19th and 20th centuries. Students will closely read and discuss books and articles by literary journalists, seeking to understand the genesis and shifts of this hybridized form (literary techniques applied to true or fact-based stories), and the contributions literary journalism is making to literature, to documentary and witness narratives, to historical records, and to the notions of truth reportage.

ENGL.4360 Writing About Culture (Formerly 42.436) - Credits: 3
In this course, students will write about local culture, using a mix of first-hand observation, archival research, and/or contextual or geographic readings of culture of literature produced in the region. This course is designed to serve as a
course in a study abroad program or one that focuses on regional authors such as Jack Kerouac or Henry David Thoreau.

ENGL.4370 Newspaper Editing (Formerly 42.437) - Credits: 3

This course will explore the techniques of putting together a student newspaper, focusing on everything from brainstorming for coming up with stories, to writing and editing them, writing headlines and captions, and design and layout. The course also discusses the nature of journalism audiences. It also discusses the practicalities of applying for journalism jobs and writing query letters for freelance writing.

ENGL.4375 Writing a Book - Credits: 3

In this course, students will learn about the methods of writing and publishing a book and put those lessons to work in writing their own work in a genre of their choice.

ENGL.4500 Creative Writing: Capstone (Formerly 42.450) - Credits: 3

In this intensive workshop course, upper-level students in the creative writing concentration work for an entire semester on a reading and longer-form writing project in one of three genres - poetry, fiction, or creative nonfiction. Students devise reading lists specific to their writing projects, with instructor's guidance. Through a creative process that involves planning and drafting, peer workshop, instructor feedback, and rigorous revision, students ultimately create portfolios that represent their best undergraduate writing.

ENGL.4790 Literature Seminar (Formerly 42.479) - Credits: 3

An advanced course that explores a variety of issues and topics in literature, literary history, and related fields. The topic or issue for a specific seminar will be announced in advanced.

ENGL.4920 Directed Study in Language Analysis (Formerly 42.492) - Credits: 1-3

The student develops a plan of directed readings in linguistics, semantics, or stylistics and defines a topic for individual research.

ENGL.4930 Directed Study in Creative Writing (Formerly 42.493) - Credits: 1-3

The student develops a series of projects in creative writing and composes poetry, fiction, or drama.

ENGL.4960 Internship I (Formerly 42.496) - Credits: 3

Internship experience (usually off-campus) gives English majors the opportunity to apply their skills in actual business, technical, educational, or professional situations. Classroom time supports student professionalization and career development. Topics include resumes, cover letters, networking, LinkedIn profiles, portfolios, and professional behavior and expectations.

ENGL.4970 Practicum (Formerly 42.497) - Credits: 1-3

An off-campus professional experience for English Majors, Minors, and BLA English Concentrators. The Practicum is intended to provide students with the opportunity of applying their writing skills in actual business, technical, educational, or professional situations. By permission only.

ENGL.4980 Practicum-English Study (Formerly 42.498) - Credits: 1-3

A short-term, intensive project related to English study and/or writing.
GNDR.2000 Special Topics in Gender Studies (200-level) (Formerly GNDR 200)(Never Offered) - Credits: 3

“Special Topics in Gender Studies” (200-level) offers students the opportunity to study a topic of special interest in the field of Gender Studies from an interdisciplinary perspective. The content and approach will vary depending upon the research and teaching interests of the faculty member teaching the course.

GNDR.2400 Introduction to Gender Studies (Formerly GNDR 240) - Credits: 3

This course is an interdisciplinary introduction to the field of Gender Studies that examines both commonalities and differences among diverse groups of women. A variety of topics are presented such as past and present stratification in work and family, sexual identities, medial representations of women, and violence against women. Social movements for women’s equality and feminist theories and methods are also introduced.

GNDR.4010 Gender Studies Practicum (Formerly GNDR 401) - Credits: 1-3

This course provides a link between the UMASS Lowell campus and the community, offering students a unique learning experience. This Community Service-Learning course provides opportunities for students to learn through thoughtful engagement in community service, applying knowledge of gender issues gained in the classroom to the world outside the classroom. Students and their faculty supervisors together will determine the kind of service work students will engage in during the semester, choosing from a wide range of available placements. They will be using their hard-won knowledge from their years in the classroom and applying it to help meet urgent needs in the he community. Students will have the opportunity to make lasting connections and effect positive change in our community. Ideally, this course will promote good citizenship through reflection on gender issues and testing of personal values, leading students toward a heightened sense of social responsibility and a lifelong commitment to their local, national, and global communities.

GNDR.4100 Directed Studies (400-level) (Formerly GNDR 410) - Credits: 1-3

This course, taken for 1 or 3 credits, may serve as a capstone experience for advanced gender studies students, helping them to explore a gender-related topic of interest while working closely with a faculty member. Projects that students complete for the Directed Studies will vary in length, scope, and topic, depending on how many credits are taken and which faculty member the student agrees to work with the student. What all projects will have in common is (1) a topic clearly relevant to gender studies, (2) an emphasis on achieving deep learning through advanced study, and (3) the integration of two or more distinct disciplines, integrating these disciplinary insights in order to solve a complex problem or analyze a complicated issue. This course allows for a student and professor to work closely together on a project of mutual interest. It is expected that the faculty member will be supporting and guiding the student’s work, and thus regular meetings will be necessary. In some cases the faculty member may not feel competent to oversee all aspects of a project in which an unfamiliar discipline is employed. In such cases, a second (and even third) faculty member may be asked to participate in the Directed Study as a consultant and final reader.
College of Fine Arts, Humanities & Social Sciences

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A student's catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

American Studies

- **General Option**
  - fall 2015 and beyond
  - [Catalog Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- **Thematic Option**
  - fall 2021 and beyond
  - [Catalog Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Art

- **Animation & Interactive Media Concentration**
  - fall 2017 and beyond
  - [Catalog Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- **Graphic Design Concentration**
  - fall 2015 - spring 2020
  - [Catalog Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- **Studio Art Concentration**
  - fall 2022 and beyond
  - [Catalog Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Composition for New Media

- **fall 2022 and beyond**
- **fall 2019 - spring 2022**

Criminal Justice

- **General Option**
  - fall 2022 and beyond
  - [Catalog Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- **Corrections Option**
  - fall 2016 and beyond
  - [Catalog Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- **Police Option**
  - fall 2022 and beyond
  - [Catalog Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- **Homeland Security Option**
  - fall 2022 and beyond
  - [Catalog Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- **Violence Option**
  - fall 2016 and beyond
  - [Catalog Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- **Crime and Mental Health Option**
Digital Media

- fall 2021 and beyond

Economics

- fall 2015 and beyond

English

- Literature Concentration
  fall 2021 and beyond
  fall 2015 - spring 2021
- Journalism & Professional Writing Concentration
  fall 2015 and beyond
  fall 2014 - spring 2015
- Creative Writing Concentration
  fall 2018 and beyond
  fall 2015 - spring 2018
- Theatre Arts Concentration
  fall 2015 and beyond
  fall 2010 - spring 2015

Graphic Design

- fall 2021 and beyond
- fall 2020 - spring 2021

History

- fall 2020 and beyond
  fall 2015 - spring 2020
- fall 2015 - spring 2015

Liberal Arts

- fall 2015 and beyond

Music Studies

- General Option
  fall 2022 and beyond
  fall 2018 - spring 2022
- Instrumental Option
  fall 2015 - spring 2018
  prior to fall 2015
- Voice Option
  fall 2015 - spring 2018
  prior to fall 2015

Music Performance

- Instrumental Option
  fall 2022 and beyond
  fall 2019 - spring 2022
  fall 2015 - spring 2019
  prior to fall 2015
- Voice Option
  fall 2022 and beyond
  fall 2019 - spring 2022
  fall 2015 - spring 2019
  prior to fall 2015

Music Business

- fall 2022 and beyond
- fall 2015 - spring 2022
- prior to fall 2015

Peace and Conflict Studies

- fall 2021 and beyond
- fall 2015 - spring 2021
Psychology

- General Concentration
  fall 2022 and beyond
  fall 2017 - spring 2022
  fall 2015 - spring 2017
  fall 2013 - spring 2015

- Behavior Analysis Concentration
  fall 2022 and beyond
  fall 2018 - spring 2022
  fall 2017 - spring 2018

- Community Social Psychology Concentration
  fall 2022 and beyond
  fall 2018 - spring 2022
  fall 2017 - spring 2018

- Clinical Psychology Concentration
  fall 2022 and beyond
  fall 2018 - spring 2022
  fall 2017 - spring 2018

- Developmental Disabilities Concentration
  fall 2022 and beyond
  fall 2018 - spring 2022
  fall 2017 - spring 2018

- Health Psychology Concentration
  fall 2022 and beyond

Political Science

- American Politics Concentration
  fall 2020 and beyond

- International Relations and Comparative Politics
  Concentration
  fall 2020 and beyond

- Law and Politics Concentration
  fall 2020 and beyond

- Political Communication and Public Opinion
  Concentration
  fall 2020 and beyond

- Sustainability and Environmental Politics Concentration
  fall 2022 and beyond

Political Science (prior to fall 2020)

- fall 2015 - spring 2020
- fall 2013 - spring 2015

Quantitative Economics

- fall 2022 and beyond

Sociology

- General Concentration
  fall 2016 and beyond

- Policy & Social Problems Concentration
  fall 2021 and beyond
beyondfall 2016 - spring 2021
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Racial Equity and Inclusion Concentration fall 2021 and beyond

Sound Recording Technology

• fall 2022 and beyond
• fall 2019 - spring 2022
• fall 2015 - spring 2019
• prior to fall 2015

World Languages and Cultures

• French Option
  fall 2018 and beyondfall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• French/Spanish Option fall 2018 and beyondfall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Italian/Spanish Option
  fall 2018 and beyondfall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Spanish Option
  fall 2018 and beyondfall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
HIST.1010 Classical Civilization (Formerly 43.101) - Credits: 3
This course provides an introduction to the Ancient Near East, Greece and Rome. The class first examines the formation of urban centers and the evolution of civilization as the late Bronze Age world transforms into the Iron Age with the creation of the vast empires such as Assyria and Achaemenid Persia. The course then focuses on the development of Greek city-states and the ideological differences between Athens and Sparta with a brief exploration of Classical Greed culture. Finally the class looks at the conquests of Alexander and his successors in the East, and the development of Rome as it shaped and was shaped by the cultures it conquered. The course requires short analytical papers, exams, and historical analysis of primary sources.

HIST.1050 Western Civilization I (Formerly 43.105) - Credits: 3
This course surveys some important issues and tendencies in the history of Western Civilization from its origins through the early modern period, including ancient Mesopotamia, classical Greece and Rome, the Middle Ages, and the Renaissance. These include "civilization" and the rise of cities, different imaginations of god(s) and humanity, evolving forms of political organization, continuity and change in social organization and everyday life, and the ongoing dialogue of faith and reason. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HIST.1060 The Modern World (Formerly 43.106) - Credits: 3
In a period of intensifying globalization a basic understanding of our world is increasingly important. The main purpose of this course is to expose students to the global processes that have shaped our modern world since roughly the year 1500. Taking on a global and comparative perspective, this course will help students to develop a topical, chronological, and geographical understanding of global history and cultures.

HIST.1070 World Civilizations to 1500 (Formerly 43.107) - Credits: 3
This class examines societies and cultures from ancient until early modern times with the underlying assumption that world history is an important conceptual tool for understanding our interdependent world. Course topics analyze the nature of the earliest human communities, the development of the first civilizations and the subsequent emergence of cultures in selected areas of Eurasia, Africa, and the Americas. This course also offers a consideration of issues related to the connections and relationships that shaped civilizations as a result of migration, war, commerce, and the various cultural expressions of self, society, and the cosmos before 1500. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HIST.1080 World Civilizations Since 1500 (Formerly 43.108) - Credits: 3
This course will introduce you to the study of world history, its relevance for living in the present, and the challenge to think critically about the emergence and subsequent development of the modern world since 1500. Participants in this course will examine experiences that transcend societal and cultural regions, focus on processes of cross-cultural interaction, and investigate patterns that influenced historical development and continue to impact societies on a global scale. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HIST.1110 United States History to 1877 (Formerly 43.111) - Credits: 3
This course surveys United States history from the early settlement of North America through the Civil War and Reconstruction. It considers the role of the political and economic leadership in the building of the nation as well as actions of ordinary people whose energies and aspirations constitute the fabric of United States society. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HIST.1120 United States History since 1877 - Credits: 3
This course surveys the history of the United States from the end of Reconstruction to the present. It covers significant developments in the politics, economy, culture, and other aspects of American life during that period. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA)

HIST.2000 Early Christianity (Formerly 43.200) - Credits: 3
This course serves as an introduction to the first 800 years of Christian history. It will begin with an introduction to the Apostolic Church of the first century (and its Jewish/Greco-Roman background) and conclude with an introduction to the Eastern Orthodox Church of Late Antiquity. The course will also cover popular topics like "Gnosticism," "Women in Early Christianity," and "Early Christian Worship and Art."

HIST.2001 Religions in Medieval Europe - Credits: 3
This course serves as an introduction to religion in medieval Europe (ca. 500-1500), that is, the Roman and Eastern traditions of Christianity, Christian movements deemed “heretical” by “orthodoxy,” Judaism, and Islam. Understanding the medieval history of these religions results in our gaining not only a comprehension of their individual developments but also how the three great monotheistic faiths have become some of the most powerful religious forces ever seen in civilization. These different religions will be treated not only individually but also in dialogue with one another.

HIST.2040 China & the Modern World (Formerly 43.204) - Credits: 3

This course introduces China’s interactions with the world since the 1840s. With the Opium War as the starting point, students are ushered into a traditional China whose political system, cultural values, and an economic structure stood in sharp contrast to those of the outside world. The main focus of the course is to explore the process in which China fought for its survival as a sovereign nation and searched for its road to modernization.

HIST.2070 Women in China (Formerly 43.207) - Credits: 3

From Confucian texts to current conditions, the course examines the evolution of Chinese women’s status throughout the centuries. The course will ask questions such as whether Confucianism dictated oppression against women, what factors influenced the changes of status for women, how Western feminism is connected with Chinese women, what roles women played in transforming China, and how ordinary women lived and are still living in China.

HIST.2090 Colonial Latin America (Formerly 43.209) - Credits: 3

This class examines the history of Latin America from 1492 until the early nineteenth century. After considering the rise of the Aztec and Inca empires, we will consider how the Spanish and Portuguese were able to acquire and maintain control in the region. Topics include indigenous-European relations, slavery, economic developments, the challenges of maintaining a colonial government, and Latin American independence.

HIST.2110 Historical Dimensions of Globalization (Formerly 43.211) - Credits: 3

This course explores the impact of globalization on the development of world societies in the late 20th-early 21st century. Using historical analysis of contemporary realities, it develops an appropriate frame of reference to address questions about the nature and cause of globalization.

HIST.2120 Modern Latin America (Formerly 43.212) - Credits: 3

Modern Latin America, a 200-level course, surveys Latin America from independence in the early nineteenth century to the present using primary sources, a textbook, and scholarly works. It begins with an understanding of the political, social, and economic context from which ideas of independence emerged and considers the wars for independence. We will spend a significant part of the course studying nation-building: how did the leaders of new nations define their nations and the values that would guide them? Who was included and who was excluded in the process of nation-building? The next part of the course examines the demands of groups originally excluded: the indigenous population, women, and the poor. The portion of the course covering the twentieth century emphasizes Latin America’s international connections, focusing on influence from the United States and the effects of world wars on the region. Mass politics also emerge, and are expressed in the Mexican Revolution and in Peronism. We also will consider the Cuban Revolution and its wider effects in the region. We will conclude our survey of the region by considering how historical trends continue to affect politics today. For example, the Bolivian political scene continues to be affected by the events and outcome of the War of the Pacific (1879-1883) and by a strong indigenist movement.

HIST.2121 Afro-Latin America - Credits: 3

This class surveys the history of Africans and people of African descent in Latin America from the sixteenth century to the present. The vast majority of enslaved people from Africa who crossed the Atlantic arrived in Latin America, not in the US. In some areas, like the Caribbean and Brazil, the majority of the population for many years was (or is) of African descent. How has this affected social, cultural, and political life in the region? We will consider a range of topics, including how elements of African culture have been incorporated into broader Latin American traditions, slavery and abolition, the struggle for citizenship and inclusion, and the formation of a distinct Afro-Latin American identity.

HIST.2130 History of the Ancient Near East (Formerly 43.213) - Credits: 3

This broad survey investigates the development of the so-called "Cradles of civilization," Ancient Mesopotamia, Egypt, Anatolia, the Levant and Persia. At times the class will dip deeply into these cultures, using primary texts as well as archaeological and artistic evidence to better understand the political, religious, economic, military, social and artistic evolution of these closely associated cultures. We will focus on themes such as the development of kingship as a secular and sacred ruler, the ideology of Empire, the environment, and the fragility of the inter-connected network of resources that developed. The ultimate goal is to understand the inter-cultural
milieu of the Ancient Near East and demonstrate how much Western civilization owes to these historical developments.

HIST.2140 Early America Through Material Culture - Credits: 3
This class examines American history from the period before European contact to the early stages of the Industrial Revolution in the nineteenth century through the lens of material objects. Comparisons will be drawn between the objects and cultures used by European, Native American, and African American peoples, as well as over time.

HIST.2230 England to 1660 (Formerly 43.223) - Credits: 3
A survey of English History to 1660 with emphasis on the Institutional, Economic and cultural developments. In addition to providing general knowledge of the topic, the course is designed to enhance the learning experience of both History and English majors.

HIST.2240 Modern Britain (Formerly 43.224) - Credits: 3
A survey of the political, social and cultural history of modern Britain from the early 19th century to the present, focusing on the evolution of Britain from the period of Empire to its current membership of the European Union. Key themes include the transition from Empire to post-imperial Britain; economic development and distress; parliamentary and popular politics; social unrest and repression; nationalism, sub-nationalism and post-nationalism; and migration and citizenship.

HIST.2250 Ancient Greek History (Formerly 43.225) - Credits: 3
A study of Greek history, institutions and culture from Minoan times through the Hellenistic period.

HIST.2255 Hellenistic History - Credits: 3
This course investigates the Hellenistic Period, defined as the era from the death of Alexander the Great in 323 BCE to the death of Cleopatra and the conquest of Rome in 31 BCE. In these centuries, the Mediterranean world was exposed to brand new cultures and ideas, leading to an unmatched period of innovation and creativity, as well as to new conflicts and struggles. This course will emphasize themes of cultural, social, and religious hybridity, which were brought about through close contact with the Near East, North Africa, and Central Asia, and closely engaged with all the complexities of the three hundred years that passed between the height of the classical Greek world and the beginning of the Roman Empire.

HIST.2260 Roman History and Civilization (Formerly 43.226) - Credits: 3
This course examines one thousand years of Roman history (ca. 500 BC-500AD) with equal emphasis upon social, political, military, and cultural aspects of the Republic and Empire.

HIST.2270 Europe in the Middle Ages (Formerly 43.227) - Credits: 3
A survey of the Latin West during the formative period from the Roman Empire to the creation and development of the first European civilization.

HIST.2280 Women in European History (Formerly 43.228) - Credits: 3
This course examines the history of women in late medieval, early modern, and modern Western Europe (ca. 1300-1900). From medieval saints and Renaissance queens to Enlightenment Salonieres and ordinary wives and mothers, women have played an astonishing variety of roles. We will utilize primary and secondary sources, historical films, and works of art to understand the contributions and challenges of women in the past.

HIST.2310 Renaissance and Reformation (Formerly 43.231) - Credits: 3
The history of Europe in the time of transition between the late Middle Ages and the Early Modern Period. Two principle topics are the intensification of cultural change which began in Italy around 1300 and spread slowly northward and the disruption of the unity of the Western Christian Church.

HIST.2350 Civil War and Reconstruction (Formerly 43.235) - Credits: 3
This course explores ways in which the U.S. changed in the years between 1848 and 1877. Topics covered may include the antislavery movement, black activism, secession, the war and reasons for U.S. victory, and the changes in American society and politics during Reconstruction.

HIST.2370 Europe in the Twentieth Century (Formerly 43.237) - Credits: 3
This course will survey the continent’s history over its "age of extremes” in the twentieth century, moving broadly from the apogee of European global power at the turn of the century to
its decline in the trauma of two world wars and decolonization, through the Cold War and post-1945 recovery and the challenges and possibilities that have arisen for Europe in the aftermath of 1989 and the fall of the Berlin Wall.

HIST.2390 The Nonwestern World Since 1945 (Formerly 43.239) - Credits: 3

The recent history of Africa, the Middle East, Asia and Latin America and the comparative global processes and trends that have influenced the world since 1945.

HIST.2400 World War I (Formerly 43.240) - Credits: 3

The course will cover the wide range of causes of this major conflict, the difficulties and changing dynamics of waging this massive war and the effects of all this on both the internal political and social conditions and external consequences for the combatants with the peace settlement.

HIST.2410 Colonial Survival: Case Studies in Early American Legal and Political History (Formerly 43.241) - Credits: 3

This class contrasts the dominant monoculture colonies of Massachusetts Bay and Virginia with the lesser known multicultural colonies of Maine, Plymouth, New Amsterdam, Maryland and Rhode Island. While some of the multicultural colonies foundered, others flourished by utilizing a wide range of political and legal methods which allowed for their survival alongside much larger rival colonies. The class finishes by examining similar political and legal methods employed by Native American tribes for their own survival, in particular the Cherokee, whose carefully negotiated accommodations to Anglo-American culture allowed them to live side by side with the growing United States until the 1830’s. Close analysis of both primary and secondary source material will provide students with an intensive look at rarely examined issues in early American history.

HIST.2420 World War II (Formerly 43.242) - Credits: 3

The Second World War transformed states and people from East Asia to the United States to Europe. We examine diplomatic and military aspects of the war and how it affected the lives of people in the countries involved. Topics include the prelude to the war, military campaigns in Europe and the Pacific, collaboration and resistance, the home front, the Holocaust, science and the atom bomb, and the consequences of the war.

HIST.2485 United States Military History - Credits: 3

This course is a survey of military history and the interaction between society and military institutions, technology and techniques, from the pre-colonial era to the present. The causes and consequences of war, the role of technology in war, and strategies and tactics of war will be emphasized.

HIST.2490 The Vietnam War (Formerly 43.249) - Credits: 3

Covers the U.S. was in Vietnam from its origins in the French colonial era to its impact on contemporary culture and foreign policy.

HIST.2580 Russia to 1796 (Formerly 43.258) - Credits: 3

The growth of the Russian state: Varangian origins, the Kievan state, conversion to Christianity, Mongol domination, the rise of Muscovy, Europeanization and expansion under Peter the Great and Catherine the Great.

HIST.2700 Women in American History (Formerly 43.270) - Credits: 3

This course surveys the history of women in the British North American colonies and United States with a special focus on social and economic change. It examines women as a distinct group but also attends to divisions among them, particularly those based on class, ethnicity/race, and regional diversity. Course themes include concepts of womanhood, the development and transgression of gender roles, unpaid work and wage labor, social reform and women’s rights activism, as well as changing ideas and practices with respect to the female body.

HIST.2740 Native American History (Formerly 43.274) - Credits: 3

A comprehensive study of the Native Americans through historical and first-hand accounts of their lives. Designed to enlighten students and to represent fairly the Native Americans, dispelling some of the existing myths about them.

HIST.2745 History of the U.S. South - Credits: 3

The history of the southern United States from the colonial period to the present. Topics include the development of plantation slavery, the Civil War and Reconstruction, industrialization and the "New South," segregation and disenfranchisement, the Civil Rights Movement, and conservatism.

HIST.2750 African-American History (Formerly...
This course surveys African American history in the United States from colonization to the present. It begins with a study of life in West Africa and traces the forced migration of Africans to the Americas. It explores West African transmissions, the freedom struggle, the great migrations from the South, the Harlem Renaissance, the modern Civil Rights movement, and the continuing impact of African Americans on life in the 21st century.

HIST.2790 History of Lowell (Formerly 43.279) - Credits: 3

This course will provide an overview of the growth, decline, and rebirth of the city of Lowell, Massachusetts. Topics will include the Industrial Revolution, role of women and unions in the workplace, immigration and the formation of ethnic neighborhoods, urban renewal, and historic preservation. The survey will also discuss notable personalities such as labor activist Sarah Bagley, Civil War general Benjamin Butler, writer Jack Kerouac, Senator Paul Tsongas and boxer Micky Ward. The foregoing names may differ over time.

HIST.2810 Sub-Saharan Africa (Formerly 43.281) - Credits: 3

This course provides a basic introduction to the history of the African continent. It will expose students to the processes and patterns that have shaped modern African history. The course examines the historical roots of the many challenges that the continent faces today. But, at the same time, it will also provide students with the knowledge to shatter the myths and stereotypes about Africa.

HIST.2860 United States History Through Film (Formerly 43.286) - Credits: 3

This course explores selected moments in United States history - such as slavery, the Great Depression, World War II, the Vietnam War, and the feminist movement - through the lens of film. Using written historical sources as well as film, students will investigate how particular films have depicted the past and shaped the way that Americans remember their history.

HIST.2950 Japan Since 1600 (Formerly 43.295) - Credits: 3

A study of the traditional Japanese institutions and the transformation of Japan into a modern state after 1868: the Tokugawa Shogunate, Meiji Restoration, Russo-Japanese War, world power status, militarism, World War II, and present day Japan.

HIST.2960 United States Diplomatic History (Formerly 43.296) - Credits: 3

Although the course takes the entire United States diplomatic history as its field of historical study, its focus is on the American foreign policy in the twentieth century. The course first explores domestic and international factors that made the United States a world power by 1898. It will then consider the goals, the practices, and the results of the twentieth century American foreign policy. The course challenges students to view American diplomacy in a global context.

HIST.2980 Introduction to Historical Methods (Formerly 43.298) - Credits: 3

An introduction for the undergraduate student to the nature and principles of history. The course takes up methodology, historiography, research methods, electronic resources, bibliography, and the technical and stylistic problems involved in the presentation of research in scholarly form. Required of all history majors in the sophomore year. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Social Responsibility & Ethics (SRE).

HIST.3010 The World of Things: Consumer Cultures in the Modern West (Formerly 43.301) - Credits: 3

This course will examine the emergence and historical impact of consumer cultures in the modern West, from the eighteenth century through the present. Topics to be covered will include the emergence of spaces of consumption (the home, the commercial/spectacular metropolis, the department store, the shopping mall, the tourist site), changing attitudes toward shopping and spending, the construction of modern social identities of class, gender, generation and race through consumption, and political struggles over consumption.

HIST.3020 The Byzantine Empire (Formerly 43.302) - Credits: 3

Through this course, students will examine the history of Byzantine culture, which grew from the Greek-speaking remains of the Roman Empire. Students will consider how leading men and women shaped Byzantine Civilization and the political and military institutions that preserved it through the fifteenth century. The course will also focus on the development and spread of Eastern Orthodox Christianity and significant aspects of Byzantine culture, such as cuisine, gender roles, cities, and art. We will explore in some detail Byzantium's complex and difficult dialog with its neighbors: the Islamic world, the Slavs, and the Latin West. This course especially emphasizes reading and discussion of primary source documents. Students will compose a research paper as their main work for this class.
HIST.3040 European Economic & Social History (Formerly 43.304) - Credits: 3
Europe has been transformed in the last 250 years from an agricultural society to a post-industrial one. We study the processes by which this happened, from the Industrial Revolution of the 18th and early 19th century to the wars and depressions of the early 20th century and the collapse of the communist system and European unification in the late 20th century. Students learn basic concepts and methods of history and economics.

HIST.3080 History of Crime and Social Control (Formerly 43.308) - Credits: 3
Analyzes the causes and development of attempts to control crime, ethnic conflict, radical protest movements, urban disorders, and attitude and role conflicts.

HIST.3100 History of New England (Formerly 43.310) - Credits: 3
Explores the evolution of New England society from pre-Columbian to the Post-Industrial, emphasizing the ways succeeding generations of New Englanders have confronted social and economic change. Topics include: white-Indian relations, ecological change, Puritanism, the New England town, the industrial revolution, the rise of cities, immigration, ethnic and class conflict, and the distinctiveness of the region.

HIST.3105 War and Native Americans in Colonial New England - Credits: 3
Explores the evolution of New England society from pre-Columbian to the Post-Industrial, emphasizing the ways succeeding generations of New Englanders have confronted social and economic change. Topics include: white-Indian relations, ecological change, Puritanism, the New England town, the industrial revolution, the rise of cities, immigration, ethnic and class conflict, and the distinctiveness of the region.

HIST.3140 American Social History II (Formerly 43.314) - Credits: 3
This course explores various aspects of common peoples' lives in the United States since 1880. Primary areas of investigation include work and leisure, family and community, as well as culture and values.

HIST.3151 Food in American History - Credits: 3
This course examines change and continuity in American foodways from the pre-Revolutionary era to the present, focusing on the significance of class, race, gender, nationality, religion and region as well as transnational dimensions in that culinary history.

HIST.3160 American Environmental History (Formerly 43.316) - Credits: 3
This course explores the environmental history of early America and the United States from the end of the last ice age (c. 12,500 years ago) to the present. It examines the role played by nature as an historical agent as well as the relationship between human communities and the physical and organic environment. Course themes include evolving land use, the environmental significance of industrial capitalism, urban public health, resource conservation and wilderness protection, the impact of ecology on public consciousness, as well as environmentalism.

HIST.3180 American East Asian Relations (Formerly 43.320) - Credits: 3
The course examines relations between the United States on one hand and Japan, Korea, China, Vietnam, and the Philippines on the other in the 19th and 20th centuries. Besides political, trade, and cultural relations, there is also emphasis on American laws and practices regarding immigrants from these East Asian countries. The aim of the course is for students to gain a basic knowledge of American relations with East Asia and to develop analytical skills for sophisticated international relations.

HIST.3182 The Holocaust (Formerly 43.321) - Credits: 3
In a world in which genocide is real, the murder of six-to-eight million Jews between 1939 and 1945 remains a critical topic of inquiry. When were factories of death first conceived? What perverse rationale motivated the collaborators who built and operated the gas chambers and crematoria? This course will answer questions of this kind by examining the most respected scholars who have written on and primary sources that speak directly to the Holocaust

HIST.3220 Chinese Foreign Policy (Formerly 43.322) - Credits: 3
Chinese foreign policy since 1949 with a strong emphasis on tracing the links between historical, ideological, and cultural influences, on the one hand, and pragmatic and nationalist considerations on the other. While tracing these links, the course explores the intricate process of policymaking in the People’s Republic of China.
HIST.3230 World of the Atlantic (Formerly 43.323) - Credits: 3

The concept of the Atlantic world arose to describe the interactions of the peoples of the Americas, Europe, and Africa through trade, conquest, colonialism, independence and beyond. In this class, we will consider the cultural, economic, and political relationships that are formed and change over time between these groups. We will pay special attention to historical approaches to studying and writing about the Atlantic World.

HIST.3270 Medieval England (Formerly 43.327) - Credits: 3

From the first century Roman Conquest of the Britons to the 15th century Tudor victory at the Battle of Bosworth Field, this course aims to illuminate the social, political, religious, and cultural elements that made medieval England. This course will explore art, gender, class structures, and England’s interactions with non-Christians, among many other topics. In addition to the extensive written sources available, special attention will be paid to archaeological discoveries that help us understand daily life in medieval England.

HIST.3290 Childhood in Premodern Europe (Formerly 43.329) - Credits: 3

This course examines the concept of childhood in medieval and Renaissance Europe (ca. 1100-1600), with particular attention to England and Italy. There are no specific prerequisites, although some knowledge of European history (i.e., Medieval Institutions, Western Civilization, Renaissance-Reformation) will be useful. Among the topics we will consider are the following: the different stages of childhood; children’s education and apprenticeship; dress, diet, and demeanor of children; orphans; royal children; Protestant and Catholic views of children; adolescent sexuality; depiction of children in art; child labor; literature for children.

HIST.3300 Tudor and Stuart England, 1485-1714 (Formerly 43.330) - Credits: 3

Traces the transformation of England from a small island kingdom to the hub of an overseas empire. During this period the English people underwent religious upheaval and civil war, saw the rise and partial decline of the monarchy, built and rebuilt London, and enjoyed the plays of Shakespeare. Although England provides the focus for this course, the rest of the Tudor and Stuart world is included.

HIST.3320 Warfare in the Ancient World (Formerly 43.332) - Credits: 3

Warfare in the Ancient World is a practical introduction to the study of warfare in the ancient world and traces the advances made in empire building, ideology and military technology. The chronological structure of the class starts with the Egyptians and continues through the Dark Age, Classical and Hellenistic Greeks, to the rise and fall of Rome. This course will trace certain themes through the centuries: how different civilizations waged war; who served in various armies and why soldiers decided to fight. While major battles and important individuals are discussed, military tactics and strategies are only tools to help understand the underlying causes for armed conflict.

HIST.3333 American Women and Public Activism, 1800-1920 - Credits: 3

Over the course of the 1800’s, women developed numerous strategies for influencing American society and politics, even though they were unable to vote in most elections. This course will explore how diverse groups of American women formed organizations that acted decisively in the public arena. By analyzing women’s social and political activism, we will see how vital civil society is for a functional democracy, and explore how change happens. Possible topics include women’s activism in social reform, local and state governments, civil rights, labor organizations, charitable work, religion, and women’s rights. Consideration will be paid to the differences among women in terms of race, class, and sexuality.

HIST.3340 The French Revolution and Napoleon (Formerly 43.334) - Credits: 3

This course will involve students directly in critical consideration of the central events and issues of the Revolutionary and Napoleonic periods, with an eye to their longer-term historical resonances in France, Europe and beyond. The core problems we will be discussing are ones which have remained vital in modern and even contemporary political history: the nature of liberty, the nation and national identity, equality and inequalities, violence and terror in politics, the cult of the leader, war and empire.

HIST.3360 Modern Ireland (Formerly 43.336) - Credits: 3

An upper-level course on the history Modern Ireland from the late 18th century to the present, covering the movements for independence in the 19th century, the cultural revival and revolutionary period from the 1890s, the social and economic history of the independent state, and the Celtic Tiger phenomenon of the late 20th century. Key themes include nationalism and identity, colonialism and post-colonialism, religion and repression, emigration and diaspora, culture and social life, and changing definitions of “Irishness” over time.
HIST.3370 Germany Since 1871 (Formerly 43.337) - Credits: 3
This course will survey major developments of Modern German History, from German Unification through European Union. Topics covered will include German social, political and military evolution under the Empire; the impact of modern, "total" war; the upheavals of the Weimar and Nazi periods; German recovery and division during the Cold War; German reunification and its contemporary aftermath.

HIST.3380 War and Memory in Twentieth Century France (Formerly 43.338) - Credits: 3
This course will address the individual and collective trauma of modern warfare, as that was experienced in France both during and after the country's three main wars in the twentieth century. It focuses on how the experience of modern war was negotiated in culture—in personal and official memory, in gender relations, and in a great variety of written and visual texts. Individual units will be dedicated to World War I, the Occupation and Vichy Regime during World War II, and the Algerian War, and to the long and conflicted afterlife of those conflicts.

HIST.3420 Inquisition: Myth and Reality (Formerly 43.342) - Credits: 3
Following a brief introduction and an overview of the medieval Inquisition, the first few weeks of the course will be devoted to a study of the Inquisition in Spain and Italy from 1450-1650. We will also discuss the way in which the history of the Inquisition has been analyzed during the past five hundred years (what historians call "historiography"). The second half of the course will focus on student research and selected topics in Inquisition studies.

HIST.3430 Fascism and the Radical Right in Twentieth Century Europe (Formerly 43.343) - Credits: 3
This course will offer a comparative exploration of the deep and enduring appeal of fascism and far rightist politics in twentieth century Europe. Beginning with the nationalist revival and cultural crisis of the late nineteenth century and the cataclysm of World War I, we will trace the rise of the radical right to political prominence in Europe in the 1920’s and 1930’s. While retaining a Europe-wide perspective throughout, we will analyze in particular detail the Fascist and National Socialist seizures of power in Italy and Germany, and examine their efforts of political, social, economic and cultural mobilization. Issues covered will include fascist political communication and governance, terror and "normality" in everyday life, labor and youth policy, racism and racial purification, and gender and reproductive politics, among others. In the final section of the course, we will contemplate the historical legacy of fascism after 1945, focusing on the politics of memory and representation in post-war Germany, Italy and Europe more generally, and assessing the recent resurgence of fascist and quasi-fascist political tendencies in the 1980’s and 1990’s.

HIST.3440 Revolutions in the Modern World (Formerly 43.334) - Credits: 3
In this comparative history course, we look at the theories of Marx, Barrington Moore, Crane Brinton, Theda Skocpol, William Sewell, and others on the causes, dynamics, and outcomes of revolutions in the modern world. We then consider the history of the French, Russian, Vietnamese, and Iranian Revolutions (list may vary each semester) to see how well the theories fit the events. The course ends with a discussion of whether the pattern and analyses discussed in the course are helpful in understanding a contemporary revolution, such as that in Egypt.

HIST.3449 American Slavery: History, Fiction, and Film - Credits: 3
This course examines the history of slavery in the United States. It explores topics such as the role of slavery in the economy, the culture of enslaved Americans, resistance to slavery, and the abolition of slavery, often making comparisons to slavery in other parts of the Western Hemisphere. The course also investigates how the institution of slavery has been represented by different generations of historians and in American popular culture from the 1850’s through the present.

HIST.3450 Slavery and Abolition (Formerly 43.345) - Credits: 3
This course takes a comparative approach to the study of plantation slavery in the Americas with special attention to developments in Virginia and Cuba. It surveys the structure of slavery in the nineteenth century United States South; slavery’s legacy in the United States; and its twenty-first century reincarnation in human trafficking and forced labor around the world.

HIST.3480 Making an Historical Documentary (Formerly 43.348) - Credits: 3
This course provides students with the basic conceptual and technical skills for developing and completing an historical documentary, including instruction about subject choice, narrative structure, camera work, and editing.
Credits: 3

This course focuses on reform movements and revolutions in modern Latin America as a way of considering how individuals and groups articulate their needs and demand access to resources, representation, and political change. Calls for land reform, voting rights, environmental protection, indigenous representation, and anti-imperialism are common themes we will consider during the semester.

HIST.3490 The Cuban Revolution (Formerly 43.349) - Credits: 3

The Cuban Revolution has been surrounded by controversy since it took power in 1959. Through readings, films, and discussions, we will examine not only the events that have occurred in Cuba over the last four decades but also the ways that they have been presented to audiences in Cuba, the United States, and elsewhere. We will carefully consider the role of perspective in academic writing and the media and how it has shaped understandings of the Castro era.

HIST.3500 Colonial North America, 1550-1750 (Formerly 43.350) - Credits: 3

This class explores societal groups across the North American continent from 1550 to 1750 by comparing the approaches and responses to colonization taken by different European and Native American groups alongside the emergence of African slavery in North America. The semester concludes with the escalating colonial wars in the early eighteenth century, which would lead to both the French and Indian, and Revolutionary, Wars.

HIST.3510 Captivity Narratives and Colonial Societies (Formerly 43.351) - Credits: 3

The long sequence of military conflicts in New England at the turn of the eighteenth century led to an equally long sequence of accounts describing the experiences of English colonists taken captive by Native American or French military forces. While these narratives remain the best known examples of this particular literary genre in the United States, this class will explore the multitude of ways in which the captivity narrative was used in colonial North America by people of different races and cultures.

HIST.3520 British Colonization in the Eighteenth Century (Formerly 43.352) - Credits: 3

This class provides a thematic examination of the British North American colonies. Topics include colonies founded in the long eighteenth century, material culture, the multi-racial British empire, the Enlightenment, and the rise of individualism's impact on society and religion, and shifting political relationships between Britain and its colonies.

HIST.3530 The French and Indian and Revolutionary Wars (Formerly 43.353) - Credits: 3

The years between 1754 and 1784 saw drastic change on the North American continent and around the world for Britain and its colonies. Colonists in North America went from being devout British subjects during the French and Indian War to rebelling and founding their own new country during the American Revolution. In turn, the British Empire went from spending millions of pounds on North America in the 1750's to barely committing the resources necessary for fighting the Revolution. This class examines these cultural and political transitions in context with discussions on the varied populations of North America who experienced them.

HIST.3540 Mapping Early America - Credits: 3

This class explores the diverse methods used by Native American, Spanish, French, British, and Dutch peoples to map, claim, and inhabit land and the built environment around them. Whether on paper, skins, or in the mind, this cartographic record documents developing technologies and shifting cultural and political identities alike. Weekly discussions provide students with both an introduction to the vast array of surviving maps from the early American world and the skills needed to analyze them.

HIST.3550 Jacksonian America (Formerly 43.355) - Credits: 3

An investigation of the social, political, and economic developments in the United States from 1815 to 1848. Special emphasis is placed on the spread of capitalism, the growth of reform movements, the development of cities, and the conflict over slavery.

HIST.3560 Civil War and Reconstruction (Formerly 43.356) - Credits: 3

This course surveys the increasing political, social, and economic tensions between the North and the South during the first half of the nineteenth century; the explosion of those tensions into secession and conflict; the four years of war; and the postwar struggle to reconstruct the South and forge a new union.

HIST.3570 American Civil War in Memory (Formerly 43.357) - Credits: 3

Students analyze how Americans have remembered the American Civil War in the years after the war ended in 1865.
By looking at novels, memoir films, National Park Service Battlefields, and monuments, students discover how remembrances are influenced by views of race, gender, patriotism, regionalism, and economic forces.

HIST.3575 The Age of Jim Crow - Credits: 3
This course examines U.S. History—particularly the history of the South—during the era of Jim Crow, the period between the Civil War and the Civil Rights Movement when African Americans were systematically denied political and social rights. This course examines the visions white southerners held for what their region should be in this period, as well as the responses of African Americans.

HIST.3580 Amazing American Lives (Formerly 43.358) - Credits: 3
Biography often has been used by historians as source material for representing the nature of the American experience. An examination of outstanding biographies of the lives of various Americans can yield insights into all levels and ranks of American society from colonial days to the late twentieth century.

HIST.3585 American Women's Lives, 1600 - present - Credits: 3
Some of the very best and most readable examples of American Women's History come in the form of biographies. While historians may sometimes lack sources for writing women's history, we often know spectacular amounts about individual women. Scholars have used this wealth of information to produce rich, complex readings of women's lives. In the process of doing so, historians of American Women also write the history of all of American society, culture, politics, and economics. This course seeks to broaden our understandings of American History, the genre of biography, and most importantly, the history of American Women. The women chosen for the study will depend on the preferences of the professor, with attempts made to cover a variety of topics, time periods, and types of biographies.

HIST.3590 Democracy in the United States 1800-1860 (Formerly 43.359) - Credits: 3
The course examines what is often referred to as the Golden Age of American Democracy. How much power did ordinary Americans have in the political system? What motivated people to participate in politics? What roles did women and racial minorities play in American politics despite not being able to vote?

HIST.3590 Russia 1796 to the Present (Formerly 43.369) - Credits: 3
This course covers the history of Russia in its various incarnations-Imperial Russia from the end of Catherine the Great's reign the Soviet Union, and today's Russian Federation. We use both historical works and literature to get a better understanding of the Imperial state, the nature and the social bases of autocracy, the ideologies and actions of the movements that supported the Empire and those that opposed it. We cover the catastrophes of World War I, the Revolutions, Civil War, and the Soviet period (preparing the student for the course on "Stalin's Russia", 43.374). We examine the causes and events involved in the decline and collapse of the Soviet Union, and the rise and emerging patterns of behavior of the Russian Federation.

HIST.3600 History of Race and Gender in Sports - Credits: 3
This course is an in-depth examination of the history of race, ethnicity and gender in the development of collegiate and professional sports in the United States. It will track the maturity over time of athletic activities, specific sports, their rules and the impact each particular sport has had on society, politics, legislation, economic stratification, educational opportunity, and the American cultural experience. Students in this course will explore issues such as racial and sexual stereotyping in sports and related advertising, college athletes and academics, Native American mascots, sports during periods of social unrest including the Civil Rights Movement, and the importance of the passage of Title IX (9).

HIST.3620 The Twenties and the Thirties (Formerly 43.362) - Credits: 3
An examination of the emergence of the corporate and governmental institutions of modern America set in two turbulent decades of cultural and political ferment that involved both booming prosperity and the economic collapse of the Great Depression.

HIST.3650 United States History since 1960 (Formerly 43.365) - Credits: 3
Discusses Cold War politics and civil rights upheavals during the 1960's and 1970's, the decline of American economic and political power, and the resurgence of conservative politics in the 1980's.
influence our modern world. You will read a number of works in order to discuss them in detail in class. In addition, you will be required to write a review of one of three required books.

HIST.3720 Women in the Middle Ages - Credits: 3

This course explores medieval Europe through the female lens. We will illuminate the influence of women on war, politics, business, religion and culture. We will study queens, writers, artists, nuns businesswomen, and peasants in order to understand how women shaped the medieval world, how they were shaped by it, and how they contributed to the brilliance of the Renaissance.

HIST.3730 Nazi Germany (Formerly 43.373) - Credits: 3

This course looks at the period 1933-1945 (the period of the "Third Reich") in Germany from the perspectives of economics, politics, society, and the arts. In the course, we will read preeminent historians who have written on each of these themes in order to gain a firm understanding of the historical debates that surround the period. Specific subjects include the Nazi consolidation of power, the increasingly brutal nature of anti-Semitic policies, the power struggles among chief Nazi officials, the ideologies and personae of figures like Hitler, Rosenberg, and Goebbels, the nature of "Nazi art" and cultural policies, and the path to war.

HIST.3740 Stalin's Russia (Formerly 43.374) - Credits: 3

Spanning the period from the "October Revolution" of 1917 to Stalin's death in 1953, this course considers "Stalinist Russia" from the perspectives of economics, society, the arts, politics and war. In the course, we will read the preeminent historians who have written on these topics.

HIST.3760 20th Century Irish History in Film (Formerly 43.376) - Credits: 3

This course is on the representation of Irish history in narrative feature and documentary films made in or about Ireland. Starting with the revolutionary era, it covers the key events, issues, and debates that defined Irish politics, culture and society in the last hundred years. The course is divided into five thematic sections and proceeds chronologically through the 20th century, starting with the War of Independence against the Britain and the Civil War that followed; the American romanticism of Ireland in film; social issues that plagued the Irish Free State and Republic; the period of violence in the North known as The Troubles; and the issues raised by multiculturalism during the Celtic Tiger era.

HIST.3790 United States Industry Twentieth Century (Formerly 43.379) - Credits: 3

An exploration of the rapid growth of the American economy in the 20th century, including the evolution of the large corporation and the mass production assembly line. Particular attention is devoted to the ways in which immigrants, women, and the African Americans were affected by the rise of big business. The course also traces the decline of the traditional U.S. manufacturing base following the Second World War and the impact this had on the working class and their unions.

HIST.3800 Work and Society (Formerly 43.380) - Credits: 3

Provides a survey of labor history from the colonial period to the present focusing on the interrelationship between culture and work in American society and on the dynamics of technical and economic changes on the organization of work processes.

HIST.3810 United States in the 1960s - Credits: 3

This course examines the United States during the 1960s. General themes include the stifling and freeing of dissent, the "rights revolution", liberal social and economic policy, foreign policy in a bipolar world, redefinition of values and morals, changing relations between women and men, increasing concern with environmental pollution, the growing credibility gap between citizens and their government, and rise of the "New Right".

HIST.3840 Radicalism in American History (Formerly 43.384) - Credits: 3

A biographical approach to the influence of radicalism on American history with emphasis on significant and representative personalities and heir contributions.

HIST.3845 Malcolm X - Credits: 3

This course investigates the personal transformation of Malcolm X during his lifetime as well as the impact he has had on both American and transnational culture and politics from the mid-twentieth century to the present.

HIST.3870 Pirates of the Mediterranean - Credits: 3

This course uses piracy, defined as armed robbery at sea, to highlight issues of violence, governmental intervention, and economic practices as they relate to marginalized people of the Greco-Roman world. Students will be introduced to the methods of underwater archeology while examining shipwreck evidence, and epigraphic conventions while reading primary source material relating to piratical events. The course follows the long history of the Mediterranean as a contested, yet central space, and tracks how the sea was used, not just as a
resource, but as an opportunity for predation and personal advancement. The main questions will be: what is a pirate, and who has the power to apply that label to others.

HIST.3880 Ancient Mediterranean: Cultures in Contact (Formerly 43.388) - Credits: 3
The ancient Mediterranean was home to a diverse array of cultures in close contact with each other through trade, warfare, and colonization. This course will study a variety of Greco-Roman responses to other cultures through a series of case studies of contact between Greeks, Romans, and other cultures of the ancient world. In particular, we will examine questions of the applicability of modern concepts such as race and ethnicity, and explore the ways in which these shifting representations of other cultures are reflective of the ways in which Greeks and Romans perceived themselves. We will also reflect on the ways in which these ancient Greco-Roman conceptions of culture relate to our own modern understandings of cultural difference.

HIST.3885 Law in the Ancient Greek World - Credits: 3
This course will examine the body of evidence for law in the ancient Greek world as a means of understanding the legal, political, and social history of the Greek poleis. In particular we will focus our attention on the large corpus of forensic speeches form Classical Athens with an eye to understanding the ways in which the Athenian city governed itself and resolved conflict within the poleis. Due to the nature of these speeches and the evidence for Greek legal practices, we will also be examining various aspects of Greek social and economic history within a legal context, including gender, slavery, property law, and citizenship.

HIST.3890 Ancient History in Film (Formerly 43.389) - Credits: 3
Ancient History in Film seeks understand the interconnection between ancient texts, social history and pop culture in American cinema. This course is more than an excuse to watch fun films and gain academic credit. It will engage the primary texts that are the foundation for these cinematic creations while investigating the social and cultural influences that shaped the making of these movies. Ultimately, this course will provide a clearer view of our own world through the lens of moviemakers mimicking the Greco-Roman world. We will read primary texts in translation, modern analyses of these movies and you are responsible to watch an entire film between class sessions. All films are on reserve in the Media Center of the O’Leary Library.

HIST.3900 Topics in History (Formerly 43.390) - Credits: 3
An advanced course of study and examination of a variety of issues and topics in history. Students without a sufficient background in history courses should not attempt this course. Subject matter to be announced in advance.

HIST.3901 Topics in History of the Portuguese World - Credits: 3
An advanced course that will cover various topics in the history of the Portuguese-speaking world, including medieval, early modern, and contemporary history in Portugal, Brazil, and other areas of the Lusophone world. The specific focus of each iteration will be announced in advance. Offered irregularly.

HIST.3910 America and the World (Formerly 43.391) - Credits: 3
In an age of increasing globalization, historians realize the need for putting the American national narrative in a wider historical context. This course will help students locate the study of the United States in a global, comparative and transnational perspective. This course will be used as one of the courses needed by History majors in the global, comparative and under-represented areas of the major.

HIST.3920 United States Immigration History (Formerly 43.392) - Credits: 3
The course focuses on the experiences of women, men, and children who came to the U.S. from the colonial era through the 21st century. Their emigrations will be examined in a global context. Irish migration, the mass European migrations during the mid and late 19th / early 20th centuries, and post-Second World War immigration particularly from Asian and African countries are discussed. The Lawrence, Lowell, and Boston immigration stories are also considered.

HIST.3930 History of the Middle East and Islamic World (Formerly 43.393) - Credits: 3
This course examines the history of the Middle East and the Islamic World from the time of Muhammad to the present. It provides an introduction to the history of this often turbulent region. It exposes students to the processes and patterns that have shaped the history of the Islamic World. The course examines the historical roots of the many challenges that the region faces today.

HIST.3931 Empire and Resistance in the Modern Middle East - Credits: 3
This course explores the role of empires in the Middle East from the 18th through the first half of the 20th century. During this period various forms of imperial rule defined the region’s governance—from Ottoman rule to the British occupation of Egypt in the late 19th century to British and French mandate states in much of the region post World War I. The course will emphasize comparative approaches to understanding how these empires shaped the region. We will examine how these various forms of empire were engaged by local populations, from elites to peasants, and how their histories impacted the independent nation-states that succeeded them.

HIST.3932 Environmental History of Middle East & North Africa - Credits: 3

This course examines the history of the Middle East and North Africa from an environmental angle. We will think about how a focus on environmental factors enables alternative perspectives on colonialism, nationalism, capitalism, gender and sexuality, empire, race, and class. What are some of the benefits of these interpretations? Are there also drawbacks? We will also consider what it means to talk about the impacts of climate change in the region when thinking historically.

HIST.3940 Immigration and Assimilation in Contemporary Europe - Credits: 3

This course examines contemporary European dilemmas of immigration, assimilation and multiculturalism, within the context of the larger history of European imperial decline after 1945. It will aim at providing fuller historical understanding of Europe’s ongoing crises of integration, while also exploring the textures of individual and community life among those of immigrant descent within contemporary Europe. For purposes of focus and continuity, greatest attention will be dedicated to South Asian, Turkish, and North African communities in Britain, Germany and France, respectively.

HIST.3960 Alcohol In American History (Formerly 43.396) - Credits: 3

This course uses the production, distribution, consumption, and prohibition of alcoholic drinks as a lens for studying cultural, political, and economic change in American life from the colonial era to the present.

HIST.4010 History Writing and Community (Formerly 43.401) - Credits: 3

Restricted to upper-level students and available only with permission of the instructor, this course offers a select number of students the opportunity to work for non-profit and governmental organizations within Lowell. Such organizations might include the National Park Service; Community Teamwork Inc.; Girls Club of Lowell; St. Athanasius Church; American Textile History Museum, and so forth. The course is primarily intended for History majors. Students will utilize their skills in research, writing, and analysis to assist an organization with its documented needs (e.g., conduct research on history of the organization; write a pamphlet or short article; organize oral history interviews; analyze the urban context in which the organization has developed). Students receive academic credit, along with invaluable work-related experience.

HIST.4100 Olympic Games and World’s Fairs (Formerly 43.410) - Credits: 3

The course studies Olympic Games and World’s Fairs from the mid-nineteenth century to the present. We examine how these international festivals participate in and contribute to six themes in the history of that period: nationalism and internationalism, mechanization of industry, modern architecture and urban planning, consumer culture, racial politics, and the Cold War. Students write brief papers connection these themes and one or more game or fair and a research paper on a relevant topic. Special attention is given to certain icons, like the Crystal Palace, the Eiffel Tower, the Nazi Olympics, and the Mexico City games.

HIST.4320 Research Seminar (Formerly 43.432) - Credits: 3

Systematic research in primary and secondary sources culminating in the writing of an original research paper using proper methodological and stylistic techniques. Weekly meetings and written and oral progress reports. Students must be acquainted with word-processing techniques. Required of all History majors. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL), Critical Thinking &Problem Solving (CTPS), and Written &Oral Communication (WOC).

HIST.4430 'Foreigners' of the Middle East (Formerly 43.443) - Credits: 3

This class focuses on how societies organize difference, looking at the relationships between national, ethnic, religious, racial, gender and/or socio-economic affiliations in creating and concretizing foreignness and minorities in the Arab Middle East and today’s Turkey and Iran during the late Ottoman and colonial eras. This class includes engagement with historical sources, movies, memoirs and more, and requires several short papers and one longer term paper and presentation.

HIST.4910 Directed Study (Formerly 43.491/591) - Credits: 1-4

GRADUATE – ALL COLLEGES

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UNDERGRADUATE / COLLEGE OF FINE ARTS, HUMANITIES AND SOCIAL SCIENCES

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Directed study offers the student the opportunity to engage in an independent study or research project under the supervision of a department member. Working closely with the instructor, students define and investigate a research topic in an area of special interest and present the results of their investigation in a significant paper. Juniors and seniors only.

HIST.4960 Practicum (Formerly 43.496) - Credits: 3
A program of on-campus and off-campus experiences for history majors only. Specific requirements vary depending upon the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural, or artistic area and for applying techniques of problem solving and/or skills that are appropriate to the student's major discipline. May be repeated for a maximum of nine credits. Students are graded 'satisfactory' or 'unsatisfactory.' The practicum experience may not be substituted for a required course in the major.

HIST.4970 Tsongas Center Field Practice (Formerly 43.497) - Credits: 3
This 3-credit hour course will be an addition to the History Department's other 400-level courses. Currently, students enrolled in the "Research Seminar" conduct primary original research and present that research in one or another format. Those in the "Directed Study" work with assigned faculty on the historiographic breadth of a particular topic, reading selected books, writing response papers, and meeting for weekly discussions. Additionally, the existing "Practicum" allows students to earn course credit for hands-on classroom and history museum projects. The "Tsongas Center Practicum" will combine elements of all three, and make it possible to identify the specific Tsongas Center focus as such on student transcripts.
HONR.1100 First Year Seminar in Honors: Text in the City (Formerly HON 110) - Credits: 3

The First Year Seminar in Honors (FYSH) uses Lowell as its text. Rich in history and culture, and the students’ home for the next four years, the City of Lowell offers a perfect topic to promote connections while learning how to view the city through the lens of the Humanities. Students will develop library research skills, including facility with primary and secondary sources, and an appreciation for the narratives that lie in buildings, objects, and what people leave behind. Activities include field trips, readings, writing, and an artistic interpretation. As important, students will have the opportunity to form strong connections to each other, to the faculty, and to the community. Note: New course, but combination of current 59.102 and 59.103 in one semester.

HONR.2001 Honors College: Student Fellowship - Credits: 0

Honors College Student Fellowship is a grant given to a Commonwealth Honors student for pre-approved scholarly engagement that is overseen and guided by a mentor. Fellowships are awarded for research, creativity, theme-based reading, author-based reading, community engagement, curating, or entrepreneurial projects. Each fellowship must have a reading component, a writing component and a speaking component.

HONR.2002 Honors College: Community Engage/Impactful Experience - Credits: 0

Honors College Community Engagement experience allows students to engage in structured community service. Students will collaborate with a community non-profit partner and work with them over the course of a year (two academic semesters) and is conducted under the mentorship of someone within the non-profit organization as well as a representative from the Honors College. Students will be required to read articles/texts appropriate to their Community Engagement experience and conduct a presentation at the completion. Each Community Engagement must have a reading, writing and speaking component.

HONR.2003 Honors College: Reading Symposium - Credits: 0

Honors College Reading Symposium consists of two one-semester sessions. Each session has three one-month long units of study, a written essay and a public presentation. A unit of study is defined by a faculty facilitator and consists of: reading, watching, and/or listening to books, articles, plays and/or films; completing pre-discussion assignments; submitting a unit reading notebook. Attending and participating in mandatory faculty-led discussion. Student must prepare and execute a 20-30 minute public presentation.

HONR.3100 Honors Thesis Project Workshop (Formerly 59.258 and HON 310) - Credits: 3

This course is designed to promote the application of interdisciplinary perspectives to problems, issues, concepts, and creations, as well as an appreciation of the research methods that characterize a broad range of disciplines. It is a writing intensive class with active participation requirements to enhance students’ oral and written expository communication skills in preparation for the Honors Thesis/Project. Students complete the CITI module on research ethics and discuss the role of the University Office for Compliance/IRB.

HONR.3200 Seminar: Special Topics in Honors (Formerly HON 320) - Credits: 3

Seminar: Special Topics in Honors offers students the opportunity to engage in depth with a subject that is of special interest in an Honors-level seminar. The course will address an inquiry-based topic that spans or falls outside the boundaries of any individual major on campus, but integrates methodology, content, and/or approaches from two or more.

HONR.3300 Seminar: Special Topic in Honors (Arts & Humanities Perspective) - Credits: 3

Seminar: Special Topics in Honors offers students the opportunity to engage in depth with a subject that is of special interest in an Honors-level seminar. The course will address an inquiry-based topic that spans or falls outside the boundaries of any individual major on campus, but integrates methodology, content, and/or approaches from two or more.

HONR.3400 Seminar: Special Topic in Honors (Social Science Perspective) - Credits: 3

Seminar: Special Topics in Honors offers students the opportunity to engage in depth with a subject that is of special interest in an Honors-level seminar. The course will address an inquiry-based topic that spans or falls outside the boundaries of any individual major on campus, but integrates methodology, content, and/or approaches from two or more.

HONR.3500 Seminar: Special Topic in Honors (STEM Perspective) - Credits: 3

Seminar: Special Topics in Honors offers students the opportunity to engage in depth with a subject that is of special interest in an Honors-level seminar. The course will address an inquiry-based topic that spans or falls outside the boundaries of any individual major on campus, but integrates
methodology, content, and/or approaches from two or more.

HONR.4900 Honors Thesis Research (Formerly HON 490) - Credits: 0

This zero credit course is designed to facilitate tracking of Honors students’ thesis progress. During the first semester of a two semester (6 credit) project, students will register for the appropriate 301 section in their department as well as HONR.4900, for which the Honors College components are required. These components include a timely and complete thesis proposal as well as an end-of-the-semester progress report, both of which are to be signed by the faculty advisor and committee member and submitted for approval to the Honors Director.

HONR.4910 Honors Thesis Project Research (Formerly HON 491) - Credits: 0

Honors students in their first semester of work towards the required Honors thesis or project enroll in this course to gain access to the Blackboard and Digication tools used to track their progress and archive their achievements. Requirements for Honors Projects and Theses include the on-time completion of a thesis/project proposal approved by the faculty mentor, committee member, and Honors Dean and development and maintenance of an ePortfolio in which the work is presented both in progress and as a finished, written product. Honors projects and theses conclude with the public presentation of the work and submission of an archivable document and completion paperwork. Honors students sign up for this course in addition to and simultaneously with the credit-bearing course used to satisfy their H7 requirement (or their H8 in the case of 3-credit Honors Projects).

HONR.4992 Honors College Directed Study - Credits: 0-3

Honor’s College Directed Study. "Variable credit course, student chooses appropriate amount of credits when registering."
LGST.1030 Introduction to Paralegal Studies (Formerly 41.103) - Credits: 3

This course familiarizes students with the role of paralegals in both the public and private sector. Other topics include principles of jurisprudence and basic legal concepts and terminology.

LGST.2100 Restorative Justice (Formerly PCS.205/41.210) - Credits: 3

This course will introduce students to the fundamental principles and practices of restorative justice as a method of building positive peace. Students develop a working knowledge of the general theories of restorative justice, as well as practical hands-on experience with peacemaking techniques. Traditional assumptions about justice and the adversarial legal process will be explored and challenged. The relationship between restorative justice, restorative practices, and other conflict resolution methods such as mediation will be discussed. Practical challenges in implementing restorative justice on the ground will also be examined.

LGST.2340 Criminal Law (Formerly 41.234) - Credits: 3

This course studies substantive criminal law, with emphasis on general principles of criminal culpability, such as the act requirement, the mens rea requirement, and causation. Topics include detailed coverage of the elements of personal and property crimes, such as homicide, rape, assault, battery, robbery, burglary, theft, arson, and fraud. The course will also cover the law of attempted crimes, accomplice liability, and defenses.

LGST.2500 Disability and the Law: Legal Rights of People with Disabilities (Formerly 41.250) - Credits: 3

This course examines the history and progress of the disability rights movement in America, the current state of the law, trends, and prospects for the future, with particular focus on those laws designed specifically to address the needs of people with disabilities.

LGST.2610 Introduction to Legal Concepts (Formerly 41.261) - Credits: 3

This course serves as an introductory legal course. It is a survey of many specific topics, such as constitutional law, contracts, intellectual property law, and current legal topics of interest. More importantly, the course emphasizes critical legal thinking, legal ethics, and human values.

LGST.2620 Introduction to Business Law (Formerly 41.262) - Credits: 3

This course introduces students to the fundamentals of business law. The main emphasis is on key aspects of contract law, including the agreement, consideration, writings, third-party rights, illegality, performance, breach, defenses, and remedies. The course also covers agency law, employment law, sections of the Uniform Commercial Code, and a variety of other legal issues and topics that influence and intersect with modern business practices. This course is highly recommended for pre-law students, CPA students, and paralegal students.

LGST.2870 Legal Writing (Formerly 41.287) - Credits: 3

This course trains students to produce effective legal work product as drafters of client letters, memoranda of law, pleadings, briefs, and other legal documents.

LGST.3600 Legal Issues in Racism (Formerly 41.360) - Credits: 3

This course presents a study of racial discrimination in the United States. Emphasis is placed on relevant constitutional provisions, statutory provisions, and on United States Supreme Court cases.

LGST.3630 Corporate and Property Law (Formerly 41.363) - Credits: 3

This course studies the law pertaining to business entities and structures. Partnerships, limited partnerships, and joint ventures are studied at the outset of the course. The main emphasis is on elements of the corporate structure. The last part of the course deals with personal and real property with coverage of wills and trusts. This course is highly recommended for pre-law students, CPA students, and paralegal students.

LGST.3650 The Legal Environment of Business (Formerly 41.365) - Credits: 3

This class explores the intersection of business and the law in modern American society. This class builds on the concepts covered in Business Law and explores current legal topics that affect doing business in the United States and abroad. Topics covered may include the U.S. Constitution and the courts system, white collar crime, cyber law, the laws of intellectual property, international trade, consumer protection, bankruptcy, product liability, administrative law, and labor and employment law, amongst others.
LGST.3660 International Law (Formerly 41.366) - Credits: 3
This course provides a broad introduction to international law with emphasis on current issues. Within public international law, topics covered will include the recognition of new states, organizations such as the United Nations and the European Union, the use of force, human rights, international crimes, the global environment, and international courts and tribunals. Within private international law, topics surveyed will include legal aspects of international trade and foreign investment, labor, intellectual property, cyber theft, and taxation. Current issues discussed will include global warming, recent corruption scandals, the Eurozone crisis, and legal issues facing global technology companies.

LGST.3670 Environmental Law (Formerly 41.367) - Credits: 3
This course examines the legal and administrative problems of protecting the quality of the human environment. Federal and state legislation on environmental policy is studied. Public interest litigation as a supplement to the enforcement of environmental law is discussed. The course also focuses on the practical problems of balancing the needs of business, the global competitiveness of the United States, the increasing demand for natural resources, and the need to protect, preserve, and restore the environment. The importance of sustainable development and environmental ethics are discussed.

LGST.3700 Real Estate Law (Formerly 41.370) - Credits: 3
This course examines contracts for the sale of real estate, deeds, title examinations, security for real estate transactions, methods and problems of co-ownership, zoning ordinances, brokerage contracts, leases and landlord, and tenant rights and liabilities.

LGST.3720 Sports, Entertainment and Art Law (Formerly 41.372) - Credits: 3
This course challenges students to engage in analytic reading, critical thinking and problem solving related to the legal issues facing the sports, entertainment and art worlds. Topics may include contracts, intellectual property rights, employment law, labor law, and other areas of interest.

LGST.3760 Family Law (Formerly 41.376) - Credits: 3
This course studies the critical family law issues facing society today. Subject matter examined may include the law of marriage, custody, adoption, divorce, child support, juveniles, right to die, fetal tissue transfer to prolong the life of another, reproduction control, and surrogate parenting. This course is taught from a legal and human values perspective.

LGST.3770 Elder Law (Formerly 41.377) - Credits: 3
This course introduces students to the major architectural components of the legal environment of the elderly, including Medicare, Medicaid, SSI, pensions, nursing homes, assisted living, estate management, and related issues.

LGST.3780 Comparative European Community Law (Formerly 41.378) - Credits: 3
This course deals with the relationship between European Community law and the law of the United States; the operation and impact of community law in the United States; and the role of the European courts in interpreting community law. International treaties, laws, and regulations affecting the free movement of people, goods, and services are traced.

LGST.3790 The Relationship of Law, Logic, and Ethics (Formerly 41.379) - Credits: 3
This course examines the impact of ethical viewpoints on the structure of legal doctrines. It stresses the fact that the study of law is a study of ethics as well as logic.

LGST.3810 Women and the Law (Formerly 41.381) - Credits: 3
This course presents legal issues that often or particularly affect women. Topics may include sex discrimination, sexual harassment, rape, marriage, divorce, reproductive control, surrogate motherhood, and custody.

LGST.3850 Immigration Law (Formerly 41.385) - Credits: 3
Studies the immigration, nationality, and naturalization laws of the United States. The topics discussed are: the immigrant selection system, the issuance of immigrant and nonimmigrant visas; grounds of excludability of aliens and waiver of excludability; grounds for deportation of aliens and relief from deportation; and change of status within the United States including legalization, refugee, and asylum status.

LGST.3860 Intellectual Property (Formerly 41.386) - Credits: 3
This course surveys the law of the protection of ideas, trade secrets, inventions, artistic creations, and reputation. The course will briefly review the law of patent, trademark, copyright, trade secret, and geographical indication. The course
will cover the distinction between the various forms of intellectual property, and the statutory and common law methods of enforcing rights.

LGST.3870 Legal Research Methods (Formerly 41.387) - Credits: 3
This course introduces students to the fundamentals of legal research and writing. Students will gain hands-on experience in legal research and in the reporting of such research in written assignments, case briefs, and memoranda.

LGST.3880 Directed Study: Law (Formerly 41.388) - Credits: 3
This course permits students to engage in specialized study under the supervision of faculty.

LGST.3900 Litigation (Formerly 41.390) - Credits: 3
This course examines the practices and procedures involved in the litigation process. Topics may include: legal research, courts and jurisdictions, evidence and discovery, pleadings, motions, depositions, trials and appeals, and federal rules of procedure.

LGST.3920 Wills, Trusts and Estates (Formerly 41.392) - Credits: 3
This course provides an introduction to the law of wills, trusts, and estates. This course covers the fundamental legal concepts and vocabulary necessary to understand, draft, and work with the core estate planning tools. Practical examples and sample legal cases and materials will be provided and discussed. No prior legal knowledge is required, though some familiarity with the United States legal system or case law will be helpful.

LGST.4800 Bankruptcy, Debtor & Creditor Law - Credits: 3
The purpose of this course is to introduce the student to U.S. Bankruptcy laws and their place in providing a safety net for both individuals and business as well as an orderly, consistent and predictable method for dealing with income, debts and assets for insolvent, such system being necessary for the proper functioning of an economy. The topics include the evolution of the laws, provisions common to all Bankruptcy petitions, and proceedings under the most common chapters. Students will study and apply the most commonly used consumer chapters of the United States Bankruptcy Code (7 &13).

LGST.4880 Directed Study in Law (Formerly 41.488) - Credits: 1-6
This course permits students to engage in specialized study under the supervision of faculty.

LGST.4890 Seminar in Law (Formerly 41.489) - Credits: 3
The course provides opportunity for small groups of advanced students to study selected legal topics.

LGST.4900 Legal Aspects of Cyberspace (Formerly 41.490) - Credits: 3
This course introduces students to the law of the Internet and regulation of lawful and unlawful computer activities. Traditional notions about privacy, defamation, contracts, freedom of expression, pornography, stalking, jurisdiction and intellectual property are challenged by the latest cyberspace technology. Much of the debate about control, which leads to questions about rights and responsibilities, centers around who, if anyone, should design the legal architecture of cyberspace. These and other topical subjects serve as the focus on the study of legal issues in cyberspace.

LGST.4970 Legal Studies Practicum (Formerly 41.497) - Credits: 3
This course consists of assigned fieldwork under the supervision and with the permission of the coordinator. The course is designed to broaden the educational experience of legal studies students by providing exposure to selected legal environments such as corporate legal departments, financial institutions, law firms, real estate departments, banks and government offices and agencies. This provides a correlation of theoretical knowledge with practical experience in an area of interest to students.
College of Fine Arts, Humanities & Social Sciences

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A student's catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

American Studies

- General Option
  - fall 2015 and beyond
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  - fall 2015 - spring 2016
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Thematic Option
  - fall 2016 and beyond
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  - fall 2016 - spring 2017
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  - fall 2015 - spring 2016
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Art

- Animation & Interactive Media Concentration
  - fall 2017 and beyond
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Graphic Design Concentration
  - fall 2015 - spring 2020
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Studio Art Concentration
  - fall 2020 and beyond
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Composition for New Media

- fall 2017 and beyond
- fall 2017 - spring 2022

Criminal Justice

- General Option
  - fall 2017 and beyond
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  - fall 2016 - spring 2017
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  - fall 2015 - spring 2016
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Corrections Option
  - fall 2016 and beyond
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  - fall 2015 - spring 2016
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  - fall 2012 - spring 2015
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Police Option
  - fall 2022 and beyond
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  - fall 2016 - spring 2017
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  - fall 2015 - spring 2016
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Homeland Security Option
  - fall 2022 and beyond
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  - fall 2016 - spring 2017
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  - fall 2015 - spring 2016
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Violence Option
  - fall 2016 and beyond
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  - fall 2016 - spring 2017
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  - fall 2015 - spring 2016
    (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Crime and Mental Health Option

(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
Digital Media

- fall 2021 and beyond

Economics

- fall 2015 and beyond

English

- Literature Concentration
  fall 2021 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2021
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Journalism & Professional Writing Concentration
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2010 - spring 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Creative Writing Concentration
  fall 2018 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2013 - spring 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Theatre Arts Concentration
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2010 - spring 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Graphic Design

- fall 2021 and beyond
- fall 2020 - spring 2021
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

History

- fall 2020 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Liberal Arts

- fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Music Studies

- General Option fall 2022 and beyond
  fall 2018 - spring 2022
- Instrumental Option fall 2015 - spring 2018
  prior to fall 2015
- Voice Option fall 2015 - spring 2018
  prior to fall 2015

Music Performance

- Instrumental Option fall 2022 and beyond
  fall 2019 - spring 2022
  fall 2015 - spring 2019
  prior to fall 2015
- Voice Option fall 2022 and beyond
  fall 2019 - spring 2022
  fall 2015 - spring 2019
  prior to fall 2015

Music Business

- fall 2022 and beyond
- fall 2015 - spring 2022
- prior to fall 2015

Peace and Conflict Studies

- fall 2021 and beyond
- fall 2015 - spring 2021
Academic Catalog 2021 - 2022 / Liberal Arts - General Information

Philosophy

- General Option
  - fall 2015 and beyond

- Communications & Critical Thinking Option
  - fall 2015 and beyond

- Philosophy & Religious Studies Option
  - fall 2015 and beyond

Political Science

- American Politics Concentration fall 2020 and beyond
- International Relations and Comparative Politics Concentration fall 2020 and beyond
- Law and Politics Concentration fall 2020 and beyond
- Political Communication and Public Opinion Concentration fall 2020 and beyond
- Sustainability and Environmental Politics Concentration fall 2022 and beyond

Political Science (prior to fall 2020)

- fall 2015 - spring 2020
- fall 2013 - spring 2015

Psychology

- General Concentration
  - fall 2022 and beyond

- Behavior Analysis Concentration
  - fall 2022 and beyond

- Community Social Psychology Concentration
  - fall 2022 and beyond

- Clinical Psychology Concentration
  - fall 2022 and beyond

- Developmental Disabilities Concentration
  - fall 2022 and beyond

- Health Psychology Concentration
  - fall 2022 and beyond

Quantitative Economics

- fall 2022 and beyond

Sociology

- General Concentration fall 2016 and beyond
- Policy & Social Problems Concentration fall 2021 and
Sample Degree Pathway for Digital Media

For students who entered fall 2021 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>DGMD.1100</td>
<td>Introduction to Digital Media Production</td>
<td>3</td>
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Spring Semester

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<tbody>
<tr>
<td>ARTS.2610</td>
<td>Photography I</td>
<td>3</td>
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<tr>
<td>DGMD.1210</td>
<td>Introduction to Audio Production</td>
<td>3</td>
</tr>
<tr>
<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
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<tr>
<td>WLxxx.xxx</td>
<td>Language 2 &amp;Culture2</td>
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Total: 16

Sophomore Year

Fall Semester

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<tbody>
<tr>
<td>DGMD.2310</td>
<td>Media, Law and Ethics</td>
<td>3</td>
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<tr>
<td>DGMD.2510</td>
<td>Video Production for Digital Media</td>
<td>3</td>
</tr>
<tr>
<td>ARHI.xxx</td>
<td>Media Culture &amp;History I</td>
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Total: 9
### Senior Year

#### Fall Semester

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<tr>
<td>DGMD.4750</td>
<td>Internship in Digital Media</td>
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<tr>
<td>xxxxx.xxxx</td>
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<td>xxxxx.xxxx</td>
<td>Concentration Elective</td>
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<td>xxxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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#### Spring Semester

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<th>Cr.</th>
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<tbody>
<tr>
<td>DGMD.xxxx</td>
<td>Digital Media Capstone</td>
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<td>xxxxx.xxxx</td>
<td>Free Elective</td>
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<td>xxxxx.xxxx</td>
<td>Free Elective</td>
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### Junior Year

#### Fall Semester

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<th>Cr.</th>
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<tr>
<td>DGMD.3400</td>
<td>Lighting Principles</td>
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<tr>
<td>xxxxx.xxxx</td>
<td>World Ready Elective or Free Elective2</td>
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<tr>
<td>xxxxx.xxxx</td>
<td>Concentration Elective</td>
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<tr>
<td>xxxxx.xxxx</td>
<td>Concentration Elective</td>
<td>3</td>
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<tr>
<td>xxxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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<td>Total</td>
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#### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>xxxxx.xxxx</td>
<td>Concentration Elective</td>
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</tr>
<tr>
<td>xxxxx.xxxx</td>
<td>Concentration Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxxx.xxxx</td>
<td>Concentration Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
</tr>
<tr>
<td>xxxxx.xxxx</td>
<td>STEM Persp. (STEM)</td>
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</tbody>
</table>

### Total Minimum Credits = 120

**Minimum Digital Media Credits: 36**

**Maximum Digital Media Credits That Can Be Counted Toward Graduation: 54**

1. Required for entering Freshmen.

2. World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) in the undergraduate catalog.

### Additional Requirements

- Students must take 36 credits within the Digital Media major with at least 15 credits at the 3000 or 4000 level. Students may take all courses within the designation
DGMD if they choose.

- Students may not take more than two (2) courses from a single department outside of Digital Media to fulfill the major credit hours requirements.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SiS. If you need assistance, please contact your advisor.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

Last updated: 11/04/2021

BLA Concentration in Criminal Justice

The BLA concentration in Criminal Justice offers students a grounding in both criminological theory and the operation of the criminal justice system. The concentration pairs well with other concentrations in the social sciences such as Psychology, Sociology, Political Science, and Legal Studies. The concentration also appeals to students seeking an interdisciplinary approach to studying criminal justice alongside areas ranging from health to education to gender studies to history, which can prepare them for a variety of possible careers in emerging fields, particularly in public service.

Required Courses (9 credits)

- CRIM.1010
- CRIM.2010
- CRIM.2210

Electives (9 credits)

- Any 3 Criminal Justice courses at the 3000-4000 level

For more information, please contact the BLA program coordinator.
FAHS.1400 College Exploration Seminar - Credits: 1
College Exploration Seminar is designed to: Guide rising high school Seniors through the process of exploring and researching academic majors and/or future careers that match their strengths, interests, personality, skills, and values; Introduce students to various research tools for exploring and comparing colleges; Provide an overview of the college application process (with guest speakers from both Admissions and Financial Aid) with an emphasis on best practices; Orient students to the concept of college (with an emphasis on the terminology used in higher education, the differences between high school and college, study skills & time management strategies for a successful first year, and available college resources); Provide an overview of available majors within specific categories (Arts & Humanities, Business, Education, Health, Social Sciences, STEM); Teach students to utilize different decision-making strategies regarding career choice, and to set realistic goals.

FAHS.1010 Values and Creative Thinking (formerly 59.101) - Credits: 3
Values and Creative Thinking is a course designed specifically for freshmen. Throughout the semester you will be asked to examine your personal value system and how it relates to your education. The purpose of this course is to help you identify those individual qualities that you can use to achieve your highest academic potential. Specifically, this course is intended to help you develop greater self-awareness and confidence; creative and critical thinking skills; career planning skills designed to help you understand the full spectrum of available careers; an understanding of different computer technologies and multimedia techniques; an awareness of the role of values in determining your experiences and perspectives; problem solving and group decision making skills relating to issues that affect the quality of your life.

FAHS.1090 First Year Experience Seminar (Formerly 59.109) - Credits: 1
The First-Year Seminar is designed to help first year students get their college careers off to a good start. Students will be provided with an introduction to key concepts that will help them succeed as university students, including: information literacy and technology, strategies for transition to college and success, time management, healthy and safe life-styles, financial management, and an introduction to on-campus resources, such as those provided by Career Services, the Centers for Learning, and other campus programs. Seminars are arranged by students’ program of study.

FAHS.1150 Lowell as Text - Credits: 3
First year seminar for students interested in exploring Lowell, past and present, and using the city to investigate various other issues beyond local.

FAHS.1400 College Exploration Seminar - Credits: 1

ASAM.2120 Introduction to Asian American Studies - Credits: 3
This course provides students with an overview of the multidisciplinary field of Asian American Studies from two distinct disciplines. The course begins with the history of Asian American Studies and the methods used to advance the field. Next, various aspects of the Asian American experience, such as gender and sexuality, are examined. Students also participate in service learning in partnership with Asian-serving community organizations in and around Lowell, MA. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

FAHS.1090 First Year Experience Seminar (Formerly 59.109) - Credits: 1

FAHS.1500 Major Exploration Seminar - Credits: 1
Major Exploration Seminar is designed to guide First and Second Year students through the process of exploring and researching college majors and careers that match their strengths, interests, personality, skills, and values. Each week we learn about a specific major, and faculty guest speakers representing that major often join us to provide insight into possible career paths. We also utilize a variety of approaches including self-assessment, online research, interest inventories, and informational interviews, so that each student begins to develop a clear picture of majors and careers that are potentially realistic and rewarding to them.

FAHS.1600 Career Exploration Seminar - Credits: 1
Career Exploration Seminar II allows students to further explore their fields of interest in a hands-on experiential way through required externship experience. With coaching from the course instructor, each student will: 1) identify two people (working in a field of interest to them) that the would like to job-shadow. 2) request, schedule, and attend the shadowing experiences. 3) provide an extensive overview of the fields and/or occupations they explored to the class. Each student will spend a total of 14 hours throughout the semester shadowing two different people who work in a role or setting that they are potentially interested in. It is suggested that students complete these hours in two 7-hour increments (a 7-hour day with one employer, and a 7-hour day with the other).

FAHS.2000 Job Search Seminar - Credits: 1
The Job Search Seminar is designed to provide students with the necessary structure, resources, and support to facilitate their career development and the pursuit of career goals. Through a variety of interactive teaching methodologies and assignments, students will participate in a sequence of learning activities including self-assessment, career exploration, and the job search process. The latter will include resume and cover
letter writing, the online search, professional networking, and strategic interviewing. The goal of the course is to assist each student in developing a sound plan of action in pursuing their career objectives.

**FAHS.2010 Innovation Project - Credits: 1**

This one credit course is designed to award academic credit for students who are engaged in a project associated with any of the Difference Maker competitions. In the College of Fine Arts, Humanities and Social Sciences, the annual Creative Venture Competition engages students in a project that creates a new product, program or service that addresses a societal need. Credit is awarded upon completion of all requirements of the competition. Since there is no in class requirement, and each project is different, a Project Description, rather than a syllabus is submitted.

**FAHS.2130 Foundations in Liberal Studies (Formerly 59.213) - Credits: 3**

Foundations of Liberal Studies is a required course for all BLA majors. This course examines the value and importance of drawing on several academic disciplines to understand issues that are too complex to be addressed effectively using any single discipline. Using a case study approach, we will examine how the elements of various disciplines can be integrated and synthesized to understand and give voice to complex issues dealing with health, environment, governance, peace and conflict, etc. Upon completing the course, students will be able to view the courses in their tow BLA concentrations from an interdisciplinary perspective by observing elements of each discipline can contribute to the understanding of global problems. These skills will be applied in the BLA Capstone Course.

**FAHS.2200 Designing the Future World (Formerly 57.220) - Credits: 3**

All purposeful human activity involves design. Every day we are surrounded by the products of design processes—buildings, cars, entertainment, corporations, schools, even laws and regulations. They make our lives easier in many ways, but they may also create significant social and environmental problems. In the past, designers often did not consider the impact of their designs on society, or ignored the negative consequences. Our culture and legal system usually permitted, or even encouraged, this irresponsibility. Today, a small group of scholars, businessmen and women, and activists are rethinking how we design the things around us, with the goal of addressing the most pressing social and environmental issues. This class will introduce students to some of these issues, the people who are confronting them, and the ways in which all of us can contribute to designing a better Future World. With a series of hands on projects, coupled with readings and other resources, students will work to design aspects of the future. In the process you will learn about possible solutions to complex, important problems, but also learn valuable life skills such as problem framing, problem solving, critical thinking, active learning, communication, and simple construction methods. No previous experience is required-only curiosity and eagerness to learn.

**FAHS.3600 Creative Community Workshop (AH) - Credits: 1-3**

This course seeks to motivate and guide students toward the improvement of their community in a measurable, actionable, and continuable manner. The course encourages creativity and promotes serviceable thinking, from concept to delivery. Students will be expected to work in a team structure to solve problems, process information, explore and pursue entrepreneurial opportunities, make decisions, communicate verbally within their team and being able to present their ideas to external audiences. The course satisfies Arts and Humanities Perspective (AH).

**FAHS.3601 Creative Community Workshop (SS) - Credits: 1-3**

This course seeks to motivate and guide students toward the improvement of their community in a measurable, actionable, and continuable manner. The course encourages creativity and promotes serviceable thinking, from concept to delivery. Students will be expected to work in a team structure to solve problems, process information, explore and pursue entrepreneurial opportunities, make decisions, communicate verbally within their team and being able to present their ideas to external audiences. The course satisfies Social Sciences Perspective (SS).

**FAHS.3700 Washington Center Term (Formerly 59.370) - Credits: 1-12**

**FAHS.3960 Environmental Studies Practicum (Formerly 59.396) - Credits: 1-6**

This course is the service learning capstone for the Environmental Studies Minor (soon to be created, after approval of this course). It emphasizes the cross-disciplinary examination of contemporary environmental issues, starting from the premise that they are multi-dimensional - biophysical, cultural, economic, ethical, historical, technical, etc. It requires only a few class meetings and otherwise involves students in work with local and regional environmental agencies and organizations. This service work is meant to encourage students to make connections between theory and practice, as well as to expand the conceptual and practical tool kit they need to understand environmental controversies and work toward sustainability.
FAHS.4130 BLA Capstone (Formerly 59.413) -
Credits: 3
Student enrolled in the BLA program complete the BLA Capstone course during their senior year. This course features a semester-long interdisciplinary project, using knowledge gained from the students’ two BLA concentrations, as well as any minors, as applicable. Students enrolled on-campus may choose to complete an original research study, creative art project (i.e., writing, film, music, drawing, etc.), or a problem-focused community action project. Online students choose to do either an original research project or a creative art project. Projects are completed in consultation with the instructor of the BLA Capstone course.

FAHS.4910 Directed Studies - Intercollegiate FAHSS
(Formerly 59.491) - Credits: 0-3
Directed Studies - Intercollegiate FAHSS. "Variable credit course, student chooses appropriate amount of credits when registering."

FAHS.4960 Directed Study in Peer Tutoring
(Formerly 59.496) - Credits: 1-9
FAHS.4970 Directed Studies: Environment and Society - Credits: 3
An individual supervised research project relative to issues of the environment and society. Thematic or methodological issues must result in a significant research paper.
College of Fine Arts, Humanities & Social Sciences

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A students catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

American Studies

- General Option
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2012 - spring 2015

- Thematic Option
  fall 2021 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Art

- Animation & Interactive Media Concentration
  fall 2017 and beyond

- Graphic Design Concentration
  fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Studio Art Concentration
  fall 2022 and beyond
  fall 2015 - spring 2022

Composition for New Media

- fall 2022 and beyond
- fall 2019 - spring 2022

Criminal Justice

- General Option
  fall 2022 and beyond
  fall 2016 - spring 2022
Digital Media

- fall 2021 and beyond

Economics

- fall 2015 and beyond

English

- Literature Concentration
  fall 2021 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2021
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Journalism & Professional Writing Concentration
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2010 - spring 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Creative Writing Concentration
  fall 2018 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Theatre Arts Concentration
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2010 - spring 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Graphic Design

- fall 2021 and beyond
- fall 2020 - spring 2021
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

History

- fall 2020 and beyond
  (https://www.uml.edu/resourcescatalogarchive/current/Undergraduate.pdf)
- fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Liberal Arts

- fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Music Studies

- General Option
  fall 2022 and beyond
  fall 2018 - spring 2022
- Instrumental Option
  fall 2015 - spring 2018
  prior to fall 2015
- Voice Option
  fall 2015 - spring 2018
  prior to fall 2015

Music Performance

- Instrumental Option
  fall 2022 and beyond
  fall 2019 - spring 2022
  fall 2015 - spring 2019
  prior to fall 2015
- Voice Option
  fall 2022 and beyond
  fall 2019 - spring 2022
  fall 2015 - spring 2019
  prior to fall 2015

Music Business

- fall 2022 and beyond
- fall 2015 - spring 2022
- prior to fall 2015

Peace and Conflict Studies

- fall 2021 and beyond
- fall 2015 - spring 2021
Philosophy

- General Option
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Communications & Critical Thinking Option
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Philosophy & Religious Studies Option
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Political Science

- American Politics Concentration
  fall 2020 and beyond

- Law and Politics Concentration
  fall 2020 and beyond

- Political Communication and Public Opinion Concentration
  fall 2020 and beyond

- Sustainability and Environmental Politics Concentration
  fall 2022 and beyond

Political Science (prior to fall 2020)

- fall 2015 - spring 2020
- fall 2013 - spring 2015

Psychology

- General Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2017 - spring 2022
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2017
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2013 - spring 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Behavior Analysis Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2018 - spring 2022
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2017 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Community Social Psychology Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2018 - spring 2022
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2017 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Clinical Psychology Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2018 - spring 2022
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2017 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Developmental Disabilities Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2018 - spring 2022
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2017 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Health Psychology Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Quantitative Economics

- fall 2022 and beyond

Sociology

- General Concentration
  fall 2016 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Policy & Social Problems Concentration
  fall 2021 and
Racial Equity and Inclusion Concentration fall 2021 and beyond

Sound Recording Technology

- fall 2022 and beyond
- fall 2019 - spring 2022
- fall 2015 - spring 2019
- prior to fall 2015

World Languages and Cultures

- French Option
  - fall 2018 and beyond fall 2015 - spring 2018
- French/Spanish Option fall 2018 and beyond fall 2015 - spring 2018
- Italian/Spanish Option
  - fall 2018 and beyond fall 2015 - spring 2018
- Spanish Option
  - fall 2018 and beyond fall 2015 - spring 2018
WLAN.1991 Directed Studies World Languages Level 1 - Credits: 3
Directed Studies World Languages Level 1

WLAN.1992 Directed Studies World Languages Level 2 - Credits: 3
Directed Studies World Languages Level 2. Permission of the instructor and department chair required.

WLAN.2991 Directed Studies World Languages Level 3 - Credits: 3
Directed Studies World Languages Level 3. Permission of the instructor and department chair required.

WLAN.2992 Directed Studies World Languages Level 4 - Credits: 3
Directed Studies World Languages Level 4. Permission of the instructor and department chair required.

WLAN.4000 Senior Capstone in World Languages and Cultures - Credits: 1
The purpose of this course is to help students document and critically analyze their experience abroad, in an internship or in a community project. Through the creation of a digital portfolio, this course validates our major students' linguistic hands-on experience through study abroad or community-based practicum experience and it establishes consistency in our major curriculum by ensuring that all our majors are getting a high-quality linguistic experience abroad or at home. This course is conducted in the target language in which the student majors. For those students majoring in French/Spanish and Italian/Spanish options, the student chooses the target language in which the coursework is completed.

WLAR.1150 Arabic 1 and Culture (Formerly 53.115) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 115, 116 and 215, 216 levels must be elected in the prescribed sequence.

WLAR.1160 Arabic 2 and Culture (Formerly 53.116) - Credits: 3
This course is for students who have completed 53.115 Arabic 1 and Culture. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 115, 116 and 215, 216 levels must be elected in the prescribed sequence.

WLAR.2150 Arabic 3 and Culture (Formerly 53.215) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 117, 118 and 215, 217 levels must be elected in the prescribed sequence.

WLAR.2160 Arabic 4 and Culture (Formerly 53.216) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 115, 116 and 215, 216 levels must be elected in the prescribed sequence.

WLCH.1050 Chinese 1 and Culture (Formerly 53.105) - Credits: 3
Continuation of 53.105 Chinese 1 and Culture. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 105, 106 and 205, 206 levels must be elected in the prescribed sequence.

WLCH.1060 Chinese 2 and Culture (Formerly 53.106) - Credits: 3
Continuation of 53.105 Chinese 1 and Culture. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 103, 104 and 205, 206 levels must be elected in the prescribed sequence.

WLCH.1080 Business Chinese I and Culture - Credits: 3
This introductory language and culture course prepares non-
Chinese speakers for potential future business engagements either in China or with Chinese speakers in the United States. Effective communication and cultural competency in standard/Mandarin Chinese are emphasized. Students will be exposed to various aspects of Chinese culture appropriate for informal as well as business social settings. Topics include, but are not limited to, self-introduction, traveling, lodging, dining, shopping, banking, seeing a doctor, making friends, and doing business. Authentic language materials (vocabulary, Pinyin, sentence structures, conversations) are presented and taught in a second language acquisition environment with interactive activities that are relevant to proper social etiquette.

**WLCH.1090 Business Chinese II - Credits: 3**

This language and culture course is a continuation of Business Chinese I. The course prepares non-Chinese speakers for potential future business engagements either in China or with Chinese speakers in the United States. Effective communication and cultural competency in standard/Mandarin Chinese are emphasized. Students will be exposed to various aspects of Chinese culture appropriate for informal as well as business social settings. Topics include, but are not limited to, self-introduction, traveling, lodging, dining, shopping, banking, seeing a doctor, making friends, and doing business. Authentic language materials (vocabulary, Pinyin, sentence structures, conversations) are presented and taught in a second language acquisition environment with interactive activities that are relevant to proper social etiquette.

**WLCH.2050 Chinese 3 and Culture (Formerly 53.205) - Credits: 3**

Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 105, 106 and 205, 206 levels must be elected in the prescribed sequence.

**WLCH.2060 Chinese 4 and Culture (Formerly 53.206) - Credits: 3**

This course is a continuation of 53.205 Chinese 3 and Culture, which is a pre-requisite. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 105, 106 and 205, 206 levels must be elected in the prescribed sequence.

**WLCH.3000 Modern Chinese Literature and Culture (Formerly 53.300) - Credits: 3**

This course offers an insight into Chinese culture and society by examining different genres of modern and contemporary Chinese Literature -- the novel, poetry, essay, and drama -- since the early Twentieth Century. Readings in English translations of representative works by major writers/essayists/poets/playwrights will be complemented by selected feature films and documentaries. The survey of Chinese literature will be put in the context of a series of sociopolitical changes in China that informed the production of these works.

**WLCH.3100 Special Topic in Chinese Studies - Credits: 3**

An in dept study of the culture, civilization, or literature from the Chinese-speaking world. Class discussions, readings, oral and written work all in English. Other materials could be in target language with translations or subtitles. May be repeated once for credit, if content changes, and with written consent of the instructor.

**WLCH.3150 Chinese Culture and Civilization (Formerly 53.215) - Credits: 3**

An in depth study of culture, civilization, and literature from the Chinese-speaking world. The emphasis of the course is not only on understanding China's history in general chronological terms, but also on understanding the cultural qualities that have made China a great yet distinctive country. Course taught in English.

**WLCH.3200 Chinese Cinema and Culture - Credits: 3**

This course offers an insight into the social, economic, and political transformation of China, particularly in the past century, through a cinematic lens. Selected films of different genres from Mainland China, Hong Kong as well as Taiwan, and even the U.S., including Hollywood films portraying China and films made by Chinese Americans, will be examined to decipher its regional differences, the urban-rural gap, daily lives, gendered identities, and the belief system as well as the cultural landscape of contemporary and modern China. Taught in English.

**WLCH.4900 Directed Study in Chinese Culture (Formerly 53.490) - Credits: 3**

Students through regular consultation with the Instructor develop a course of directed study in Chinese Culture. Students findings are presented in a paper of significant proportion.

**WLCH.4950 Advanced Tutorial in Chinese Culture (Formerly 53.495) - Credits: 3**

A program of directed study to give an opportunity to a student to explore problems in Chinese Culture in greater dept
or to initiate additional problems in Chinese Culture.

**WLFR.1010 French 1 and Culture (Formerly 50.101)** - Credits: 3

Develops French speaking, listening, reading and writing skills through the discovery of French and Francophone culture in a communicative approach (instruction occurs in French with clarification in English). This class is the 1st of the 4-course French language program offered at UML. Language courses are sequential and must be taken accordingly.

**WLFR.1020 French 2 and Culture (Formerly 50.102)** - Credits: 3

Continuation of French 1 and Culture (or equivalent), which is a pre-requisite. Strengthens French speaking, listening, reading and writing skills acquired in French 1 and Culture through the discovery of French and Francophone culture in a communicative approach (instruction occurs in French with some clarification in English). This class is the 2nd of the 4-course French language program offered at UML. Language courses are sequential and must be taken accordingly.

**WLFR.2110 French 3 and Culture (Formerly 50.211)** - Credits: 3

Enhances the four skills acquired in French 2 and Culture (or equivalent), which is a pre-requisite: speaking, listening, reading and writing through the discovery of French and Francophone culture in a communicative approach (instruction occurs in French with minimal use of English). This class is the 3rd of the 4-course French language program offered at UML. Language courses are sequential and must be taken accordingly.

**WLFR.2120 French 4 and Culture (Formerly 50.212)** - Credits: 3

This course has French 3 and Culture (or equivalent) as a pre-requisite and is the 4th and last of the 4-course French language program offered at UML. The course strengthens the four skill acquired in prior levels. It emphasizes increased accuracy and depth of students' abilities and knowledge of French and Francophone culture and language in a communicative approach (instruction occurs in French with almost no use of English). Students express themselves orally and in writing at the national standards level of high-intermediate and understand key-concepts when spoken clearly at native speed.

**WLFR.3000 Quebec Literature and Culture** - Credits: 3

This course explores the culture and literature of French-speaking Quebec. Through essays, literary readings, songs, works of art, and film, students will follow the development of this province of Canada from its origins as a French colony through the exodus of French-Canadians in the early twentieth century and the Revolution Tranquille of the 1960’s, up to the present day. Conducted entirely in French.

**WLFR.3010 Survey of French Literature (Formerly 50.301)** - Credits: 3

A panoramic survey of French Literature based on the history and civilization of France from the Middle Ages to the 20th Century, through readings in the original French language of excerpts from milestone novels, theater and poetry. Class conducted in French.

**WLFR.3015 Inventing Paris** - Credits: 3

The "Haussmanization" of Paris coincides with the emergence of the capital city of France as both a setting for contemporary literature, and as a literary character in its own right, holding different meanings for its many poets, writers, and painters. This course explores how Paris changed over the course of the nineteenth century by examining poetic and fictional responses to the Parisian landscape, and through their explorations of what it meant to live in the capital. Readings will include works by main French writers such as Balzac, Baudelaire, Hugo, Zola, and Maupassant, and feature cinematic works by Godard and Varda, in addition to examples of Paris as represented in new media. Taught in French.

**WLFR.3020 Survey of Francophone Literature (Formerly 50.302)** - Credits: 3

A survey of contemporary Francophone Literature of African, European, and North American French speaking countries since 1960 until today.

**WLFR.3025 The Short Story in Francophone Literature** - Credits: 3

A panoramic survey of the short story in Francophone literature, based on the history and civilization of France from the Early Modern period, through the beginning of the 21st Century, and including readings in the original French language of important works of short prose by Marguerite de Navarre, Jean de la Fontaine, Madame de Sevign, Jean de La Bruyere, Montesquieu, Francoise de Graffigny, Honor de Balzac, Gustave Flaubert, Guy de Maupassant, Rachilde, Madeleine Bourdouxhe, Fatou Diome, and Scholastique Mukasonga. Class conducted in French.

**WLFR.3030 Special Topics: in Francophone Studies**
WLFR.3050 World Ready Topic for French Track - Credits: 3

This course, taught in English, is for non-French majors and minors. It is offered for students who are completing their language requirement through the World Ready option, and have chosen the French track. The course covers a topic of the French-speaking world's culture, civilization, cinema or literature. Class discussions, readings, oral and written work all in English. Other materials could be in target language with translations or subtitles. May be repeated once for credit, if content changes, and with written consent of the instructor.

WLFR.3100 French Speaking World (Formerly 50.310) - Credits: 3

Designed for prospective majors and minors in French as well as for those who have completed four years of high school or two years of college French. The course examines similarities and differences in the ethos of nations of the French-speaking world and in the life-styles of the individuals and groups that make them up. Conducted in French.

WLFR.3150 Francophone Communities in North America (Formerly 50.315) - Credits: 3

This course introduces the concept of "Francophonie" and describes the origins of the main francophone communities left in North America: Quebec, Acadia and New-Foundland in Canada, and Louisiana and New England (including Lowell) in the U.S. The primary focus of this class is Culture, history and language (different varieties of French spoken by those communities). Class conducted in French.

WLFR.3200 Contemporary French Civilization and Culture (Formerly 50.320) - Credits: 3

In this course we look closely at some fundamental issues reflecting the rapidly changing parameters of French culture and society today; the question of national identity and cultural hybridite, the relationship between the evolving types of family relations and new forms of social and political contracts; the crucial personal problems faced by the young, the poor, the immigrant and the elderly in an increasingly multicultural Hexagone attempting to define its place, role and function within the recently defined Europe unit and the new global world order; the current status of women; the relationship between cities and ghettos, violence and crime; the nature of emerging forms of cultural production within new trends and styles of modernite.

WLFR.3400 Contemporary French Cinema (Formerly 50.340) - Credits: 3

Provides a critical appreciation of contemporary French cinema (1985-today) aiming at sorting out its eclecticism and focusing on the following aspects: 1) French cultural exception in the European Union: cultural integration and national identity; 2) Representation of the ongoing social and moral changes in contemporary France; 3) The new generation of French filmmakers. Class taught in French.

WLFR.3460 Advanced French Conversation (Formerly 50.346) - Credits: 3

Advanced oral practice in rapid and idiomatic speech. Topics of contemporary significance are selected from contemporary prose.

WLFR.3480 Advanced French Conversation and Composition (Formerly 50.348) - Credits: 3

Designed to improve and reinforce proficiency in spoken and written French through regular exercises of oral communication and free composition, through the analysis of literary texts and authentic written and oral materials. Taught in French.

WLFR.3760 French Cinema & Society (Formerly 50.376) - Credits: 3

Covers the dramatic presentation French society gives of itself during the period of profound social and economic change, from the New Wave and the May 68 events to today's younger generation facing an uncertain tomorrow. Each screening (in French with subtitles) is preceded by an introduction placing the film in its historical context. In English.

WLFR.3800 Francophone Identity through Cinema (Formerly 50.380) - Credits: 3

Provides a critical appreciation of the notion of Francophone identity through modern and contemporary (1970-today) Francophone cinema from diverse places such as but not limited to North Africa, West Africa (especially Senegal), Canada (especially Quebec) the Caribbean, Belgium, and Switzerland. The course is aiming at showing the evolution of the Francophone identity in the postcolonial period until now and is focusing on the following aspects: 1) The emergence and importance of postcolonial Francophone cinema in the 1970s
as a "cinema engage" (especially Sembene Ousmane in Senegal); 2) Contemporary issues of the postcolonial Francophone societies through films; 3) Representations of the cultural diversity in Francophone films; 4) Identity, race and immigration, women’s status issues.

WLFR.3815 Francophone Caribbean Studies through Lit & Film - Credits: 3
This course explores major works from French Caribbean authors. Through novels, films, short stories, poetry, and play, we will uncover the historical, intellectual and social dynamics that define the French Caribbean world. A special emphasis will be placed on topics such as Ngritude, Antillanit, Crolit, and Migration.

WLFR.3820 Francophone Literature and Visual Arts of Senegal - Credits: 3
Senegal has particular significance in Francophone studies for the highly visible contributions of its writers and artists from the colonial era through today, and its emblematic role in cultural production in West Africa. Through film, literature, visual arts and other cultural productions in the country from the French colonial period up through today, we examine how artists have responded to the history and present legacies of colonialism through their creative works. The course is conducted in French.

WLFR.3825 Migration in Francophone Literature & Visual Arts - Credits: 3
The long history of migration in France, and its current visibility in politics and society make studying this theme in literature, film, and other cultural production fundamental to our understanding of mainland France today. This course focuses on written and visual texts connected to both France, and other regions of departure (including but not limited to North Africa and West/Central Africa). We examine key themes in texts focused on migration: labor, education and assimilation, family/next generations, and clandestine immigration. In addition to primary texts, secondary critical reading will ground discussion in postcolonial theory, gender studies, and francophone studies in order to understand the long tradition of these themes in francophone literature and film.

WLFR.3940 Enhancing and Advancing your Knowledge of French (Formerly 50.394) - Credits: 3
Designed for students who need/wish to enhance and advance their linguistic skills in French. Conducted entirely in French, the course will focus on the vocabulary of contemporary French as well as selected grammatical and syntactical structures through the analysis of French-speaking Media (newspapers, Radios, TVs) available on the Web.

WLFR.4910 Directed Studies in French Literature (Formerly 50.491) - Credits: 3
Individual research projects in French literature. Students, through regular and frequent consultation with their instructor, develop a course of directed study in French literature and define a problem for individual research. The student’s findings are presented in a paper of significant proportions.

WLFR.4920 Directed Studies French Composition (Formerly 50.492) - Credits: 3
Students, through regular and frequent consultation with their instructor, pursue a special program of composition or creative expression.

WLFR.4950 Advanced French Tutorial (Formerly 50.495) - Credits: 3
A program of directed study which affords the advanced student with an additional opportunity to pursue a previously explored problem in greater depth or to initiate a new problem. The purpose of the course is to sharpen and refine techniques for scholarly research, presentation and creative expression.

WLFR.4960 French Practicum Experience (Formerly 50.496) - Credits: 1-9
A program of on-campus and/or off-campus experiences (for French and Modern Language Majors only). Specific requirements vary depending upon faculty policies and the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural, or artistic area and for applying techniques of problem solving and/or skills which are appropriate to the student's major discipline. May be repeated for a maximum of nine credits. Students are graded "satisfactory" or "unsatisfactory". The practicum experience may not be substituted for a required course in the major.

WLGE.1010 German 1 and Culture (Formerly 51.101) - Credits: 3
Develops German speaking, listening, reading and writing skills through the discovery of the culture of German speaking countries in a communicative approach (instruction occurs in German with clarification in English). This class is the 1st of the 4-course German language program offered at UML. Language courses are sequential and must be taken accordingly.
WLGE.1020 German 2 and Culture (Formerly 51.102)  
- Credits: 3
Continuation of German 1 and Culture (or equivalent), which is a pre-requisite. Strengthens German speaking, listening, reading and writing skills acquired in German 1 and Culture through the discovery of the culture of German speaking countries in a communicative approach (instruction occurs in German with some clarification in English). This class is the 2nd of the 4-course German language program offered at UML. Language courses are sequential and must be taken accordingly.

WLGE.2110 German 3 and Culture (Formerly 51.211) - Credits: 3
Enhances the four skills acquired in German 2 and Culture (or equivalent), which is a pre-requisite: speaking, listening, reading and writing through the discovery of the culture of German speaking countries in a communicative approach (instruction occurs in German with minimal use of English). This class is the 3rd of the 4-course German language program offered at UML. Language courses are sequential and must be taken accordingly.

WLGE.2120 German 4 and Culture (Formerly 51.212) - Credits: 3
This course has German 3 and Culture (or equivalent) as a pre-requisite and is the 4th and last of the 4-course German language program offered at UML. The course strengthens the four skill acquired in prior levels. It emphasizes increased accuracy and depth of students' abilities and knowledge of the culture of German speaking countries in a communicative approach (instruction occurs in German with almost no use of English). Students express themselves orally and in writing at the national standards level of high-intermediate and understand key-concepts when spoken clearly at native speed.

WLGE.3000 Grimms' Fairy Tales (Formerly 51.300) - Credits: 3
This course will provide a study of the Grimms' fairy tales, their collection and publication by Jacob and Wilhelm Grimm in the contest of 19th century German Romanticism, and their enduring relevance to modern social commentary. Reading the texts in English translation, students will gain a critical understanding of the content and structure of the tales, of their cultural components, and their function through time to entertain, edify, and inform about life in the social milieu. The course is taught in English.

WLGE.3010 German Culture and Civilization -

WLGE.4920 Direct ed Study in German Composition (Formerly 51.492) - Credits: 3
This course examines the cultural and social development of Germany, from the end of World War II until now. This course analyzes the radical transformation of Germany through a deep identity crisis and the rising of new German generations. Germany's cultural, political and economical reconstruction will be discussed in readings, films, documentaries, architecture, pictures, and paintings. Course materials are in English or in German with English subtitles. This course is conducted in English.

WLGE.4950 Advanced German Tutorial (Formerly 51.495) - Credits: 3
A program of directed study which affords Modern Language majors an additional opportunity to pursue a previously explored topic in greater depth or to initiate an additional topic. The purpose of this tutorial is to sharpen and refine techniques of scholarly research, presentation and creative expression.

WLIT.1010 Italian 1 and Culture (Formerly 52.101) - Credits: 3
Develops Italian speaking, listening, reading and writing skills through the discovery of the culture of Italy in a communicative approach (instruction occurs in Italian with clarification in English). This class is the 1st of the 4-course Italian language program offered at UML. Language courses are sequential and must be taken accordingly.

WLIT.1020 Italian 2 and Culture (Formerly 52.102) - Credits: 3
Continuation of Italian 1 and Culture (or equivalent), which is a pre-requisite. Strengthens Italian speaking, listening, reading and writing skills acquired in Italian 1 and Culture through the discovery of the culture of Italy in a communicative approach (instruction occurs in Italian with some clarification in English). This class is the 2nd of the 4-course Italian language program offered at UML. Language courses are sequential and must be taken accordingly.
WLIT.2110 Italian 3 and Culture (Formerly 52.211) - Credits: 3
Enhances the four skills acquired in Italian 2 and Culture (or equivalent), which is a pre-requisite: speaking, listening, reading and writing through the discovery of the culture of Italy in a communicative approach (instruction occurs in Italian with minimal use of English). This class is the 3rd of the 4-course Italian language program offered at UML. Language courses are sequential and must be taken accordingly.

WLIT.2120 Italian 4 and Culture (Formerly 52.212) - Credits: 3
This course has Italian 3 and Culture (or equivalent) as a pre-requisite and is the 4th and last of the 4-course Italian language program offered at UML. The course strengthens the four skill acquired in prior levels. It emphasizes increased accuracy and depth of students' abilities and knowledge of the culture of Italy in a communicative approach (instruction occurs in Italian with almost no use of English). Students express themselves orally and in writing at the national standards level of high-intermediate and understand key-concepts when spoken clearly at native speed.

WLIT.3000 Modern & Contemporary Italian Civilization and Culture (Formerly 52.300) - Credits: 3
This interdisciplinary and multimedia course will provide a comprehensive view of Italian civilization from the Unification to the present. Through readings, movies, documentaries, pictures, and paintings, students will gain a critical understanding of many of the key events that have shaped Italian history, politics, and economy, and will be guided to discover questions of national identity, language, religion, gender and sexuality, ethnicity, immigration, media and fashion. Conducted in English (English reading material; film screenings In Italian with English subtitles.)

WLIT.3100 Special Topics in Italian Studies - Credits: 3
A limited topic of special interest in culture, civilization, or literature. May be taught in English or Italian. Course content and approach varies depending on instructor. The faculty post and distribute a detailed course description each semester, and students are urged to use this information in making their selections.

WLIT.3200 Special Topics: Italian Study (Formerly 52.320) - Credits: 3
Depends on faculty and student interests associated with Italian literature, composition and culture. 

WLIT.3250 Italian American Literature and Culture (Formerly 52.325) - Credits: 3
Discusses the most prominent authors and works of Italian-American Literature as they, by using the ethnic setting, are able to convey universal human concerns and themes. The discussion on Italian-American ethnic issues will include such films as The Godfather, Moonstruck, The Sicilian, Goodfellas, and The Untouchables. Conducted in English.

WLIT.3300 Italian Women Writers (Formerly 52.330) - Credits: 3
Studies women writers of Italy by giving attention to the genres of narrative, poetry, theater and autobiography. Authors are selected according to their impact on issues affecting women, gender studies, feminism, avant-garde, modernism, social relations and psychological discourse. Conducted in English.

WLIT.3400 Readings in Contemporary Italian Literature - Credits: 3
This course covers selected works from contemporary Italian prose and poetry, with particular attention to texts written in the last twenty years. It focuses on textual analysis and interpretation, and is intended to improve students' familiarity with idioms and vocabulary of contemporary Italian language. The course is taught in Italian and will advance students' skills in all areas of Italian language and culture.

WLIT.3440 Advanced Italian Grammar - Credits: 3
A systematic study of complex grammatical structures in Italian. Conducted in Italian only.

WLIT.3450 Advanced Italian Conversation (Formerly 52.345) - Credits: 3
Advanced oral practice in rapid and idiomatic speech. Topics of contemporary significance are selected from contemporary prose.

WLIT.3500 Italian Language and Culture Through Films - Credits: 3
This course offers a systematic approach to learning Italian language and culture through films. It is designed to improve students' language skills and enrich their knowledge of Italian contemporary society. This class is taught in Italian.

WLIT.3600 Advanced Italian Conversation and Composition - Credits: 3
The course aims at developing advanced written and oral proficiency. Topics of contemporary significance are selected for discussions. This class is taught in Italian.

WLIT.3730 Italian Humanism (Formerly 52.373) - Credits: 3

A study of the waning of the Middle Ages and the dawning of the Renaissance as seen through the work of Petrarch and Boccaccio. Emphasis is on the study of sources and the influence of Petrarch and Boccaccio upon the literatures of western Europe. Conducted in English.

WLIT.3780 Italian Cinema and Culture (Formerly 52.378) - Credits: 3

A guide to contemporary Italian studies through literary and cultural approaches. The works of central figures in contemporary Italian letters are examined in view of their impact on Italian life. Emphasis is given to poets, novelists, the new cinema, the influences of existentialism, and the impact of America on Italian literature. Conducted in Italian/English.

WLIT.3790 Black Italy: Debunking Italian-ness - Credits: 3

This course explores literary, cinematic and social media representations of race and identity in Italy from the late 19th century to today. Through the study of texts and drawing from history, sociology, critical race theory, media and cultural studies, students will discover how Black Italians challenge mainstream discourses, thus contributing to redefine the multilayered composition of Italian society. This course will be taught in English. Knowledge of Italian is preferred but not required. Italian majors and minors will complete all written assignments, reviews, and exams in Italian.

WLIT.3800 Italian Cinema: Directors and Themes (Formerly 52.380) - Credits: 3

A study of Italian film history and its accomplishment by exploring the relationship of cinema to sociopolitical, economic, cultural, and literary events. The course will discuss in depth either a) one or two major and well known directors; b) a major thematic and stylistic division in a century of cinematic creativity.

WLIT.4910 Directed Study in Italian Literature (Formerly 52.491) - Credits: 3

Individual research projects for modern language majors. Students, through regular and frequent consultation with their instructor, develop a course of directed study in Italian literature and define a subject for individual research. The student’s findings are presented in a paper of significant proportions.

WLIT.4920 Directed Studies Italian Composition (Formerly 52.492) - Credits: 1-6

Individual research projects for modern language majors. Students, through regular and frequent consultation with their instructor, pursue a special topic of composition or creative expression.

WLIT.4950 Advanced Italian Tutorial (Formerly 52.495) - Credits: 1-6

A program of directed study which affords Language majors an additional opportunity to pursue a previously explored topic in greater depth or to initiate an additional topic. The purpose of this tutorial is to sharpen and refine techniques of scholarly research, presentation and creative expression. Permission of Instructor.

WLIT.4960 Italian Practicum Experience (Formerly 52.496) - Credits: 3

A program of on-campus and/or off-campus experiences (for Italian and Language Majors only). Specific requirements vary depending upon faculty policies and the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural, or artistic area and for applying techniques of problem solving and/or skills which are appropriate to the student’s major discipline. The practicum experience may not be substituted for a required course in the major. Permission of Instructor.

WLKH.1040 Elementary Cambodian for Heritage Speakers - Credits: 3

This intensive, 3-credit Cambodian language and culture course is intended for heritage Cambodian speakers who already have a basic command of the spoken and written language. The course covers the reading, writing, speaking and listening skills comprising the Cambodian Language &Culture 1 &2 course in a single semester. Contemporary news information is also presented on a weekly basis.

WLKH.1350 Cambodian 1 and Culture (Formerly 53.135) - Credits: 3

Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 135, 136 and 235, 236 levels must be elected in the prescribed sequence.
WLKH.1360 Cambodian 2 and Culture (Formerly 53.136) - Credits: 3

This course continues the oral practice, reading, writing, grammar and cultural studies begun in 53.135. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 135, 136 and 235, 236 levels must be elected in the prescribed sequence.

WLKH.2040 Intermediate Cambodian for Heritage Speakers - Credits: 3

This intensive 3-credit Cambodian language and culture course is intended for heritage Cambodian speakers who already have successfully completed WLKH.1040, Elementary Cambodian for Heritage Speakers, or its equivalent. The course covers the reading, writing, speaking and listening skills comprising the Cambodian Language & Culture 3 & 4 courses in a single semester. Contemporary news information is also presented on a weekly basis.

WLKH.2100 Introduction to Cambodian Culture (Formerly 59.210) - Credits: 3

This 3-credit course focuses on the culture of Cambodia from ancient times to present. Specifically, this course provides an overview of the geography, demographics, monarchy, religion, architecture, dance & music, literature and performing arts in historical context. The course also requires students to examine contemporary Cambodia in terms of change continuity.

WLKH.2350 Cambodian 3 and Culture (Formerly 53.235) - Credits: 3

Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 135, 136 and 235, 236 levels must be elected in the prescribed sequence.

WLKH.2360 Cambodian 4 and Culture (Formerly 53.236) - Credits: 3

This course is a continuation of 53.235 Cambodian 3 and Culture, which is a pre-requisite. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 135, 136 and 235, 236 levels must be elected in the prescribed sequence.

WLKH.3100 The Literary Cultures of Cambodia - Credits: 3

This course provides a survey of the role and function of literature and literary institutions in Cambodia. Selections of literature in translation from various genres (poetry, the short story, novels) are analyzed in terms of the development of the particular genre and its function vis-a-vis Cambodia’s cultural institutions. Similarly, the course examines the role of these cultural institutions in supporting the production of these literatures in different historical periods (classical to modern). Particular emphasis is given to the role of literature and literary institutions in the development of national and cultural identity during and after colonial rule.

WLKH.3200 Cambodian Culture in Lowell - Credits: 3

This course examines the emergence and growth of the Cambodian American culture in Lowell from the early 1980s until the present. The course focuses on cultural and artistic organizations and events, such as the Angkor dance troupe and the Southeast Asian Water Festival within the changing political and historical context of Lowell during that period. Particular attention is given to the role of Cambodian cultural organizations and events in Lowell’s cultural economy, which includes Lowell’s art district and city organizations like the Cultural Organization of Lowell (COOL), the Merrimack Repertory Theater and the Lowell National Historical Park.

WLKH.3250 Contemporary Cambodian Cinema - Credits: 3

This 3-credit course examines Cambodian cinema and filmmakers from the 20th and 21st centuries. The course will include films in English or with English subtitles made by Cambodian filmmakers, as well as films about Cambodia made by foreign filmmakers. The course will be organized chronologically and thematically beginning with the first documentary films from the 1290’s produced by foreign filmmakers, to Cambodia’s “golden age” of cinema in the 1960’s, to films from the 1980’s about the genocide, to the fast-growing contemporary film scene in Cambodia. Students will view and examine the films in terms of their cultural context and how this context is reflected in the films’ plot, characters and perspective.

WLKH.3490 Literature, Politics and Genocide in Cambodia (Formerly 59.349) - Credits: 3

This course will examine various literary and political responses to the Cambodian genocide, particularly personal accounts or literary testimony by survivors and government sanctioned legal proceedings. The course will consider how the literary and political responses to the Cambodian genocide have at different times paralleled, complimented and opposed each other. The course will also ask whether their overall effect contributes to or detracts from the serving of justice and the process of healing for the survivors. To pursue these questions, we will read selections from novels and poetry written by
Cambodian survivors side by side with accounts of political activities of the Cambodian government and the international community to bring the perpetrators of the genocide to justice.

WLKH.4930 Directed Study in Cambodian Culture (Formerly 53.493) - Credits: 1-6
Students through regular and frequent consultation with their instructor develop a course of directed study in Cambodian (Kmer) culture, and define a problem for individual research. The student’s findings are presented in a paper of significant proportions.

WLLA.3200 Special Topics in Latin Study (Formerly 56.320) - Credits: 3
Depends on faculty and student interests associated with Latin literature, composition and culture.

WLLA.4910 Directed Studies in Latin (Formerly 56.491) - Credits: 3
Individual research projects on Latin language and/or culture. Students, through regular and frequent consultation with instructor, pursue a special topic of research or translation. Permission of Instructor.

WLPO.1100 Portuguese for Spanish Speakers I (Formerly 53.110) - Credits: 3
Taught at a faster pace than a regular beginning course in Portuguese, is an introduction to the foundations of the Portuguese language and the cultural diversity of the Lusophone world for speakers of Spanish. Specific attention is devoted to the advantages and challenges that Portuguese presents to native or near-native speakers of Spanish. The course acknowledges that, in spite of the similarities between the two languages, there are important differences in pronunciation, vocabulary and grammatical structures. The course gives emphasis to all four language skill-listening, speaking, reading, writing-in order to achieve communicative goals. Portuguese is the language of instruction.

WLPO.1130 Portuguese 1 and Culture (Formerly 53.113) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 113, 114 and 213, 214 levels must be elected in the prescribed sequence.

WLPO.1140 Portuguese 2 and Culture (Formerly 53.114) - Credits: 3
A continuation of 53.113 Portuguese 1 and Culture, which is a pre-requisite. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 113, 114 and 213, 214 levels must be elected in the prescribed sequence.

WLPO.2130 Portuguese 3 and Culture (Formerly 53.213) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 113, 114 and 213, 214 levels must be elected in the prescribed sequence.

WLPO.2140 Portuguese 4 and Culture (Formerly 53.214) - Credits: 3
A continuation of 53.213 Portuguese 3 and Culture, which is a pre-requisite. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 113, 114 and 213, 214 levels must be elected in the prescribed sequence.

WLPO.3011 Special Topics: in Lusophone Studies (Formerly 53.301) - Credits: 3
An in-depth study of a specific topic in literature, culture, civilization from the Lusophone world. Class discussions, readings, oral and written work all in Portuguese or in English. May be repeated once for credit, if content changes, and with written consent of the Instructor.

WLPO.3020 Special Topics: in Portuguese Studies (Formerly 53.302) - Credits: 3
An in-depth study of a specific topic in literature, culture, civilization or cinema from Portugal. Class discussions, readings, oral and written work all in Portuguese or in English. May be repeated once for credit, if content changes, and with written consent of the Instructor.

WLPO.3030 Survey of Brazilian Cinema - Credits: 3
An introduction to Brazilian cinema and society, focusing on the Cinema Novo (New Cinema) of the 1960s and 1970s as well as more contemporary films influenced by the ideals of this movement. Films will be analyzed via reference to historical and theoretical texts. Topics to be addressed include Brazilian history as reflected in film and the formation of a
distinct Brazilian aesthetic sensibility. Taught in English.

WLPO.3040 Survey of Brazilian, Portuguese and Lusophone African Cinema (Formerly 53.304) - Credits: 3

This course is designed as an introduction to film studies and to Brazilian, Portuguese and Lusophone African cinema and cultures. Taught in English. College Writing 1 (421 01) and College Writing 2 (42102).

WLPO.3050 Culture and Civilization of Brazil - Credits: 3

This course is an introduction to Brazilian culture and society. Attention is given to history, geography, cinema, literature, art, and issues of race, gender, and social inequality as they lead toward a fuller understanding of Brazil. This course will cover major aspects of Brazilian society. The main texts review significant events and forces that have helped shape Brazil today. A variety of films and videos will be used. Course will be taught in English.

WLPO.3060 The Short Story in the Lusophone World - Credits: 3

This course will introduce students to the development of the short story in the Portuguese-speaking world from the 19th century to today. Through theoretical readings, discussion and writing activities, students will learn to analyze, ask critical questions of, and develop critical arguments about short fiction. Readings will be chosen from a variety of canonical authors from Brazil, Portugal, Cabo Verde, Mozambique, Angola, and Macau. Conducted in English.

WLPO.3070 The City in Contemporary Lusophone Literature and Film - Credits: 3

This course provides a comprehensive view of contemporary Lusophone urban space through literature and film. The course will explore the histories and cultures of the Portuguese-speaking countries by analyzing fictional texts and films related to their cities. Through readings and films, students will gain a critical understanding of many key events that have shaped Lusophone history, politics, and economy, and will be guided to discover, among others, themes related to national identity, language, ethnicity, migration, economic injustice, unhealed wounds of war, dictatorship, and colonialism. Conducted in English (English reading material; film screenings will be in Portuguese with English subtitles).

WLPO.3080 Lusophone Music and Culture - Credits: 3

This course will study the role of music and song in Lusophone cultures, including Brazil, Portugal, and Lusophone Africa. We will examine the historical and cultural evolution of some iconic music genres, including fado, samba, bossa nova, morna, and kizomba. Students will examine the social and political importance of music, including the politically engaged song from the 1960s and 1970s to today. Conducted in English.

WLPO.3090 Luso-Brazilian Women Writers in Translation - Credits: 3

This course studies a diverse selection of texts by women writers from Brazil and Portugal. This course further examines the differing strategies deployed by female-authored fiction, poetry, autobiography and essay as these negotiate genre and gender, and issues affecting feminism, social relations and psychological discourses. Conducted in English.

WLPO.3370 Portuguese Literature in Translation (Formerly 53.237) - Credits: 3

This course offers a broad overview of Portuguese literature, in English translation, from the Middle Ages to the contemporary period, placing literary movements and major authors in their historical and aesthetic context. It focuses on promoting a basic level of cultural literacy about Portugal based on representative reading drawn from the last seven centuries of the country’s history situated in their social, cultural and historic contexts. Course assignments lead students to develop skills in textual interpretation, critical thinking, and academic writing.

WLPO.3440 Advanced Portuguese Grammar - Credits: 3

A systematic review of Portuguese grammar and syntax, and the study and practice of the basic principles of writing in Portuguese. Taught in Portuguese.

WLPO.3450 Advanced Portuguese Conversation and Composition - Credits: 3

The course aims at developing advanced written and oral proficiency in Portuguese. Topics of contemporary significance are selected for discussions. Taught in Portuguese.

WLPO.4810 Directed Studies in Portuguese Composition (Formerly 53.481) - Credits: 3

Students, through regular and frequent consultation with their instructor, pursue a special program of composition or creative expression in Portuguese.

WLPO.4830 Independent Studies in Portuguese
This course allows students to undertake research on non-literature related topic on the Portuguese speaking world that is not made available through normal course offerings. The syllabus for the independent study will specify the topic and readings for the course, as well as dates by which readings and written work must be completed, the frequency of required meetings, and how the grade for the course will be determined. As an independent study is an upper level course, there is substantial writing component.

WLPO.4850 Advanced Portuguese Tutorial (Formerly 53.485) - Credits: 3

A program of directed study affords advanced student to provide an additional opportunity to pursue a previously explored problem in greater depth or to initiate and additional problem. The purpose is to sharpen and refine techniques for scholarly research and presentation and for creative expression.

WLSP.1010 Spanish 1 and Culture (Formerly 54.101) - Credits: 3

Develops Spanish speaking, listening, reading and writing skills through the discovery of the culture of Spanish speaking countries in a communicative approach (instruction occurs in Spanish with clarification in English). This class is the 1st of the 4-course Spanish language program offered at UML. Language courses are sequential and must be taken accordingly.

WLSP.1020 Spanish 2 and Culture (Formerly 54.102) - Credits: 3

Continuation of Spanish 1 and Culture (or equivalent), which is a pre-requisite. Strengthens Spanish speaking, listening, reading and writing skills acquired in Spanish 1 and Culture through the discovery of the culture of Spanish speaking countries in a communicative approach (instruction occurs in Spanish with some clarification in English). This class is the 2nd of the 4-course Spanish language program offered at UML. Language courses are sequential and must be taken accordingly.

WLSP.1030 Medical Spanish (Formerly 54.103) - Credits: 3

This course is designed to develop basic conversational skills necessary to communicate with patients in a health care setting. Students will acquire a basic linguistic and cultural foundation enabling them to interview and manage patients in clinical settings using Spanish; to take a history and perform a physical exam using Spanish, and to interpret health concerns of Spanish-speaking populations. The course is designed for health care professionals.

WLSP.1050 Spanish Heritage Speakers I - Credits: 3

Spanish for Heritage Speakers (I) is targeted to students who are exposed to Spanish in their everyday life while growing up but have received limited or no formal instruction in this language. This course builds on the knowledge and experiences that students bring to the classroom by providing them with advanced sociolinguistic and grammar skills that will enable them to use Spanish for personal, social, and academic purposes. This course will also strengthen the students communication skills in Spanish and help them differentiate between the use of Spanish and English in formal and informal contexts. Students will reflect on issues around Hispanic and Latino identities, as well as on the linguistic and cultural diversity in Latin America, Spain and the United States.

WLSP.2110 Spanish 3 and Culture (Formerly 54.211) - Credits: 3

Enhances the four skills acquired in Spanish 2 and Culture (or equivalent), which is a pre-requisite: speaking, listening, reading and writing through the discovery of the culture of Spanish speaking countries in a communicative approach (instruction occurs in Spanish with minimal use of English). This class is the 3rd of the 4-course Spanish language program offered at UML. Language courses are sequential and must be taken accordingly.

WLSP.2120 Spanish 4 and Culture (Formerly 54.212) - Credits: 3

This course has Spanish 3 and Culture (or equivalent) as a pre-requisite and is the 4th and last of the 4-course Spanish language program offered at UML. The course strengthens the four skill acquired in prior levels. It emphasizes increased accuracy and depth of students' abilities and knowledge of the culture of Spanish speaking countries in a communicative approach (instruction occurs in Spanish with almost no use of English). Students express themselves orally and in writing at the national standards level of high-intermediate and understand key-concepts when spoken clearly at native speed.

WLSP.2150 Spanish Heritage Speakers II - Credits: 3

Spanish Heritage Speakers II

WLSP.2210 Reading and Conversing in Spanish I (Formerly 54.221) - Credits: 3

Emphasizes Spanish grammar review and the development of reading and conversational skills. Selected contemporary works provide the basis for developing conversational comprehension
WLSP.3005 LGBTQ and the Hispanic World - Credits: 3

This course will examine relevant works of 20th and 21st century LGBTQ+ Spanish speaking literature and visual representations, including selections from well-known authors and a new generation of writers. We will explore these works within broad social and political contexts that extend from the beginning of the twentieth century to the present day. In this course, we will study how literature serves as a tool both for the expression of same-sex desire and for questioning political and social practices that have traditionally silenced non-heteronormative identities. Finally, we will discuss how LGBTQ+ literature defies aesthetic conventions to expand existing cultural frameworks and to create new ones that align with social and political progress. Taught in Spanish.

WLSP.3010 Introduction to Spanish Literature (Formerly 54.301) - Credits: 3

This course studies representative literary texts of Spain form its beginnings to present times. The readings exemplify various genres and reveal the complicated series of interactions, conflict, and influences which have contributed to its cultural diversity and relevance in today’s global context. Conducted in Spanish.

WLSP.3020 Survey of Latin American Literature (Formerly 54.302) - Credits: 3

A study of the major writers of Latin America from Native American literature to the modernist period. The authors and their works are placed in their historical, sociological, and literary perspective, thus introducing students to the Latin American World. Conducted in Spanish.

WLSP.3030 Modern and Contemporary Latin American Literature (Formerly 54.303) - Credits: 3

A continuation of WLSP 53.3020, Survey of Latin American Literature and Culture I. Conducted in Spanish.

WLSP.3040 Special Topics: in Latin American Studies (Formerly 54.304) - Credits: 3

An in-depth study of a specific topic in literature, culture, civilization or cinema from Latin American countries. Class discussions, reading, oral and written work all in Spanish. May be repeated once for credit, if content changes, and with written consent of the Instructor.

WLSP.3050 World Ready Topic Spanish Track - Credits: 3

This course, taught in English, is for non Spanish majors and minors. It is offered for students who are completing their language requirement through the World Ready option, and have chosen the Spanish track. The course covers a topic of the Spanish-speaking world's culture, civilization, cinema or literature. Class discussions, readings, oral and written work all in English. Other materials could be in target language with translations or subtitles. May be repeated once for credit, if content changes, and with written consent of the instructor.

WLSP.3100 Spanish Civilization and Culture (Formerly 54.310) - Credits: 3

Considers Spanish culture and civilization up to the present. Through audiovisual aids, current newspapers and selected readings, the student will explore the Spanish way of being, thinking, and living. Emphasis is placed on the main contributions of Spain to the Western world. Conducted in Spanish only.

WLSP.3110 Contemporary Spanish Culture and Society - Credits: 3

Contemporary Spanish Culture and Society (1975-present) is a 3 credit course specifically designed for the UML summer faculty-led on-site program in Cadiz, Spain, over a period of 3 weeks (Dates TBA in July and August). Throughout our stay, as a group, we will discuss and exchange about the readings posted in advance on Blackboard (all in English) specifically reflecting upon the connections between what you learned, what you experienced personally in Spain and how different/similar this is from what you expected or imagined. Class is taught in English.

WLSP.3120 Cultural Representations of the Spanish Civil War - Credits: 3

This course will examine the war as the foundational trauma on which Spanish modernity and its cultural production are based. With this goal in mind, this course will examine the representation and understanding of the Civil War through the lens of Francoist, Communist, and Anarchist discourse. We will explore different ideological representations of the war in conjunction with a variety of aesthetic perspectives, such as realism, avant-garde, testimonial literature, and existentialism. We will also complement the study of literature with the representation of this event through film and photography produced during and after the Civil War.
WLSP.3130 Fieldwork in the Spanish Community (Formerly 54.313) - Credits: 3
Involves individual assignments under the sponsorship of local service agencies servicing the Spanish-speaking community involving individual family and group contact. Written and oral reports will be in Spanish.

WLSP.3150 Latin American Civilization and Culture (Formerly 54.315) - Credits: 3
Considers significant intellectual, artistic, historical, and sociopolitical aspects of Latin America from the beginning of its history. Through audiovisual aids and selected readings, the student will explore the Latin American way of being and expressing.

WLSP.3200 Special Topics in Spanish Studies (Formerly 54.320) - Credits: 3
Focuses on a limited topic of special interest in culture, civilization, or literature. May be taught in English or in Spanish. Course content and approach will vary depending on instructor.

WLSP.3300 Spanish and Latin-American Women Writers (Formerly 54.330) - Credits: 3
Studies women writers of the Spanish speaking world. Emphasis is given to their contribution to the development of Spanish literature and culture as well as their vision of the world and their concerns for the rights of women and humanity. Conducted in Spanish only.

WLSP.3330 Advanced Spanish Grammar (Formerly 54.333) - Credits: 3
A systematic study of complex grammatical structures in Spanish. Conducted in Spanish only.

WLSP.3340 Advanced Spanish composition (Formerly 54.334) - Credits: 3
The purpose of this course is to help students make their writing more accurate, organized and to develop students abilities in composition tasks. Specifically, students will learn how to approach the act of writing successfully by focusing on the interaction between writer, reader, purpose, and message. Students will also learn to manage important writing resources such as grammar, vocabulary, rhetorical techniques for organizing information, and strategies for writing through problems, reading critically, revising, and rewriting. Required for Spanish Majors.

WLSP.3470 Advanced Spanish Conversation (Formerly 54.347) - Credits: 3
The course aims at developing advanced oral proficiency in rapid idiomatic speech. Topics of contemporary significance are selected for discussions. Required for Spanish Majors.

WLSP.3500 Introduction to Literary Analysis (Formerly 54.350) - Credits: 3
In this course, students examine the various definitions and functions of literary language, and the formal aspects of diverse genre: narrative, poetry and essay. In this course, students also study the concept of literature as aesthetic phenomenon and its socio-cultural implications, through concepts such as author, reader, narrator and discourse. Major authors, themes, and genres from both Latin America and Spain are included, with basic concepts of contemporary literary criticism and theory. Taught in Spanish.

WLSP.3510 Latin American Theater (Formerly 54.351) - Credits: 3
Examines Latin American theatrical works as forms of socially accepted resistance and politically charged art forms. The course will consider plays and performances that challenge governments, inequities, and the status quo. In this course, students will study a variety of Latin American plays, as well as performances an political acts that explore these issues.

WLSP.3520 Hispanic Perspectives (Formerly 54.352) - Credits: 3
In this course we will explore some of the foundational texts of Hispanic literature while discussing the intersections of political, literary, and cultural traditions that connect the United States with Spain and Latin America.

WLSP.3710 Hispanic Literature & Film (Formerly 54.371) - Credits: 3
This course examines the relationship between the Hispanic narrative discourse and cinema, including film adaptations of literary works. Modern social and cultural issues, as well as Hispanic self-images. The selected works provide an array of genres and perspectives that reflect the cultural, historical, and socio-political aspects of each period. Taught in Spanish.

WLSP.3750 Latin American and Spanish Cinema (Formerly 54.375) - Credits: 3
An exploration of representative Spanish and latin American films from a variety of major directors. Areas of investigation
include the cinematic representation of nationality, ethnicity, identity, gender, history and politics. This course will be taught in English. Knowledge of Spanish is desirable but not required. Spanish majors and minors will complete written assignments, reviews, quizzes, and exams in Spanish.

WLSP.3940 Enhancing your Knowledge of Spanish - Credits: 3
Designed for students who need/wish to enhance and advance their linguistic skills in Spanish. Conducted entirely in Spanish, the course will focus on the vocabulary of contemporary Spanish as well as selected grammatical and syntactical structures through the analysis of authentic audio, visual and printed texts. Spanish-speaking media (newspapers, radio, podcasts, TV) are readily available on the Web.

WLSP.4010 Spanish Selected Authors (Formerly 54.401) - Credits: 3
Presents an intensive study of the works by a few Spanish and/or Latin American authors.

WLSP.4040 Cervantes (Formerly 54.404) - Credits: 3
In this study of the works of Cervantes participants will complete analysis and readings of either the Don Quijote and/or other works including but not limited to the short stories and the one-act plays.

WLSP.4045 Cervantes' Don Quijote in translation - Credits: 3
Cervantes' Don Quijote will examine new ideas and concepts concerning one of the world's greatest novels. Taught in English, there is no language requirement for this course; however, this course is designed to engage student interest in historically and culturally significant events in Golden Age Spain and to - more importantly - expand student interest in literary criticism of the Spanish Golden Age and of Cervantes' masterwork in particular. Because it is taught in English, this course does not count toward the Spanish major or minor.

WLSP.4090 20th-21st Century Spanish Literature (Formerly 54.409) - Credits: 3
This course explores the most relevant literary movements of 20th and 21st century Spanish peninsular literature through some of its most renowned authors. We will analyze a selection of literary texts in relation to the literary movements in which they are conceived, such as modernism, avant-garde, tremendism, realism, experimentalism, etc. This course also examines key social and cultural issues related to literature of this period, such as the Spanish Civil War (1936-39) and the emergence of new identities and subjectivities in democratic Spain. This course will help students develop a solid understanding of 20th and 21st century Spanish literary culture, and its relevance within a larger European and global context.

WLSP.4100 Realism and the Nineteenth Century Spanish Novel (Formerly 54.410) - Credits: 3
Offers a study of fundamental aspects of life, thought, land itself and its sense of history as reflected in the literary masterpieces of Valera, Galdos, Alarcon, Pereda, and others. An analysis of the literary techniques and fiction of the Realism will be included.

WLSP.4160 The Latin American Novel (Formerly 54.416) - Credits: 3
A study of the development of the Latin American novel. Three major works of Latin American short story writers such as Borges, Cortazar, Marquez, Rulfo.

WLSP.4910 Directed Studies in Spanish Literature (Formerly 54.491) - Credits: 3
Individual research projects in Spanish literature. Students, through regular and frequent consultation with their instructor, develop a course of directed study in Spanish literature and define a problem for individual research. The student’s findings are presented in a paper of significant proportions. Permission of Instructor.

WLSP.4920 Directed Study in Latin America (Formerly 54.492) - Credits: 1-4
Individual research projects in Latin American topics. Students, through regular and frequent consultation with their instructor, develop a course of directed study in a specific Latin American topic and define a problem for individual research. The student’s findings are presented in a paper of significant proportions. Permission of Instructor.

WLSP.4930 Directed Studies in Spanish Composition (Formerly 54.493) - Credits: 3
Students, through regular and frequent consultation with their instructor, pursue a special program of composition or creative expression.

WLSP.4940 Independent Study in Spanish (Formerly 54.494) - Credits: 1-6
Students, through regular and frequent consultation with their instructor, develop a course of independent study in Spanish culture and define a problem for individual research. The student’s findings are presented in a paper of significant proportions.

**WLSP.4950 Advanced Spanish Tutorial (Formerly 54.495) - Credits: 3**

A program of directed study which affords advanced students an additional opportunity to pursue a previously explored problem in greater depth or to initiate an additional problem. The purpose is to sharpen and refine techniques for scholarly research and presentation and for creative expression.

**WLSP.4960 Spanish Practicum Experience (Formerly 54.496) - Credits: 1-9**

A program of on-campus and/or off-campus experiences for Spanish or Modern Language majors only. Specific requirements vary depending upon faculty policies and the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural, or artistic area and for applying techniques of problem solving and/or skills which are appropriate to the student’s major discipline. May be repeated for a maximum of nine credits. Students are graded satisfactory, or unsatisfactory. The practicum experience may not be substituted for a required course in the major.
College of Fine Arts, Humanities & Social Sciences

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A student’s catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

American Studies

- General Option
  - fall 2015 and beyond
  - fall 2012 - spring 2015
- Thematic Option
  - fall 2021 and beyond
  - fall 2015 - spring 2021
- Corrugated Option
  - fall 2016 and beyond
  - fall 2015 - spring 2016

Art

- Animation & Interactive Media Concentration
  - fall 2017 and beyond
- Graphic Design Concentration
  - fall 2015 - spring 2020
- Studio Art Concentration
  - fall 2022 and beyond

Composition for New Media

- fall 2022 and beyond
- fall 2019 - spring 2022

Criminal Justice

- General Option
  - fall 2022 and beyond

Graduate – All Colleges
Digital Media

- fall 2021 and beyond

Economics

- fall 2015 and beyond

English

- Literature Concentration
  fall 2021 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Journalism &Professional Writing Concentration
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Creative Writing Concentration
  fall 2018 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Theatre Arts Concentration
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Graphic Design

- fall 2021 and beyond
- fall 2020 - spring 2021
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

History

- fall 2020 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Liberal Arts

- fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Music Studies

- General Option fall 2022 and beyond
  fall 2018 - spring 2022
- Instrumental Option fall 2015 - spring 2018
  prior to fall 2015
- Voice Option fall 2015 - spring 2018
  prior to fall 2015

Music Performance

- Instrumental Option fall 2022 and beyond
  fall 2019 - spring 2022
- Voice Option fall 2022 and beyond
  fall 2019 - spring 2022

Music Business

- fall 2022 and beyond
- fall 2015 - spring 2022
- prior to fall 2015

Peace and Conflict Studies

- fall 2021 and beyond
- fall 2015 - spring 2021
Philosophy

- General Option
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Communications & Critical Thinking Option
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Philosophy & Religious Studies Option
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Political Science

- American Politics Concentration fall 2020 and beyond
- International Relations and Comparative Politics Concentration fall 2020 and beyond
- Law and Politics Concentration fall 2020 and beyond
- Political Communication and Public Opinion Concentration fall 2020 and beyond
- Sustainability and Environmental Politics Concentration fall 2022 and beyond

Political Science (prior to fall 2020)

- fall 2015 - spring 2020
- fall 2013 - spring 2015

Psychology

- General Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2017 - spring 2022
  fall 2015 - spring 2017 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Behavior Analysis Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2018 - spring 2022
  fall 2017 - spring 2018 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Community Social Psychology Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2018 - spring 2022
  fall 2017 - spring 2018 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Clinical Psychology Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2018 - spring 2022
  fall 2017 - spring 2018 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Developmental Disabilities Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2018 - spring 2022
  fall 2017 - spring 2018 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Health Psychology Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2018 - spring 2022
  fall 2017 - spring 2018 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Quantitative Economics

- fall 2022 and beyond

Sociology

- General Concentration fall 2016 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Policy & Social Problems Concentration fall 2021 and beyond
beyondfall 2016 - spring 2021
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Racial Equity and Inclusion Concentration fall 2021 and beyond

Sound Recording Technology

- fall 2022 and beyond
- fall 2019 - spring 2022
- fall 2015 - spring 2019
- prior to fall 2015

World Languages and Cultures

- French Option
  fall 2018 and beyondfall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- French/Spanish Option fall 2018 and beyondfall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Italian/Spanish Option
  fall 2018 and beyondfall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Spanish Option
  fall 2018 and beyondfall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Degree Pathways

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university.

Composition for New Media

- fall 2022 and beyond
- fall 2019 - spring 2022

Music Studies

- General Option fall 2022 and beyondfall 2018 - spring 2022
- Instrumental Option fall 2015 - spring 2018 prior to fall 2015
- Voice Option fall 2015 - spring 2018 prior to fall 2015

Music Performance

- Instrumental Option fall 2022 and beyondfall 2019 - spring 2022fall 2015 - spring 2019 prior to fall 2015
- Voice Option fall 2022 and beyondfall 2019 - spring 2022fall 2015 - spring 2019 prior to fall 2015

Music Business

- fall 2022 and beyond
- fall 2015 - spring 2022
- prior to fall 2015

Sound Recording Technology

- fall 2022 and beyond
- fall 2019 - spring 2022
- fall 2015 - spring 2019
- prior to fall 2015
MUHI.1010 European Art Music (Formerly 74.101) - Credits: 1

An aural introduction to the various types of European concert music from the 18th through the 20th century. This course emphasizes aural acquaintance with literature and genre and consists of in-class listening and discussion designed to enhance the aural experience. Required of all first year music majors as a prerequisite to Music History 1 and 2.

MUHI.1020 Introduction To Non European Musics (Formerly 74.102) - Credits: 1

An introduction to selected world musics from a contextual perspective which explores music as an integral part of both society and culture and its function in labor, ritual and celebration. Aspects of instrumental classification, spontaneity and improvisation, as well as elements of music as both organized sound and silence in all cultures will be considered. This includes timbre, melody, rhythm, harmony, form, and texture. Required of all first year music majors as a prerequisite to Music History 1 and 2.

MUHI.1040 Musical Practices I (Formerly 74.104) - Credits: 1

Musical Practices I includes the basic study of musical elements, vocabularies, and concepts in Western musical traditions, supplemented with global perspectives. Students will develop critical inquiry skills to study how music is experienced throughout Western culture, broadening the student's understanding of different musical structures, diverse arenas of production, while exploring professional, creative outlets for this knowledge. At the same time common conventions of musical style will be examined which tie the Western tradition together regardless of when or where the music originated.

MUHI.1050 Musical Practices 2 (Formerly 74.105) - Credits: 1

Musical Practices 2 builds upon the basic study of musical elements, vocabularies, and concepts established in Musical Practices 1, extending the exploration of these principles in more depth, with a primary focus on non-western musical traditions and cultural practices.

MUHI.2161 Music of Western Civilization: Antiquity-Mid 18th Century (Formerly 74.161/MUHI.1610) - Credits: 3

Students will listen to and learn to understand Western European Art music from the earliest times through the Middle Ages, Renaissance, Baroque, and 18th-century Classical era. We will examine significant composers, forms, and styles, and explore such things as the kinds of music people sang and played, the instruments they played, how music has been used in worship and in the theater, how the historical context influenced composers’ procedures and decisions, how music from several hundred years ago has influenced music of today, and why music has been on of the most enduring forms of community and culture in Europe and America. Open to non-music majors only.

MUHI.2162 Music of Western Civ.: Classical Era¿21st Century - Credits: 3

Overview of basic elements common to all music of Western Culture, such as melody, harmony, rhythm, timbre, and texture, followed by a survey of music from the late eighteenth-century Classical era into the 21st century. Significant forms, styles, composers, and aesthetic concepts are examined, including the music of such composers as Beethoven, Tchaikovsky, Debussy, and Stravinsky. Open to non-music majors only. Prerequisite: none.

MUHI.2610 Music History 1 (Formerly 74.261) - Credits: 3

Studies sacred and secular musical forms from pre-Christianity to 1750.

MUHI.2620 Music History 2 (Formerly 74.262) - Credits: 3

Analyzes musical forms and styles from 1750 to present.

MUHI.3010 American Music (Formerly 74.301) - Credits: 3

An historical, cultural and contextual survey of diverse styles of concert and vernacular music in the United States from the colonial era to the present. Open to music and non-music majors.

MUHI.3110 American Musical Theatre (Formerly 74.311) - Credits: 3

An intensive study of the position of the American musical theater, this course examines contributions to musical thought, and traces the development of the musical style from its origins to the present through musical study and analysis, historical research, and critical interpretation.

MUHI.3550 Jazz (Formerly 74.355) - Credits: 3

An intense study of the history of jazz from its origins to the present, covering a wide selection of styles and schools of jazz.
in various ensemble configurations.

MUHI.3610 History Of Opera - Credits: 3
MUHI.3860 History of Rock Music (Formerly 74.386) - Credits: 3
Traces the roots of American popular music from its origins and influences from the earliest European song forms to American folk songs, Gospel, Country, Rhythm and Blues, Jazz, and other popular forms up through current trends as related to the development of the music industry and other socio-musical influences of the commercial song from the 1500s to the present.

MUHI.4001 Introduction to Ethnomusicology - Credits: 3
This course is designed to introduce students to the basic principles of ethnomusicology beginning with a survey of the historical development of ethnomusical thought form the late 19th century to the present. Fieldwork methodology will be examined in depth, and a final project incorporating interviews, field observation, and musical transcription will allow student to put theory into practice. Permission of Instructor.

MUHI.4040 History of Record Production - Credits: 3
This course surveys the emergent technologies and processes of sound recording from the late 19th century to the present, specifically focusing on the techniques and styles record producers and recording engineering utilize in shaping the conception of musical sound and performance for musicians and their audiences.

MUHI.4560 Film Music (Formerly 74.456) - Credits: 3
A study of music in sound cinema from the 1920s to the present. The course focuses on the expressive, formal, and semiotic function that film music serves, either as sound experienced by the characters, as another layer of commentary to be heard only by the viewer, and/or some mixture of the two. Composers to be studied include Max Steiner, Bernard Hermann, Jerry Goldsmith, John Williams, Danny Elfman, and others, as well as film scores that rely upon a range of musical styles, including classical, popular, and non-Western. The singularly most important goal of the course will be to study how music functions in a given film, regardless of its musical style. In the process, ancillary ideas will emerge including discovering how music establishes psychological moods, guides emotions, and reveals aspects of the narrative structure of the film. By the end of the course, the student will have gained a greater understanding of both music and film and it is likely that students will never watch or listen another movie in quite the same way.

MUHI.4950 Directed Study: Music History (Formerly 74.495) - Credits: 3
Individual work under the supervision of a member of the music history faculty. May be repeated with permission of the chairperson.

MUTH.1000 Fundamentals of Musicianship (Formerly 71.100) - Credits: 3
A study of the visual and aural symbolics of music and their application to the comprehension of the architectural, organizational, and aural elements of music literature.

MUTH.1010 Music Theory 1 (Formerly 71.101) - Credits: 3
An intensive study of the theoretical language of music. Stresses part writing in S.A.T.B. and basso continuo realization with a free instrumental part which utilizes free voice leading relative to the use of non-harmonic activity and the harmonic principles through first and second inversion triads. Instruments of the string section are covered, and appropriate listening assignments are given. Original composition in the style being studied is required.

MUTH.1020 Music Theory 2 (Formerly 71.102) - Credits: 3
Serves as a continuation of the practices of 71.101 relative to part writing (both vocal and instrumental) including secondary triads, the Neapolitan sixth, modal interchange, dominant sevenths in inversion and root position, modulation, and secondary dominants. Instrumentation covers the woodwind section, and original composition in the style being covered is required.

MUTH.1030 Aural Skills 1 (Formerly 71.103) - Credits: 1
Development of basic sight singing, listening, and dictation skills as they relate to music theory and analysis. Activities include singing (using moveable do/tone do solmization), listening, and dictation (melodic, harmonic and rhythmic) of diatonic music. Music majors only. Coreq. 710.101

MUTH.1040 Aural Skills 2 (Formerly 71.104) - Credits: 1
Development of basic sight singing, listening and dictation
skills as they relate to music theory and analysis. Activities include singing (using moveable do/tonic do solmization), listening, and dictation (melodic, harmonic and rhythmic) of more diatonic music. Music majors only. Prerequisite: 71.101 and 71.103. Coreq. 71.102

MUTH.1050 Freshman Chorus (Formerly 71.105) - Credits: 0

A vocal ensemble consisting of all first-year music students, the Choir aims to build a community among those students by having them all share a common experience. Whether they have an extensive musical background or are novice musicians with little or no formal training, the First-Year Choir is intended to help students overcome the natural apprehensions that are associated with the first year of college. Additionally, the Choir will encourage ALL students to be comfortable singing in front of their peers and instructors, thereby making their experience in Aural Skills less daunting.

MUTH.1080 Musicianship & Analysis 1 (Formerly 71.108) - Credits: 4

An intensive, critical and integrated study of musical concepts. Through applied experiences composing, improvising, writing, performing, listening, and analyzing, students will explore and develop competencies in hearing, understanding and applying concepts of musical sound, timbre, and texture; time, shape, and form; pulse; meter; rhythmic subdivision; melodic contour; plainchant; pentatonic melodies; and interlocking melodic systems.

MUTH.1090 Musicianship & Analysis 2 (Formerly 71.109) - Credits: 4

An intensive, critical and integrated study of intermediate macro, meso, and micro concepts of music and musicianship. Through applied experiences composing, improvising, writing, performing, listening and analyzing, students will explore and develop competencies in hearing, understanding and applying concepts of compound meters; rhythmic subdivision (expanded); major and minor scales; counterpoint; triadic harmony; phrases and cadences; and song forms.

MUTH.1100 Basic Music Theory (Formerly 71.110) - Credits: 3

This beginning music theory course provides an introduction to the basics of sound: reading music in bass and treble clefs; diatonic and chromatic notes; note and rest values; rhythm, meter, and time signatures; intervals; modes and scales; key signatures; and triads. Non-majors only.

MUTH.1110 Basic Music Theory 2 (Formerly 71.111) - Credits: 3

Basic Music Theory 2 builds upon the music theory concepts and skills developed in Basic Music Theory (71.110). This class will include an introduction to the structure of tonality; diatonic chords in keys; counterpoint; chord inversion; figured bass; voice-leading in four voices; seventh chords; phrases and cadences; embellishing tones; principles of harmonic progression, and analysis. Non-Music Majors only.

MUTH.1200 Musicianship and Analysis Keyboard Lab (Formerly 71.120) - Credits: 2

This lab will provide basic keyboard skills required to successfully complete the Musicianship and Analysis sequence including understanding the piano keyboard, notational reading skills in both treble and bass clefs, fingering techniques, left and right hand coordination, and approaches to chord voicings and the execution of melodic improvisation.

MUTH.2010 Music Theory 3 (Formerly 71.201) - Credits: 3

A continuation of practices of Music Theory II relative to part writing both vocal and instrumental including remote modulation and satellite keys, the diminished seventh, augmented sixth, ninth, eleventh, and thirteenth extensions, sequential secondary dominants and secondary sevenths. Instrumentation covers the brass section; original work in the style being covered and in various formal configuration is required.

MUTH.2020 Music Theory 4 (Formerly 71.202) - Credits: 3

A study of twentieth century music theory via a compositional approach relative to tertial, quartal, and secundal vertical sonorities, and linear combinations featuring modal and synthetic scale resources as well as serial and preserial atonality.

MUTH.2030 Aural Skills 3 (Formerly 71.203) - Credits: 1

Presents an intensive application of requisite skills to chromatic and non-diatonic music, changing and composite meters, displaced accents, cross rhythms, and a vertical approach to reading often necessary in the study of scores. Advanced tonal as well as tonal literature is considered. Harmonic dictation continues to follow the sequence and progress of 71.201.

MUTH.2040 Aural Skills 4 (Formerly 71.204) - Credits: 1
A concentration on the techniques employed in solving the notation and musical problems of the music of the 20th century. The consideration include synthetic and nonwestern scales, pitch sets and twelve-tone serialism.

**MUTH.2080 Musicianship & Analysis 3 (Formerly 71.208) - Credits: 4**

An intensive, critical, and integrated study of intermediate macro, meso, and micro concepts of music and musicianship. Through applied experiences composing, improvising, writing, performing (vocally, on keyboard and on the students primary instrument), listening and analyzing, students will explore and develop competencies in hearing, understanding and applying concepts of pitch modes; syncopation; mixed meters; extended harmony; expanded song forms, and multi-timbral transcription.

**MUTH.2090 Musicianship & Analysis 4 (Formerly 71.209) - Credits: 4**

An intensive, critical, and integrated study of advanced macro, meso, and micro concepts of music and musicianship. Through applied experiences composing, improvising, writing, performing (vocally, on keyboard and on the students primary instrument), listening and analyzing, students will explore and develop competencies in hearing, understanding and applying concepts of multi-timbral transcription; chromaticism; microtonal intonation; polyrhythm; extended modulations; altered chords and extensions; polytonality; and atonality.

**MUTH.3001 Songwriting - Credits: 3**

This course is designed to facilitate a greater range of creative expression for aspiring songwriters by analyzing the musical and lyric components of song composition, posing songwriting problems to be solved, and developing an identifiable musical style.

**MUTH.3350 Arranging (Formerly 71.335) - Credits: 3**

Analysis and practical application of techniques of scoring for vocal and instrumental combinations in varied configurations. Scoring projects for in-class performance, effective arranging of music in a variety of styles, and problem solving for the arranger will be included.

**MUTH.4950 Directed Study in Music Theory (Formerly 71.495) - Credits: 3**

Individual work under the supervision of a member of the music theory faculty on a wide variety of topics approved by the instructor and the theory faculty. Permission of chairperson required.
## Sample Degree Pathway for Music Business

**For students who entered prior to fall 2015.**

### Freshman Year

#### Fall Semester

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| xxxx.xxxx               | Science w/lab (Gen. Ed. Sci.) | 3/4 |

| Total                   |                                  | 15/16 |

#### Spring Semester

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| xxxx.xxxx               | Science w/lab | 3/4 |

| Total                   |                                  | 15/16 |

### Sophomore Year

#### Fall Semester

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| Total                   |                                  | 16 |

#### Spring Semester

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**Junior Year**

**Fall Semester**

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**Spring Semester**

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**Senior Year**

**Fall Semester**

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<td>xxxxx.xxxx</td>
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**Spring Semester**

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</table>

**Total Minimum Credits = 127-129**

1 Consult with your advisor. Depending upon Internship placement, this course may not be required.

Please see advisor or Music Office for more specific requirements pertaining to Freshman Chorus, Recital Attendance, Applied Music, Ensembles and Internships.
Refer to the General Education [website](https://www.uml.edu/Academics/undergraduate-programs/core-curriculum/Gened/default.aspx) for General Education requirements.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved [here](https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy [here](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

*Last updated: 6/12/2018*

### Sample Degree Pathway for Music Business

**For students who entered fall 2015 to spring 2022.**

#### Freshman Year

**Fall Semester**

<table>
<thead>
<tr>
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<th>Course Name</th>
<th>Credits</th>
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**Spring Semester**

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#### Sophomore Year

**Fall Semester**

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**Spring Semester**

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### Junior Year

#### Fall Semester

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<td>Principles of Microeconomics (SS), (QL)</td>
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#### Spring Semester

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### Senior Year

#### Fall Semester

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<td>MUBU.4040</td>
<td>Music Entrepreneurship</td>
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<td>xxxx.xxxx</td>
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#### Spring Semester

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<th>Course Name</th>
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<td>Intro to Stats. (MATH)</td>
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Total Minimum Credits = 127-129

1Consult with your advisor. Depending upon internship
placement, this course may not be required.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements.

- Department Specific Policies

Please see advisor or contact the Music Department for more specific requirements pertaining to Freshman Chorus, Recital Attendance, Applied Music, Ensembles and Internships.

Current UMass Lowell students should be using their Advisement Report in SiS. If you need assistance, please contact your adviser.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

Last updated: 6/12/2018

Sample Degree Pathway for Music Business

For students who entered fall 2022 and beyond.

Freshman Year

Fall Semester

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Spring Semester

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Sophomore Year
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Total Minimum Credits = 127-129

Consult with your advisor. Depending upon internship placement, this course may not be required.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements.

- Department Specific Policies

Please see advisor or contact the Music Department for more specific requirements pertaining to Freshman Chorus, Recital Attendance, Applied Music, Ensembles and Internships.

Current UMass Lowell students should be using their Advisement Report in iSiS (http://www.uml.edu/enrollment/sis/default.aspx). If you need assistance, please contact your adviser.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

*Last updated: 3/17/2022*
MUBU.2010 Computers In Music Business (Formerly 77.201) - Credits: 3
This course provides students with fundamental collaborative computing tools applicable to the music industry. Topics will include standard office applications, web tools, and media processing tools. Students will develop skills and efficiency through collaboration with each other and outside artists. The internet will provide opportunities for researching relevant sharing platforms for the effective dissemination of information. Projects to include e-press kit creation/promotional website, video creation, and other media development.

MUBU.3010 Music Business 1 (Formerly 77.301) - Credits: 3
A systematic look at career options in the Music Industry. Topics discussed include: songwriting, music publishing, national and international copyright law, music licensing, artist management, and concert promotion.

MUBU.3020 Music Business 2 (Formerly 77.302) - Credits: 3
A systematic look at career options in the Music Industry. Topics include: music merchandising, arts administration, record promotion, marketing, and distribution, radio and television broadcasting, advertising and jingle production, and film scoring.

MUBU.3030 Music Publication and Copyright (Formerly 77.303) - Credits: 3
A thorough study of the legal environment within the Music Industry. Topics discussed include: music publishing, national and international copyright law, live performance, managers & agents, music organizations, recording agreements, music publishing, film and television music production, music merchandising, and other contractual obligations.

MUBU.3040 Music Promotion and Merchandising (Formerly 77.304) - Credits: 3
A thorough study of the principles and application of marketing, promotion, and distribution of products within the Music Industry. Case studies of various music products and companies will be studied and analyzed.

MUBU.4010 Music Business Seminar (Formerly 77.401) - Credits: 3
Prepares students to undertake their Internship by providing an in-depth study of how to prepare successfully to enter a career path.

MUBU.4040 Music Business Entrepreneur (Formerly 77.404) - Credits: 3
An in-depth study of how to start a successful business within the Music Industry. Case studies of successful entrepreneurs and their companies will be researched and analyzed. Students will develop a written Business Plan for their own Music Business enterprise.

MUBU.4950 Directed Studies In Music Business (Formerly 77.495) - Credits: 3
Permission of coordinator required.

MUBU.4991 Music Business Internship (Formerly 77.499) - Credits: 6
Music Business Internship
LMUCM.1990 Music Composition 1000 Elective - Credits: 3
Music Composition 1000 Elective.

LMUCM.2990 Music Composition 2000 Elective - Credits: 3
Music Composition 2000 Elective.

LMUCM.3990 Music Composition 3000 Elective - Credits: 3
Music Composition 3000 Elective

LMUCM.4990 Music Composition 4000 Elective - Credits: 3
Music Composition 4000 Elective.

MUCM.1010 Audio Production Fundamentals - Credits: 1
An introduction to sequencing, looping, editing, and mixing concepts in digital audio workstations. Students learn basic digital gain staging, scoring and sound design, realization of MIDI mock ups, audio theory, file maintenance and workflow strategies through hands-on laboratory exercises with keyboard controllers, software synthesizers, and sample libraries.

MUCM.1030 Applied Composition I - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUCM.1040 Applied Composition 2 - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUCM.1990 Music Composition 1000 Level Elective - Credits: 3
Music Composition 1000 Level Elective.

MUCM.2010 Keyboarding for Arrangers I - Credits: 1
Group instruction in basic re-harmonization techniques and their practical application for realizing original compositions. The course explores block chords, arranging concepts, modal textures, and counterpoint. Students develop keyboarding techniques for arranging purposes.

MUCM.2020 Keyboarding for Arrangers II - Credits: 1
A deeper exploration of re-harmonization techniques and voicing concepts along with their applications in medium and large ensemble writing. Students apply block-chord techniques, transcription, and simple improvisation to realize new arrangements and compositions along with developing functional two-handed keyboard technique in a variety of contemporary styles.

MUCM.2030 Applied Composition 3 - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUCM.2040 Applied Composition 4 - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUCM.2080 Advanced Music Editing and Production - Credits: 2
Editing concepts are developed and refined during the post-production phase. Students learn tempo-mapping techniques, advanced synchronization with dialog and effects, mixing and final delivery concepts so that soundtrack elements appropriately support the visual medium. Students explore the role of temporary scores to guide creative and editing decisions. Students transcribe and prepare scores for a variety of ensembles and learn the principles of transposition, ornamentation, layout and note accuracy. Final project includes an original notated score for visual media. Permission of Instructor.

MUCM.2090 Digital Synthesis and Remixing -
Credits: 3
This course introduces the concept of the "sound collage" for creative purposes. Students gather commonly accessible sounds with portable recorders and explore synthesis techniques using digital audio workstations. The course explores the expressive role of sound in commercial applications, mash ups, and music composition. Includes a historical overview and discussion of etroacoustic music.

MUCM.2990 Music Composition 2000 Level Elective - Credits: 3
Music Composition 2000 Level Elective.

MUCM.3010 Creative Applications in Sound Design - Credits: 3
The role of sound design is explored in interactive media, live performance, web and mobile platforms and visual content. Students compose original soundtrack elements through field recordings, ambient spaces, and creative environments using coding language. Historical analysis of the role of sound in film, television, games, and interactive media supports laboratory exercises and group projects.

MUCM.3020 Commercial Music Arranging - Credits: 3
Contemporary jazz arranging for instruments and voice. Course includes topics such as melodic development, stylistic diversity, rhythm section considerations, virtual s. acoustic instrumentation, sequences and loops, range and articulations, background figures and five-part writing. Final project includes and original "Supersax" arrangement for modern studio instrumentation.

MUCM.3030 Applied Composition 5 - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUCM.3040 Applied Composition 6 - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUCM.3050 Special Topics in Composition - Credits: 3
This course explores interdisciplinary collaboration with the Art, Theater, and Digital Media areas. Contemporary issues and practices in music composition are explored through approved practicum experiences, directed study, guest lectures, group collaborative projects, and independent research.

MUCM.3060 Composition Seminar - Credits: 2
Group instruction in writing for solo performers and small ensembles. Students write individual pieces and receive weekly feedback from peers and faculty members. The composer-artist relationship is explored in depth along with a live recital performance of student compositions.

MUCM.3070 Sound Narrative - Credits: 2
This course introduces creative applications of sound for inclusion in long-form narrative structures including soundscapes, podcasts, and installations, with a particular emphasis on the immersive role of sound in documenting authentic and abstract environments. The course explores the pioneering work of artist/composers including Barry Truax, Bernard Krause, Brian Eno, and includes discussions of listener perception and acoustic ecology. Basic approaches in surround sound mixing are explored to support compositional practice.

MUCM.3090 Eurhythmics and Improvisation - Credits: 1
Instruction in Dalcroze Eurhythmics concepts. Topics include rhythmic movement, body motion, multimodal ear-training approaches, improvisation and performance aesthetics. Students learn complex rhythmic concepts through simple dance motions, group interaction, and multi-sensory listening. Course includes approaches for solo and group improvisation for composers and performers.

MUCM.3160 Digital Orchestration and Counterpoint - Credits: 3
Writing and arranging for large ensembles using high quality sample libraries. Melodic development concepts are explored along with basic orchestration principles for strings, woodwinds, brass, and percussion. MIDI optimization concepts including quantization, key switching, and multitimbral layers are refined through laboratory projects.

MUCM.3990 Music Composition 3000 Level Elective
- Credits: 3

Music Composition 3000 Level Elective.

MUCM.4000 Music and Sound for Games - Credits: 3

Integration of original music, sound effects, and dialog assets into standard game engine software. The course explores audio implementation, scripting and basic coding concepts using middleware platforms. Permission of instructor.

MUCM.4010 Scoring for Visual Media - Credits: 3

Creating fully realized musical scores for video, television, web, and advertising. Tempo and synchronization issues are addressed along with basic sound design concepts. Students analyze the role of music in supporting the visual image along with comprehensive study of successful composers of the past three decades.

MUCM.4020 Music and Multimedia Production - Credits: 3

This course introduces multi-platform production approaches in music and sonic composition. Students explore the fundamentals of still-image and color manipulation, video editing, and contemporary recording techniques for creative purposes. Composers are encouraged to write multi-channel pieces that explore sound in diverse environments. Students learn basic video editing, motion graphics and color manipulation.

MUCM.4030 Applied Composition 7 - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUCM.4040 Applied Composition 8 - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUCM.4070 Contemporary Styles and Analysis - Credits: 3

Twentieth-century compositional practices are studied from a variety of musical, cultural, social, political, and creative perspectives. The availability and impact of technology on compositional aesthetics is explored along with discussions about emerging trends in new media, sound art, installations, and mobile technology.

MUCM.4090 Senior Project Capstone - Credits: 3

Students must propose a final project before their senior year to be completed under faculty supervision. The project demonstrates the student’s mastery of contemporary music composition and/or sound design concepts, critical thinking, interdisciplinary collaboration, and reflective practices. Students may collaborate with other departments with Coordinator/Department Chair approval.

MUCM.4990 Music Composition 4000 Level Elective - Credits: 3

Music Composition 4000 Level Elective.
Sample Degree Pathway for Music Performance - Instrumental Option

For students who entered prior to fall 2015.

Freshman Year

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Total 15

Sophomore Year

Fall Semester

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Spring Semester

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Spring Semester

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## Junior Year

### Fall Semester

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## Senior Year

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<td>Chamber Ensemble</td>
<td>1</td>
</tr>
<tr>
<td>MUAP.4990</td>
<td>Senior Recital</td>
<td>1</td>
</tr>
</tbody>
</table>
Total Minimum Credits = 122-124

Please see advisor or Music Office for more specific requirements pertaining to Freshman Chorus, Recital Attendance, Applied Music, Ensembles and Internships.

Refer to the General Education (https://www.uml.edu/Academics/undergraduate-programs/core-curriculum/Gened/default.aspx) website for General Education requirements.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last updated: 10/26/2017

Sample Degree Pathway for Music Performance - Voice Option

For students who entered prior to fall 2015.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUTH.1050</td>
<td>Freshman Chorus</td>
<td>0</td>
</tr>
</tbody>
</table>

Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUAP.1110</td>
<td>Applied Voice 1</td>
<td>2</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
<td>2</td>
</tr>
<tr>
<td>MUTH.1080</td>
<td>Musicianship &amp;Analysis 1</td>
<td>4</td>
</tr>
<tr>
<td>MUHI.1040</td>
<td>Musical Practices 1</td>
<td>1</td>
</tr>
<tr>
<td>ENGL.1010</td>
<td>College Writing I (Gen. Ed.)</td>
<td>3</td>
</tr>
<tr>
<td>MATH.1110/1510</td>
<td>Math (Gen. Ed. - MA)</td>
<td></td>
</tr>
</tbody>
</table>

Total

Sophomore Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUTH.1090</td>
<td>Musicianship &amp;Analysis 2</td>
<td>4</td>
</tr>
<tr>
<td>MUHI.1200</td>
<td>M&amp;AKeyboard Lab</td>
<td>2</td>
</tr>
<tr>
<td>MUHI.1050</td>
<td>Musical Practices 2</td>
<td>1</td>
</tr>
<tr>
<td>ENGL.1020</td>
<td>College Writing II (Gen. Ed.)</td>
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Total

1 5
### Junior Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
</tr>
<tr>
<td>MUAP.2620</td>
<td>Performance Voice 3</td>
<td>3</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
<td>2</td>
</tr>
<tr>
<td>MUTH.2090</td>
<td>Musicianship &amp;Analysis 4</td>
<td>4</td>
</tr>
<tr>
<td>MUHL.2620</td>
<td>Music History 2 (Gen. Ed. - AH)</td>
<td>3</td>
</tr>
<tr>
<td>MUPF.2340</td>
<td>Conducting 2</td>
<td>2</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Foreign Language</td>
<td>3</td>
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<tr>
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### Senior Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
</tr>
</tbody>
</table>
### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
<td>2</td>
</tr>
<tr>
<td>MUAP.4610</td>
<td>Performance Voice 6</td>
<td>3</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Chamber Ensemble 1</td>
<td></td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Upper Level Music Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Social Science (Gen. Ed. - SS)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Social Science (Gen. Ed. - SS)</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
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</tr>
</tbody>
</table>

**Total Minimum Credits = 122-125**

Please see advisor or Music Office for more specific requirements pertaining to Freshman Chorus, Recital Attendance, Applied Music, Ensembles and Internships.

Refer to the [General Education](https://www.uml.edu/Academics/undergraduate-programs/core-curriculum/Gened/default.aspx) website for General Education requirements.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved.

---

**Sample Degree Pathway for Music Performance - Instrumental Option**

For students who entered fall 2015 to spring 2019.

### Freshman Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUTH.1050</td>
<td>Freshman Chorus</td>
<td>0</td>
</tr>
<tr>
<td>MUAP.1xxx</td>
<td>Applied Music 1</td>
<td>2</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
<td>2</td>
</tr>
<tr>
<td>MUTH.1080</td>
<td>Musicianship &amp;Analysis 1</td>
<td>4</td>
</tr>
<tr>
<td>MUHL.1040</td>
<td>Musical Practices 1</td>
<td>1</td>
</tr>
<tr>
<td>ENGL.1010</td>
<td>College Writing I (CW)</td>
<td>3</td>
</tr>
<tr>
<td>MATH.xxxx</td>
<td>Math Persp. (MATH)</td>
<td></td>
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</tbody>
</table>

prior to enrollment. See the [catalog policy](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

*Last updated: 10/26/2017*
### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUTH.1050</td>
<td>Freshman Chorus</td>
<td>0</td>
</tr>
<tr>
<td>MUAP.1x20</td>
<td>Performance Applied 1</td>
<td>3</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
<td>2</td>
</tr>
<tr>
<td>MUTH.1090</td>
<td>Musicianship &amp; Analysis 2</td>
<td>4</td>
</tr>
<tr>
<td>MUTH.1200</td>
<td>M&amp;AKeyboard Lab</td>
<td>2</td>
</tr>
<tr>
<td>MUHL.1050</td>
<td>Musical Practices 2</td>
<td>1</td>
</tr>
<tr>
<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
<td>3</td>
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<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
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</table>

### Sophomore Year

#### Fall Semester

<table>
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<th>Course Name</th>
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</thead>
<tbody>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
</tr>
<tr>
<td>MUAP.2x10</td>
<td>Performance Applied 2</td>
<td>3</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
<td>2</td>
</tr>
<tr>
<td>MUTH.2090</td>
<td>Musicianship &amp; Analysis 4</td>
<td>4</td>
</tr>
<tr>
<td>MUHI.2620</td>
<td>Music History 2 (AH)</td>
<td>3</td>
</tr>
<tr>
<td>MUPF.2340</td>
<td>Conducting 2</td>
<td>2</td>
</tr>
<tr>
<td>MUPF.xxxx</td>
<td>Performance Elective</td>
<td>3</td>
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<td></td>
<td><strong>Total</strong></td>
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</table>

#### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
</tr>
<tr>
<td>MUAP.2x20</td>
<td>Performance Applied 3</td>
<td>3</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
<td>2</td>
</tr>
<tr>
<td>MUTH.2090</td>
<td>Musicianship &amp; Analysis 4</td>
<td>4</td>
</tr>
<tr>
<td>MUHI.2620</td>
<td>Music History 2 (AH)</td>
<td>3</td>
</tr>
<tr>
<td>MUPF.2340</td>
<td>Conducting 2</td>
<td>2</td>
</tr>
<tr>
<td>MUPF.xxxx</td>
<td>Performance Elective</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

### Junior Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
</tr>
<tr>
<td>MUAP.3x10</td>
<td>Performance Applied 4</td>
<td>3</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
<td>2</td>
</tr>
<tr>
<td>MUPF.4930</td>
<td>Performance Seminar 1</td>
<td>3</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Chamber Ensemble</td>
<td>1</td>
</tr>
<tr>
<td>MUxx.xxxx</td>
<td>Upper Level Music Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Sciences w/Lab Persp. (SCL)</td>
<td>3/4</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>15/16</strong></td>
</tr>
</tbody>
</table>

#### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
</tr>
</tbody>
</table>
### Senior Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
<td>2</td>
</tr>
<tr>
<td>MUAP.4x10</td>
<td>Performance Applied 6</td>
<td>3</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Chamber Ensemble</td>
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</tr>
<tr>
<td>MUPF.4530</td>
<td>Instrumental Pedagogy</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>15/16</td>
</tr>
</tbody>
</table>

#### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
<td>2</td>
</tr>
<tr>
<td>MUAP.4x20</td>
<td>Performance Applied 7</td>
<td>3</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Chamber Ensemble</td>
<td>1</td>
</tr>
</tbody>
</table>

**Total Minimum Credits = 122-124**

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements.

Please see advisor or Music Office for more specific requirements pertaining to Freshman Chorus, Recital Attendance, Applied Music, Ensembles and Internships.

Current UMass Lowell students should be using their Advisement Report in SiS. If you need assistance, please contact your adviser.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

For students who entered fall 2015 to spring 2019.
## Freshman Year
### Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUTH.1050</td>
<td>Freshman Chorus</td>
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</tr>
<tr>
<td>MUAP.1110</td>
<td>Applied Voice 1</td>
<td>2</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
<td>2</td>
</tr>
<tr>
<td>MUTH.1080</td>
<td>Musicianship &amp;Analysis 1</td>
<td>4</td>
</tr>
<tr>
<td>MUHI.1040</td>
<td>Musical Practices 1</td>
<td>1</td>
</tr>
<tr>
<td>ENGL.1010</td>
<td>College Writing I (CW)</td>
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</tr>
<tr>
<td>MATH.xxxx</td>
<td>Math. Persp. (MATH) - MATH.1110 / MATH.1510</td>
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Total: 15

### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>MUTH.1050</td>
<td>Freshman Chorus</td>
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<tr>
<td>MUAP.1620</td>
<td>Performance Voice 1</td>
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</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
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</tr>
<tr>
<td>MUTH.1090</td>
<td>Musicianship &amp;Analysis 2</td>
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</tr>
<tr>
<td>MUTH.1200</td>
<td>M&amp;AKeyboard Lab</td>
<td>2</td>
</tr>
<tr>
<td>MUHI.1050</td>
<td>Musical Practices</td>
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Total: 15

## Sophomore Year
### Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
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<tr>
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<td>Performance Voice 2</td>
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</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
<td>2</td>
</tr>
<tr>
<td>MUTH.2080</td>
<td>Musicianship &amp;Analysis 3</td>
<td>4</td>
</tr>
<tr>
<td>MUHI.2610</td>
<td>Music History 1 (AH)</td>
<td>3</td>
</tr>
<tr>
<td>MUPF.2330</td>
<td>Conducting 1</td>
<td>2</td>
</tr>
<tr>
<td>WLxx.xxxx</td>
<td>Foreign Language - Italian, German recommended</td>
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</tbody>
</table>

Total: 17

### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
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<tr>
<td>MUAP.2620</td>
<td>Performance Voice 3</td>
<td>3</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
<td>2</td>
</tr>
<tr>
<td>MUTH.2090</td>
<td>Musicianship &amp;Analysis 4</td>
<td>4</td>
</tr>
<tr>
<td>MUHI.2620</td>
<td>Music History 2 (AH)</td>
<td>3</td>
</tr>
</tbody>
</table>
### Junior Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
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<tr>
<td>MUAP.3610</td>
<td>Performance Voice 4</td>
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<td>MUEN.xxxx</td>
<td>Ensembles</td>
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</tr>
<tr>
<td>MUPF.4930</td>
<td>Performance Seminar 1</td>
<td>3</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Chamber Ensemble</td>
<td>1</td>
</tr>
<tr>
<td>MUAP.4630</td>
<td>Vocal Pedagogy &amp; Repertoire</td>
<td>3</td>
</tr>
</tbody>
</table>

| xxxx.xxxx         | Sciences w/Lab Persp. (SCL) | 3/4 |

| Total             |                              | 15/16 |

#### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Recital Attendance</td>
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<tr>
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<td>Performance Voice 5</td>
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<td>Ensembles</td>
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<tr>
<td>MUEN.xxxx</td>
<td>Chamber Ensemble</td>
<td>1</td>
</tr>
<tr>
<td>MUAP.4990</td>
<td>Senior Recital</td>
<td>1</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>STEM Persp. (STEM)</td>
<td>3</td>
</tr>
</tbody>
</table>

| xxxx.xxxx         | Arts and Hum. Persp. (AH)    | 3   |

| Total             |                              | 1/3  |

### Senior Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
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<tbody>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
<td>2</td>
</tr>
<tr>
<td>MUAP.4610</td>
<td>Performance Voice 6</td>
<td>3</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Chamber Ensemble</td>
<td>1</td>
</tr>
<tr>
<td>MUAP.4620</td>
<td>Upper Level Music Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
<td>3</td>
</tr>
</tbody>
</table>

| Total             |                              | 15/16 |

#### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
<td>2</td>
</tr>
<tr>
<td>MUAP.4620</td>
<td>Performance Voice 7</td>
<td>3</td>
</tr>
<tr>
<td>MUEN.xxxx</td>
<td>Chamber Ensemble</td>
<td>1</td>
</tr>
<tr>
<td>MUAP.4990</td>
<td>Senior Recital</td>
<td>1</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>STEM Persp. (STEM)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
</tr>
</tbody>
</table>

| Total             |                              | 1/3  |

**Total Minimum Credits = 122-125**
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_Last updated: 5/01/2019_

**Sample Degree Pathway for Music Performance - Instrumental Option**

_For students who entered fall 2019 to spring 2022._

**Freshman Year**

**Fall Semester**

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
</tr>
<tr>
<td>MUHI.1040</td>
<td>Musical Practices 1</td>
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**Spring Semester**

<table>
<thead>
<tr>
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<th>Course Name</th>
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<tbody>
<tr>
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<tr>
<td>MUHI.1050</td>
<td>Freshman Chorus</td>
<td>0</td>
</tr>
<tr>
<td>MUTH.1090</td>
<td>Musicianship and Analysis 2</td>
<td>4</td>
</tr>
<tr>
<td>MUTH.1200</td>
<td>Musicianship and Analysis Keyboard Lab</td>
<td>2</td>
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<tr>
<td>MUHL.1050</td>
<td>Musical Practices 2 (DCA)</td>
<td>1</td>
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<tr>
<td>MUEN.xxxx</td>
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<tr>
<td><strong>Total</strong></td>
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**Sophomore Year**

**Fall Semester**

<table>
<thead>
<tr>
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<th>Course Name</th>
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<tbody>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
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</tr>
<tr>
<td>MUTH.2080</td>
<td>Musicianship and Analysis 3</td>
<td>4</td>
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<tr>
<td>MUHL.2610</td>
<td>Music History 1 (AH)</td>
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### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
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<tbody>
<tr>
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<tr>
<td>MUHI.2620</td>
<td>Music History 2 (AH), (WOC)</td>
<td>3</td>
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<tr>
<td>MUPF.2020</td>
<td>Performance Applied 4</td>
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<td>MUPF.2120</td>
<td>Mindfulness and Optimal Performance</td>
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<td>MUPF.2000</td>
<td>Mechanics of Movement</td>
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<tr>
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<td>Musicianship and Analysis 4</td>
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### Junior Year

#### Fall Semester

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<tr>
<td>MUPF.3010</td>
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<td>Creative Performance 2: Introductory Recital</td>
<td>2</td>
</tr>
<tr>
<td>MUPF.3820</td>
<td>Media and Marketing for Performing Musicians</td>
<td>2</td>
</tr>
<tr>
<td>MUPF.3460</td>
<td>Improvisation</td>
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<td>MUEN.xxxx</td>
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<td>xxxx.xxxx</td>
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### Senior Year

#### Fall Semester

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<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
</tr>
<tr>
<td>MUPF.3810</td>
<td>The Musician's Toolbox (IL)</td>
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</tr>
<tr>
<td>MUPF.3850</td>
<td>Recording for Performers</td>
<td>2</td>
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<tr>
<td>MUEN.xxxx</td>
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<td>xxxx.xxxx</td>
<td>Sciences w/Lab Persp. (SCL)</td>
<td>3/4</td>
</tr>
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<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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<tr>
<td>Total</td>
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</table>
Sample Degree Pathway for Music Performance - Voice Option

For students who entered fall 2019 to spring 2022.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
</tr>
<tr>
<td>MUHI.1040</td>
<td>Musical Practices 1</td>
<td>1</td>
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<tr>
<td>MUPF.1040</td>
<td>Performance Elective</td>
<td>3</td>
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<tr>
<td>MUSR.1100</td>
<td>Intro to Music Technology</td>
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<tr>
<td>MUTH.1050</td>
<td>Freshman Chorus</td>
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</tr>
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<td>MUTH.1080</td>
<td>Freshman Chorus and Analysis</td>
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<td>Ensembles</td>
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<tr>
<td>MUEN.xxxx</td>
<td>STEM Persp. (STEM)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
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<td>15</td>
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</table>

Total Minimum Credits = 120-122

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Last updated: 8/03/2020

Spring Semester

<table>
<thead>
<tr>
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<th>Course Name</th>
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<tbody>
<tr>
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<td>Performance Applied 8</td>
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<tr>
<td>MUPF.4420</td>
<td>Performance Artistry 2: Capstone Recital (AIL)</td>
<td>2</td>
</tr>
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<td>MUPF.xxxx</td>
<td>Performance Elective</td>
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<td>MUEN.xxxx</td>
<td>Ensembles</td>
<td>2</td>
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<tr>
<td>MATH.xxxx</td>
<td>Math. Persp. (MATH) - MATH.1110 recommended (QL)</td>
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<tr>
<td>xxxx.xxxx</td>
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### Spring Semester

<table>
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<tr>
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<tbody>
<tr>
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<td>College Writing II (CW)</td>
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<tr>
<td>MUHI.1050</td>
<td>Musical Practices 2 (DCA)</td>
<td>1</td>
</tr>
<tr>
<td>MUPF.1020</td>
<td>Performance Applied 2</td>
<td>2</td>
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<tr>
<td>MUTH.1050</td>
<td>Freshman Chorus</td>
<td>0</td>
</tr>
<tr>
<td>MUTH.1090</td>
<td>Musicianship and Analysis 2</td>
<td>4</td>
</tr>
<tr>
<td>MUTH.1200</td>
<td>Musicianship and Analysis Lab</td>
<td>2</td>
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### Sophomore Year

#### Fall Semester

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<thead>
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<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
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<tr>
<td>MUHI.2620</td>
<td>Music History 2 (AH), (WOC)</td>
<td>3</td>
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<tr>
<td>MUPF.2001</td>
<td>Language and Diction</td>
<td>2</td>
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<td>MUPF.2020</td>
<td>Performance Applied 4</td>
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<tr>
<td>MUPF.2120</td>
<td>Mindfulness and Optimal Performance</td>
<td>2</td>
</tr>
<tr>
<td>MUTH.2090</td>
<td>Musicianship and Analysis 4</td>
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#### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
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<tbody>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
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<tr>
<td>MUHI.2610</td>
<td>Music History 1 (AH)</td>
<td>3</td>
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<td>MUPF.2010</td>
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<tr>
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<td>Health, Wellness and the Art of Practice</td>
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<td>MUPF.2330</td>
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<td>Musicianship and Analysis 3</td>
<td>4</td>
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<td>Ensembles</td>
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### Junior Year

#### Fall Semester

<table>
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<th>Course #</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>MUAP.1000</td>
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</tr>
<tr>
<td>MUPF.3010</td>
<td>Performance Applied 5</td>
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<tr>
<td>MUPF.3410</td>
<td>Creative Performance 1: Preparation</td>
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<tr>
<td>MUPF.3810</td>
<td>The Musician’s Toolbox (IL)</td>
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<td>MUPF.3850</td>
<td>Recording for Performers</td>
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### Spring Semester
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<tr>
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<td>Creative Performance 2: Introductory Recital</td>
<td>2</td>
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<tr>
<td>MUPF.3460</td>
<td>Improvisation</td>
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<tr>
<td>MUPF.3820</td>
<td>Media and Marketing for Performing Musicians</td>
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<td>MUEN.xxxx</td>
<td>Ensembles</td>
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**Spring Semester**

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<tr>
<th>Course #</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>MUPF.4020</td>
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<td>Performance Artistry 2: Capstone Recital (AIL)</td>
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<td>Ensembles</td>
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<tr>
<td>xxxx.xxxx</td>
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Last updated: 8/03/2020.

Sample Degree Pathway for Composition for New Media

For students who entered fall 2019 to spring 2022.

**Freshman Year**

**Fall Semester**

<table>
<thead>
<tr>
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<td>College Writing I / FYSH (CW)</td>
<td>3</td>
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<td>MUCM.1010 (<a href="https://www.uml.edu/catalog/courses/MUCM/1010">https://www.uml.edu/catalog/courses/MUCM/1010</a>)</td>
<td>Audio Production Fundamentals</td>
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<td>MUCM.1030 (<a href="https://www.uml.edu/catalog/courses/MUCM/1030">https://www.uml.edu/catalog/courses/MUCM/1030</a>)</td>
<td>Applied Composition 1</td>
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<td>MUHI.1040 (<a href="https://www.uml.edu/catalog/courses/MUHI/1040">https://www.uml.edu/catalog/courses/MUHI/1040</a>)</td>
<td>Musical Practices 1</td>
<td>1</td>
</tr>
<tr>
<td>MUTH.1050 (<a href="https://www.uml.edu/catalog/courses/MUTH/1050">https://www.uml.edu/catalog/courses/MUTH/1050</a>)</td>
<td>Freshman Chorus</td>
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<td>MUTH.1090 (<a href="https://www.uml.edu/catalog/courses/MUTH/1090">https://www.uml.edu/catalog/courses/MUTH/1090</a>)</td>
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<td>MUTH.1200 (<a href="https://www.uml.edu/catalog/courses/MUTH/1200">https://www.uml.edu/catalog/courses/MUTH/1200</a>)</td>
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</tr>
<tr>
<td>MUEN.xxxx (<a href="https://www.uml.edu/catalog/courses/MUEN">https://www.uml.edu/catalog/courses/MUEN</a>)</td>
<td>Ensembles</td>
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<tr>
<td>MATH.xxxx (<a href="https://www.uml.edu/catalog/courses/MATH">https://www.uml.edu/catalog/courses/MATH</a>)</td>
<td>Math. Persp. (MATH), (QL) - MATH.1110 (<a href="https://www.uml.edu/catalog/courses/MATH/1110">https://www.uml.edu/catalog/courses/MATH/1110</a>) recommended</td>
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**Spring Semester**

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<td>College Writing II (CW)</td>
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**Sophomore Year**

**Fall Semester**

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<tr>
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<td>MUCM.2010 (<a href="https://www.uml.edu/catalog/courses/MUCM/2010">https://www.uml.edu/catalog/courses/MUCM/2010</a>)</td>
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<td>MUCM.2030 (<a href="https://www.uml.edu/catalog/courses/MUCM/2030">https://www.uml.edu/catalog/courses/MUCM/2030</a>)</td>
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<td>Musicianship and Analysis 3</td>
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**Spring Semester**

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<td>College Writing I (CW)</td>
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### Junior Year

#### Fall Semester

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#### Spring Semester

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<td>MUCM.3020</td>
<td>Commercial Arranging</td>
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<td>MUCM.3030</td>
<td>Applied Composition 5</td>
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### Senior Year

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<td>MUCM.4010</td>
<td>Scoring for Visual Media</td>
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<td>Music and Multimedia Production</td>
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<td>MUCM.4030</td>
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taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements.

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Last updated: 1/18/2022

Sample Degree Pathway for Composition for New Media

For students who entered fall 2022 and beyond.

Freshman Year

Fall Semester

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Spring Semester

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<td>MUHI.1050</td>
<td>Musical Practices 2 (DCA)</td>
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Sophomore Year

Fall Semester

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### Spring Semester

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<td>MUCM.2090</td>
<td>Digital Synthesis and Remiking</td>
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<td>MUH1.2620</td>
<td>Music History 2 (AH), (WOC)</td>
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### Junior Year

#### Fall Semester

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<td>Commercial Arranging</td>
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### Spring Semester

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<td>MUCM.3000</td>
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<td>Scoring for Visual Media</td>
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<td>MUCM.4020</td>
<td>Music and Multimedia Production</td>
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### Fall Semester

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<td>MUCM.4090 (<a href="https://www.uml.edu/catalog/courses/MUCM/4090">https://www.uml.edu/catalog/courses/MUCM/4090</a>)</td>
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<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
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</tr>
</tbody>
</table>

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*Last updated: 3/16/2022*

### Sample Degree Pathway for Music Performance - Instrumental Option

For students who entered fall 2022 and beyond.

#### Freshman Year

Spring Semester

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#### Sophomore Year

Fall Semester
### Junior Year

#### Fall Semester

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#### Spring Semester

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<td>Media and Marketing for Performing Musicians</td>
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<td>MUPF.3460</td>
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### Senior Year

#### Fall Semester

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#### Spring Semester

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**Academic Catalog 2021 - 2022 / Music Performance - General Information**

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[UMASS LOWELL](#)  

**UNDERGRADUATE / COLLEGE OF FINE ARTS, HUMANITIES AND SOCIAL SCIENCES**

**Pg. 316**
### Fall Semester

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<td><strong>Total</strong></td>
<td></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

### Spring Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUPF.4020</td>
<td>Performance Applied 8</td>
<td>2</td>
</tr>
<tr>
<td>MUPF.4420</td>
<td>Performance Artistry 2: Capstone Recital (AIL)</td>
<td>2</td>
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<tr>
<td>MUPF.xxxx</td>
<td>Performance Elective</td>
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<tr>
<td>MUEN.xxxx</td>
<td>Ensembles</td>
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<tr>
<td>xxx.xxxx</td>
<td>STEM Persp. (STEM)</td>
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<tr>
<td>xxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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</table>

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*Last updated: 3/18/2022*

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### Sample Degree Pathway for Music Performance - Voice Option

**For students who entered fall 2022 and beyond.**

#### Freshman Year

**Fall Semester**

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
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<tr>
<td>ENGL.1010</td>
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<td>MUAP.1000</td>
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<td>MUHI.1040</td>
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<td>MUPF.1010</td>
<td>Performance Applied 1</td>
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<td>MUSR.1100</td>
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### Spring Semester

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<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENGL.1020</td>
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<tr>
<td>MUTH.1090</td>
<td>Musicianship and Analysis 2</td>
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<td>MUTH.1200</td>
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### Fall Semester

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<td>MUPF.2001</td>
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<td>MUPF.2020</td>
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<td>MUPF.2120</td>
<td>Mindfulness and Optimal Performance</td>
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### Junior Year

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<td>MUPF.3010</td>
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<td>MUPF.3410</td>
<td>Creative Performance 1: Preparation</td>
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<td>MUPF.3810</td>
<td>The Musician's Toolbox (IL)</td>
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<td>MUPF.3850</td>
<td>Recording for Performers</td>
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### Spring Semester

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<td>Creative Performance 2: Introductory Recital</td>
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<td>MUPF.3460</td>
<td>Improvisation</td>
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### Senior Year

**Fall Semester**

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<td>MUPF.4110</td>
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### Spring Semester

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prior to enrollment. See the
catalog policy
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

for details.

Last updated: 3/18/2022.
MUAP.0010 Applied Music (Formerly 72.001) - Credits: 0

MUAP.1000 Recital Attendance (Formerly 72.100) - Credits: 0

Required attendance at scheduled Thursday Recital Hours and ten concerts/recital each semester from those listed on the Department of Music Performance Calendar. Seven semesters required of all music majors.

MUAP.1010 Applied Keyboard 1 (Formerly 72.101) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1020 Applied Keyboard 2 (Formerly 72.102) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1050 Applied Music Technology 1 - Credits: 2

Studio instruction in graduated sequence with music technology as the principal instrument. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1060 Applied Music Technology 2 - Credits: 2

Studio instruction in graduated sequence with music technology as the principal instrument. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1110 Applied Voice 1 (Formerly 72.111) -

Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1120 Applied Voice 2 (Formerly 72.112) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1210 Applied Woodwinds 1 (Formerly 72.121) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1220 Applied Woodwinds 2 (Formerly 72.122) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1310 Applied Brass & Percussion 1 (Formerly 72.131) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.
MUAP.1320 Applied Brass & Percussion 2 (Formerly 72.132) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1410 Applied Strings 1 (Formerly 72.141) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1420 Applied Strings 2 (Formerly 72.142) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1520 Performance Keyboard 1 (Formerly 72.152) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1620 Performance Voice 1 (Formerly 72.162) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1720 Performance Woodwinds 1 (Formerly 72.172) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1820 Performance Brass & Percussion 1 (Formerly 72.182) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1920 Performance Strings 1 (Formerly 72.192) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2010 Applied Keyboard 3 (Formerly 72.201) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2020 Applied Keyboard 4 (Formerly 72.202) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.
MUAP.2050 Applied Music Technology 3 - Credits: 2

Studio instruction in graduated sequence with music technology as the principal instrument. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2060 Applied Music Technology 4 - Credits: 2

Studio instruction in graduated sequence with music technology as the principal instrument. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2110 Applied Voice 3 (Formerly 72.211) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2120 Applied Voice 4 (Formerly 72.212) - Credits: 2

Studio instruction in graduated sequence with voice as the principal instrument.

MUAP.2210 Applied Woodwinds 3 (Formerly 72.221) - Credits: 2

Studio instruction in graduated sequence with woodwind as the principal instrument.

MUAP.2220 Applied Woodwinds 4 (Formerly 72.222) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2310 Applied Brass & Percussion 3 (Formerly 72.231) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2320 Applied Brass & Percussion 4 (Formerly 72.232) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2410 Applied Strings 3 (Formerly 72.241) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2420 Applied Strings 4 (Formerly 72.242) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.
MUAP.2510 Performance Keyboard 2 (Formerly 72.251) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2520 Performance Keyboard 3 (Formerly 72.252) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2610 Performance Voice 2 (Formerly 72.261) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2620 Performance Voice 3 (Formerly 72.262) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2710 Performance Woodwinds 2 (Formerly 72.271) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2720 Performance Woodwinds 3 (Formerly 72.272) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2810 Performance Brass & Percussion 2 (Formerly 72.281) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2820 Performance Brass & Percussion 3 (Formerly 72.282) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2910 Performance Strings 2 (Formerly 72.291) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2920 Performance Strings 3 (Formerly 72.292) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.
MUAP.3010 Applied Keyboard 5 (Formerly 72.301) - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3020 Applied Keyboard 6 (Formerly 72.302) - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3050 Applied Music Technology 5 - Credits: 2
Studio instruction in graduated sequence with music technology as the principal instrument. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3060 Applied Music Technology 6 - Credits: 2
Studio instruction in graduated sequence with music technology as the principal instrument. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3110 Applied Voice 5 (Formerly 72.311) - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3120 Applied Voice 6 (Formerly 72.312) - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3210 Applied Woodwinds 5 (Formerly 72.321) - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3220 Applied Woodwinds 6 (Formerly 72.322) - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3310 Applied Brass & Percussion 5 (Formerly 72.331) - Credits: 2
Studio instruction in graduated sequence with brass or percussion as the principal instrument.

MUAP.3320 Applied Brass & Percussion 6 (Formerly 72.332) - Credits: 2
Studio instruction in graduated sequence with brass or percussion as the principal instrument.

MUAP.3410 Applied Strings 5 (Formerly 72.341) - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.
performances.

MUAP.3420 Applied Strings 6 (Formerly 72.342) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3510 Performance Keyboard 4 (Formerly 72.351) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3520 Performance Keyboard 5 (Formerly 72.352) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3610 Performance Voice 4 (Formerly 72.361) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3620 Performance Voice 5 (Formerly 72.362) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3710 Performance Woodwinds 4 (Formerly 72.371) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3720 Performance Woodwinds 5 (Formerly 72.372) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3810 Performance Brass & Percussion 4 (Formerly 72.381) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3820 Performance Brass And Percussion 5 (Formerly 72.382) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3910 Performance Strings 4 (Formerly 72.391) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.
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**MUAP.3920 Performance Strings 5 (Formerly 72.392) - Credits: 3**

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

**MUAP.4010 Applied Keyboard 7 (Formerly 72.401) - Credits: 2**

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

**MUAP.4020 Applied Keyboard 8 (Formerly 72.402) - Credits: 2**

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

**MUAP.4050 Applied Music Technology 7 - Credits: 2**

Studio instruction in graduated sequence with music technology as the principal instrument. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

**MUAP.4060 Applied Music Technology 8 - Credits: 2**

Studio instruction in graduated sequence with music technology as the principal instrument. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

**MUAP.4110 Applied Voice 7 (Formerly 72.411) - Credits: 2**

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

**MUAP.4120 Applied Voice 8 (Formerly 72.412) - Credits: 2**

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

**MUAP.4210 Applied Woodwinds 7 (Formerly 72.421) - Credits: 2**

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

**MUAP.4220 Applied Woodwinds 8 (Formerly 72.422) - Credits: 2**

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

**MUAP.4310 Applied Brass And Percussion 7 (Formerly 72.431) - Credits: 2**

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.
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MUAP.4320 Applied Brass And Percussion 8
(Formerly 72.432) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4410 Applied Strings 7 (Formerly 72.441) -
Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4420 Applied Strings 8 (Formerly 72.442) -
Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4510 Performance Keyboard 6 (Formerly
72.451) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4520 Performance Keyboard 7 (Formerly
72.452) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4610 Performance Voice 6 (Formerly 72.461) -
Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4620 Performance Voice 7 (Formerly 72.462) -
Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4710 Performance Woodwinds 6 (Formerly
72.471) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4720 Performance Woodwinds 7 (Formerly
72.472) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4810 Performance Brass And Percussion 6
(Formerly 72.481) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.
setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4820 Performance Brass And Percussion 7 (Formerly 72.482) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4910 Performance Strings 6 (Formerly 72.491) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4920 Performance Strings 7 (Formerly 72.492) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4991 Senior Recital (Formerly 72.499) - Credits: 1

Public performance to be presented, registered concurrently with Applied Music 8 or Performance Applied Music 7.

MUEN.0100 Ensemble 1 (Formerly 76.010) - Credits: 1
MUEN.0200 Ensemble 2 (Formerly 76.020) - Credits: 2
MUEN.1010 University Orchestra (Formerly 76.101) - Credits: 2

Open to all students by audition. Works from the orchestral repertoire are studied and publicly performed with additional opportunities for solo accompaniment.

MUEN.1030 Wind Ensemble (Formerly 76.103) - Credits: 2

Open to all students by audition. Compositions are selected from a wide repertoire of wind ensemble literature for study and performance. Opportunity for solo performance with wind ensemble accompaniment.

MUEN.1050 Concert Band (Formerly 76.105) - Credits: 2

Open to all students by audition. Selected band repertoire studied and performed.

MUEN.1060 Marching Band (Formerly 76.106) - Credits: 2

Open to all students of the University, without regard for major field of study. The marching band performs at University events and at selected band festivals throughout New England. Custom musical arrangements and visual designs are featured. No audition required.

MUEN.1080 Studio Orchestra (Formerly 76.108) - Credits: 2

Open to all students by audition. A wide spectrum of jazz orchestration and solo performance is studied and performed.

MUEN.1220 Early Music Ensemble - Credits: 1

The Early Music Ensemble provides the opportunity to explore the music of the Medieval, Renaissance, and Baroque Eras in ensembles of various sizes. Students may perform on any combination of their primary or secondary instruments. In cooperation with other members of the course, students will have the chance to tailor their repertoire choices to their own musicological interests and desired areas of growth. By Audition.

MUEN.1240 Blues Ensemble - Credits: 1

This ensemble course explores the wide array of blues and blues based musical traditions including their fundamental forms and grooves, as well as common riffs and melodic structures. Particular focus is given to creating compelling, spontaneous performances through the use of improvisation, body language, audience interaction/participation, effective phrasing, musical communications and cueing. Open to instrumentalists and vocalists of all types by audition.
MUEN.1260 Accompanying Ensemble - Credits: 1
Accompanying Ensemble focuses on developing collaborative skills among duos, trios, and quartets. Students will learn how to lead efficient rehearsals, explore interpretive possibilities, and increase aural sensitivity to other musicians. Weekly coachings for each group will be scheduled by the instructor. Open to all genres and instrument/voice combinations. By Audition.

MUEN.1280 R&B Ensemble - Credits: 1
This ensemble is open to both instrumentalists and vocalists and is designed to familiarize students with Rhythm and Blues material, from classic repertoire of the 1960’s through the present, while preparing for a concert at the end of the semester. Students are guided through the process of putting a working band together and rehearsing repertoire for performance, including attention to authentic stylistic approaches. By Audition.

MUEN.1470 Ensemble Performance 1 (Formerly 76.147) - Credits: 2
This ensemble provides students with an introduction to the skills, knowledge, and attitudes necessary for satisfactory ensemble performance, namely: adequate technical facility for successful ensemble participation; functional knowledge of musical grammar and syntax in reference to its application in ensemble performance; proper application of aural and rhythmic skills in an ensemble setting; music sensitivity in relation to ensemble performance; and a knowledge of the protocols of ensemble preparation and performance. Emphasis on utilization of major scales and chords through application in both classical and jazz styles.

MUEN.1480 Ensemble Performance 2 (Formerly 76.148) - Credits: 2
Ensemble Performance 2 is an introduction to the fundamentals of the jazz idiom, jazz theory, and jazz improvisation. Topics include correct interpretation of jazz rhythm and articulation, basic jazz theory, and the development of improvised melodies. Students will play in small ensembles, or "combos", in this course. Students are expected to have at least an intermediate level of skill on their instruments at the time they begin this course.

MUEN.1490 Ensemble Performance 3 (Formerly 76.149) - Credits: 2
Introduction to multiple styles of American popular music: more advanced harmony and rhythm; improvising on common chord progressions; semi-independent combos.

MUEN.1500 Ensemble Performance 4 (Formerly 76.150) - Credits: 2
Performing advanced jazz and pop compositions; advanced improvisation; semi-independent combos.

MUEN.1510 Brass Ensemble (Formerly 76.151) - Credits: 1
Open to all students by audition. Provides a wide range of performance experience through varied brass literature.

MUEN.1530 Percussion Ensemble (Formerly 76.153) - Credits: 1
Open to all students by audition. Exploration of the growing body of literature for percussion ensemble. Public performance.

MUEN.1540 Classical Guitar Ensemble (Formerly 76.154) - Credits: 1
MUEN.1560 Electric Guitar Ensemble (Formerly 76.156) - Credits: 1
Open to all students by audition. Provides study and performance of literature for guitar, lute, etc. Required of all guitar majors each semester.

MUEN.1580 Piano Ensemble (Formerly 76.158) - Credits: 1
Open to all students by audition. Provides performance experiences through varied piano ensemble literature for one and two pianos.

MUEN.1590 Mixed Chamber Ensemble (Formerly 76.159) - Credits: 1
Open to all students by audition. Offers a wide range of performance experience through a selection of literature for varying combinations of instruments.

MUEN.1600 String Ensembles (Formerly 76.160) - Credits: 1
Open to all students by audition. Provides experience in the performance of string orchestra literature.

MUEN.1610 Small Jazz Ensemble (Formerly 76.161) - Credits: 1
Open to all students by audition. Provides experience in the performance of jazz literature for groups ranging from four to eight members.

**MUEN.1620 Jazz Laboratory Ensemble (Formerly 76.162) - Credits: 1**

Open to all students by audition. Provides students with a clear understanding of the skills, knowledge and attitudes necessary to satisfactory ensemble performance and practical experience in the application of such skills, knowledge and attitudes.

**MUEN.1640 World Music Ensemble (Formerly 76.164) - Credits: 1**

An immersion into the music of non-western cultures, this course will provide instrumental and vocal instruction, as well as an introduction to the theory and cultural contexts that shape the practice of traditional music. The ensemble will meet weekly, with the goal of a public performance at the close of the semester.

**MUEN.1650 Jazz/Rock Big Band (Formerly 76.165) - Credits: 1**

Open to all students by audition. Fusion big band covering a wide variety of contemporary jazz rock literature. Solo improvisational opportunities. Numerous performances.

**MUEN.1700 Contemporary Electronic Ensemble (Formerly 76.170) - Credits: 1**

Explores the electronic production and manipulation of music in a live ensemble setting. Students will incorporate synthesis, signal processing, sampling, etc. into a musical framework. Beside performing from the constantly expanding repertoire of electronic music, students will be encouraged to create original compositions and arrangements for the ensemble. A public performance will be given at the end of each semester.

**MUEN.1711 Diverse Practices Ensemble - Credits: 1**

This ensemble will feature variable topics focusing on musical practices that fall outside of typical Western-music traditions. Possibilities include contemporary concert music, improvisation, early music, electronic dance music, performances for music therapy, and many more. The ensemble is open to all students based on audition.

**MUEN.1721 Secondary Instrument Ensemble - Credits: 1**

This ensemble will offer students the opportunity to explore and develop their abilities on a secondary instrument. Topics for section include percussion for non-percussionists, piano for non-pianists, and guitar for non-guitarists. Open to all students based on permission of instructor.

**MUEN.1750 Video Game Ensemble - Credits: 1**

This ensemble will perform live music based on video games. Potential projects may include: 1) performing student arrangements of game soundtracks for ensemble members (acoustic or electroacoustic). 2) Using in-game mechanics to develop a live performance. 3) Developing actual games to feature original sound and music. Live performance in semester-end concert required for all participants. Open to all vocalists and instrumentalists by permission only.

**MUEN.2010 Chamber Singers (Formerly 76.201) - Credits: 2**

A small, select choir open to all singers by audition. Performs music ranging from the present day to the Middle Ages.

**MUEN.2020 University Choir (Formerly 76.202) - Credits: 2**

Open to all students by audition. Includes the study and performance of a wide variety of choral compositions.

**MUEN.2100 Opera Workshop (Formerly 76.210/510) - Credits: 1**

**MUEN.2510 Choral Union (Formerly 76.251) - Credits: 1**

A large chorus open to the campus and the community without audition. Performs larger works in the choral repertoire including oratorios, masses, motets and opera.

**MUEN.3450 Songwriting Ensemble - Credits: 1**

This course is designed to facilitate a greater range of creative expression for aspiring songwriters by analyzing the musical and lyric components of a song composition, posing songwriting problems to be solved, and developing an identifiable musical style.

**MUPF.1010 Performance Applied 1 - Credits: 2**

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.
MUPF.1020 Performance Applied 2 - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUPF.1320 Introduction To Keyboard 2 (Formerly 75.132) (Last offered Spring 2012) - Credits: 1

A study of more advanced chord progressions, ensemble keyboard playing, patriotic songs, more advanced accompaniment patterns and advanced solo literature and a continuation of the use of improvisational techniques.

MUPF.2000 Mechanics of Movement for Instrumentalists - Credits: 2

Critical study of motion and posture techniques for optimal performance. Topics include Alexander technique, Feldenkrais Method and Mensendieck System. Adjunct approaches for relaxation and recovery will also be explored, including massage, Rolfing, yoga, and tai chi.

MUPF.2001 Language and Diction - Credits: 2

This course teaches the basics of diction and the International Phonetic Alphabet, as utilized by professional singers. These principles are specifically applied to English, French, Italian and German.

MUPF.2010 Performance Applied 3 - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUPF.2020 Performance Applied 4 - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUPF.2110 Health, Wellness, and the Art of Practice -

Credits: 2

This foundational course teaches techniques for effective and efficient practice, examines approaches to injury prevention and management, and discusses strategies for career longevity and long-term healthy music making.

MUPF.2120 Mindfulness and Optimal Performance - Credits: 2

In-depth survey of issues related to the mental aspects of performance and preparation, with a focus on practical application for performers. Topics include Performance anxiety, focus, Visualization, available resources and mental wellness.

MUPF.2330 Conducting 1 (Formerly 75.233) - Credits: 2

Training in basic baton technique and related study for instrumental and choral conducting.

MUPF.2340 Conducting 2 (Formerly 75.234) - Credits: 2

Continuation of 75.233 exploring more advanced choral and instrumental conducting techniques.

MUPF.2550 Piano Accompanying 1 (Formerly 75.255) (Last offered Fall 2014) - Credits: 1

This course is designed for both piano and non-piano majors. A discussion of concepts of form with special emphasis on working together with and being sensitive to other musicians will be emphasized. Accompaniments will consist of music for instrumental and vocal soloists and ensembles and will include simple harmonizations and improvisations based on melodies from folk, classical, jazz, and popular music. Techniques of adjustment and cooperation in performance will also be discussed.

MUPF.3010 Performance Applied 5 - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUPF.3020 Performance Applied 6 - Credits: 2

Studio instruction in graduated sequence. Applied Lessons
consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUPF.3410 Creative Performance 1: Preparation - Credits: 2

Experiential learning environment for the assimilation and practice of performance skills, utilizing "collaborative masterclass" model. Course culminates with a mid-length, shared recital of approximately 15 minutes in duration per student. Various topics and application to performance setting and context will be discussed each semester.

MUPF.3420 Creative Performance 2: Introductory Recital - Credits: 2

Experiential learning environment for the assimilation and practice of performance skills, utilizing "collaborative Masterclass" model. Course culminates with the completion of a junior recital of approximately 30-45 minutes in duration. Various topics and application to performance setting and context will be discussed.

MUPF.3460 Improvisation - Credits: 2

Study of improvisation techniques as applied to a diverse array of stylistic practice and historical periods.

MUPF.3610 Jazz Improvisation 1 (Formerly 75.361) - Credits: 3

A study of basic jazz structures, motives, chord progressions, scales, melodic analysis, use of some approach techniques, tensions and their application to improvisation. Includes in class performance by small instrumental and/or vocal groups.

MUPF.3620 Jazz Improvisation 2 (Formerly 75.362) - Credits: 3

A continuation of 75.361. Will emphasize the study and performance of more advanced levels of improvisation.

MUPF.3810 The Musician's Toolbox - Credits: 2

This course builds the collection of promotional tools a performing musician needs to secure work in the field (such as biography, photos, audio samples, business cards, etc.), creates a means of dissemination (website), and discusses applications for use. Additionally, strong emphasis is placed upon location, evaluation and effective use of various resources needed to support success in an entrepreneurial music career.

MUPF.3820 Marketing & Media for Performing Musicians - Credits: 2

Addresses modern media strategies utilized by performing musicians to promote music and career interests. Students will design and build a promotional website, craft a professional presence on social media, and learn techniques to advance career. Responsible online conduct is discussed and emphasized, and forward-looking online business models are analyzed.

MUPF.3850 Recording for Performers - Credits: 2

This course addresses techniques and concepts utilized in creating a professional recording, cost-effective solutions for production, and various concerns surrounding sonic media. Course culminates with a high-quality recording of student material.

MUPF.3940 Performance Seminar I (Formerly 75.394) - Credits: 3

The study and performance of selected works from the repertoire of each of the five primary areas of performance; keyboard, voice, woodwinds, strings, and brass/percussion. Emphasis will be placed on student and faculty performance, leading to detailed consideration of the relationship between the demands of the composer and the problems of the performer and the manner in which these concerns influence the musical and artistic judgments necessary to achieve a quality performance.

MUPF.4010 Performance Applied 7 - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUPF.4020 Performance Applied 8 - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUPF.4110 Teaching Artistry - Credits: 2
Most performers supplement their incomes by teaching. This course explores the qualities, considerations and skills necessary for students to become excellent educators, and examines various instructional settings emerging professional musicians are likely to experience.

MUPF.4410 Performance Artistry 1: Preparation - Credits: 2
Experiential learning environment for the assimilation and practice of performance skills. Course culminates with a mid-length, shared recital of approximately 15-30 minutes in duration. Various topics and application to performance setting and context will be discussed each semester.

MUPF.4420 Performance Artistry 2: Capstone Recital - Credits: 2
Experiential Learning environment for the assimilation and practice of performance skills, utilizing "collaborative masterclass" model. Course culminates with a full-length, high-quality senior recital of approximately 60 minutes in duration. Various topics and application to performance setting and context will be discussed throughout the semester.

MUPF.4530 Instrumental Pedagogy (Formerly 75.453/553) - Credits: 3
This course is directed toward the development and refinement of instrumental repertoire and pedagogy. The course will examine the application of musical content and learning sequences to the teaching of instrumental music to students at all levels. It will include the study of teaching methods and materials for use in private and group instruction. Observation of studio and class teaching and supervised teaching experience will also be included. This course is directed toward meeting the NASM undergraduate pedagogy component.

MUPF.4630 Vocal Pedagogy (Formerly 75.463/563) - Credits: 3
Course will introduce students to the basics of teaching singing. It will include an overview of the anatomy of the respiratory and vocal mechanism and their application to singing; the categorization of voice types with suggestions for repertoire for young solo singers; an overview of vocal exercises for various technical goals and the diagnosis of common vocal problems and how to treat them. The class will also cover the child and adolescent voice and include in-class supervised teaching.

MUPF.4740 Practical Intonation (Formerly 75.474) - Credits: 3
The study of orchestral and band instruments relative to intonation. The development of conceptual awareness relative to the various characteristics of pitch, which are inherent in the design of the various instruments. Identification of problematic intonation and procedures to alleviate problems through performance.
### Sample Degree Pathway for Music Studies - Voice Option

For students who entered prior to fall 2015.

#### Freshman Year

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<tr>
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#### Spring Semester

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<td>MUTH.1050 (<a href="https://www.uml.edu/catalog/courses/MUTH/1050">https://www.uml.edu/catalog/courses/MUTH/1050</a>)</td>
<td>Freshman Chorus</td>
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<td>MUHI.1050 (<a href="https://www.uml.edu/catalog/courses/MUHI/1050">https://www.uml.edu/catalog/courses/MUHI/1050</a>)</td>
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Instrumental Option

For students who entered prior to fall 2015.

Freshman Year

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<td>College Writing (Gen. Ed.)</td>
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Spring Semester

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<td>MUHL.1050</td>
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Total Minimum Credits = 130-131

Please see advisor or Music Office for more specific requirements pertaining to Freshman Chorus, Recital Attendance, Applied Music, Ensembles and Internships.

Refer to the General Education website for General Education requirements.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

Last updated: 6/12/2018

Sample Degree Pathway for Music Studies -
### Sophomore Year

#### Fall Semester

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<td>Intro to Brass Pedagogy 21</td>
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<td>Intro to Strings Pedagogy 2</td>
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### Junior Year

#### Fall Semester

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<td>Music History 1 (Gen. Ed.-AH)</td>
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<td>Intro to Brass Pedagogy 1</td>
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<td>Intro to Strings Pedagogy 1</td>
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<td>MUED.2440</td>
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#### Spring Semester

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<th>Course Name</th>
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<td>MUED.1440</td>
<td>Intro to Woodwind Pedagogy</td>
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<td>MUED.3010</td>
<td>Technology in Music Education</td>
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<td>PSYC.2600</td>
<td>Child &amp; Adol. Psych (Gen.Ed-SS)</td>
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<tr>
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### Senior Year

#### Spring Semester

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### Senior Year

#### Fall Semester

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<tr>
<td>MUPF.2340</td>
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<td>Intro to Guitar Pedagogy</td>
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### Spring Semester

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<td>MUED.3940</td>
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**Total Minimum Credits = 129-131**

1Will need to be switched in alternate years.

Please see advisor or Music Office for more specific requirements pertaining to Freshman Chorus, Recital Attendance, Applied Music, Ensembles and Internships.

Refer to the [General Education](https://www.uml.edu/Academics/undergraduate-programs/core-curriculum/Gened/default.aspx) website for General Education requirements.

**Restriction on off-campus study:**

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Sample Degree Pathway for Music Studies - General Option

For students who entered fall 2018 to spring 2022.

Freshman Year

Fall Semester

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<td>Musicianship &amp; Analysis 1</td>
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Spring Semester

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### Spring Semester

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### Junior Year

#### Fall Semester

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<th>Course Name</th>
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#### Spring Semester

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### Senior Year

#### Fall Semester

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**Academic Catalog 2021 - 2022 / Music Studies - General Information**

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<th>Course Name</th>
<th>Credits</th>
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<td>MUED.4930</td>
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### Spring Semester

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**Total Minimum Credits = 131-133.**

1Music Studies students meet the Quantitative Literacy Essential Learning outcome outside the major. See the complete list of approved QL courses.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements.

- **Department Specific Policies**

Please see advisor or contact the Music Department for more specific requirements pertaining to Freshman Chorus, Recital Attendance, Applied Music, Ensembles and Internships.

Current UMass Lowell students should be using their Advisement Report in SiS. If you need assistance, please contact your adviser.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.


### Sample Degree Pathway for Music Studies - Instrumental Option

For students who entered fall 2015 to spring 2018.

### Fall Semester

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```
Academic Catalog 2021 - 2022 / Music Studies - General Information
```
### Sophomore Year

#### Fall Semester

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### Junior Year

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<td>MUPF.2330</td>
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### Senior Year

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Spring Semester

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Total Minimum Credits = 129-131

1Music Studies students meet the Quantitative Literacy Essential Learning outcome outside the major. See the complete list of approved QL courses (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf).

2Will need to be switched in alternate years.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the CoreCurriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements.

Please see advisor or Music Office for more specific requirements pertaining to Freshman Chorus, Recital Attendance, Applied Music, Ensembles and Internships.

Current UMass Lowell students should be using their Advisement Report in SiS (https://www.uml.edu/Enrollment/SiS/default.aspx). If you need assistance, please contact your adviser.

Restriction on off-campus study:
Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last updated: 6/12/2018

Sample Degree Pathway for Music Studies - Voice Option

For students who entered fall 2015 to spring 2018.
Freshman Year

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### Sophomore Year

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### Spring Semester

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### Junior Year

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### Spring Semester

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### Senior Year

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### Total Minimum Credits = 130-131

1Music Studies students meet the Quantitative Literacy Essential Learning outcome outside the major. See the complete list of approved QL courses.

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taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements.

Please see advisor or Music Office for more specific requirements pertaining to Freshman Chorus, Recital Attendance, Applied Music, Ensembles and Internships.

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Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last updated: 6/12/2018

Sample Degree Pathway for Music Studies - General Option

For students who entered fall 2022 and beyond.

Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.1010 / HONR.1100</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
</tr>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
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Total 15

Spring Semester

<table>
<thead>
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<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
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<tr>
<td>MUTH.1090</td>
<td>Musicianship &amp; Analysis 2</td>
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<tr>
<td>MUHL1030</td>
<td>Musical Practices 2 (DCA)</td>
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</tr>
<tr>
<td>MUED.1000</td>
<td>Observation Lab 1</td>
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</tr>
<tr>
<td>MUED.1510</td>
<td>Intro to Music Education (CTPS)</td>
<td>2</td>
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<tr>
<td>MUED.1620</td>
<td>Intro to Percussion Pedagogy</td>
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<tr>
<td>MUTH.1200</td>
<td>Musicianship &amp; Analysis Keyboard Lab</td>
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<td>MUAP.xxxx</td>
<td>Applied Music 2</td>
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<tr>
<td>MUEN.xxxx</td>
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Total 17

Sophomore Year

Winter Semester

<table>
<thead>
<tr>
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<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.1010 / HONR.1100</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
</tr>
<tr>
<td>MUAP.1000</td>
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Total 15
### Junior Year

#### Fall Semester

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<tr>
<td>MUTH.2080</td>
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<tr>
<td>MUHI.2610</td>
<td>Music History 1 (AH)</td>
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</tr>
<tr>
<td>MUED.1410</td>
<td>Intro to Brass Pedagogy 1</td>
<td>1</td>
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<tr>
<td>MUED.2410</td>
<td>Intro to Strings Pedagogy 1</td>
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<tr>
<td>MUED.2440</td>
<td>Intro to Voice Pedagogy 1</td>
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<td>MUAP.xxxx</td>
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<tr>
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<tr>
<td>MUED.1440</td>
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<tr>
<td>MUED.3010</td>
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<tr>
<td>xxxx.xxxx</td>
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#### Spring Semester

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<tr>
<td>MUTH.2090</td>
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</tr>
<tr>
<td>MUHI.2620</td>
<td>Music History 2 (AH), (WOC)</td>
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</tr>
<tr>
<td>MUED.2470</td>
<td>Intro to Practical Accompanying</td>
<td>1</td>
</tr>
<tr>
<td>MUED.2490</td>
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</tr>
<tr>
<td>MUAP.xxxx</td>
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<td>MUEN.xxxx</td>
<td>Ensembles</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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<td><strong>Total</strong></td>
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### Spring Semester

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<tr>
<td>MUPE.2340</td>
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<tr>
<td>MUED.2000</td>
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<tr>
<td>MUED.xxxx</td>
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</tr>
<tr>
<td>MUED.xxxx</td>
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<tr>
<td>MUAP.xxxx</td>
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<tr>
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### Academic Catalog 2021 - 2022 / Music Studies - General Information

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUTH.1000</td>
<td>Recital Attendance</td>
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</tr>
<tr>
<td>MUHI.3010</td>
<td>American Music</td>
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</tr>
<tr>
<td>MUED.3000</td>
<td>Observation Lab</td>
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<tr>
<td>MUED.4930</td>
<td>Instrumental Ensemble Lab</td>
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<tr>
<td>MUED.4200</td>
<td>General Music Methods</td>
<td>3</td>
</tr>
<tr>
<td>MUED.4920</td>
<td>Instrumental Repertoire &amp; Rehearsal Techniques</td>
<td>3</td>
</tr>
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<td>Ensembles</td>
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<tr>
<td>MUAP.xxx</td>
<td>Applied Music</td>
<td>2</td>
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<tr>
<td>xxxx.xxx</td>
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<td>3/4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>17</strong>/18</td>
<td></td>
</tr>
</tbody>
</table>

**Total Minimum Credits = 131-133.**

1Music Studies students meet the Quantitative Literacy Essential Learning outcome outside the major. See the complete list of approved QL courses.

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- Department Specific Policies

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_Last updated: 3/17/2022._
MUED.1000 Observation Lab I (Formerly 73.100) - Credits: 0
All students who are registered for 73.151 Introduction to Music Education are required to sign up for Observation Lab I and complete 15 hours of school observations outlined by course instructor.

MUED.1410 Introduction To Brass Pedagogy 1 (Formerly 73.141/501) - Credits: 1
Intensive class instruction toward the development of basic performance proficiency on brass instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.1420 Introduction to Brass Pedagogy 2 (Formerly 73.142) - Credits: 1
A continuation of 73.141. Intensive class instruction toward the development of basic performance proficiency on brass instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.1440 Introduction to Woodwind Pedagogy 1 (Formerly 73.144/504) - Credits: 1
Intensive class instruction toward the development of basic performance proficiency on woodwind instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.1450 Introduction to Woodwind Pedagogy 2 (Formerly 73.145/505) - Credits: 1
A continuation of 73.144. Intensive class instruction toward the development of basic performance proficiency on woodwind instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.1510 Introduction To Music Education (Formerly 73.151) - Credits: 2
Designed to provide the student with an overview of the principles and practices of music education in today’s public schools. Students will observe regular classrooms and music instruction at all levels of N-12 education. This course is a prerequisite for all professional education courses in music education and includes the component of required pre-practicum fieldwork.

MUED.1620 Introduction to Percussion Pedagogy (Formerly 73.162/5060) - Credits: 1
Intensive class instruction toward the development of basic performance proficiency on percussion instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.2000 Observation Lab 2 (Formerly 73.200) - Credits: 0
All students who are registered for 73.410 Globas Music for the Classroom are required to sign up for Observation Lab 2 and complete 20 hours of school observations outlined by course instructor.

MUED.2120 Special Topics (Formerly 73.212) - Credits: 3
Special Topics: A variety of topical issues in music will be explored through an interdisciplinary lens, which will vary from semester to semester. This music elective may include analysis and discussions of musical structure and form, culture and its influence on musical genres, gender in music, as well as identity and inclusion, depending on faculty and student interest.

MUED.2410 Introduction to Strings Pedagogy 1 (Formerly 73.241/507) - Credits: 1
Intensive class instruction toward the development of basic performance proficiency on string instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.2420 Introduction to String Pedagogy 2 (Formerly 73.242/508) - Credits: 1
Intensive class instruction toward the development of basic performance proficiency on string instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.2440 Introduction to Voice Pedagogy 1 (Formerly 73.244/516) - Credits: 1
Intended to cultivate the fundamental principles of singing. The psychology of singing and the psychology of the singing voice are considered as they apply to tone production and resonance.

MUED.2450 Introduction to Voice Pedagogy 2 (Formerly 73.245/517) - Credits: 1
A continuation of Voice Pedagogy 1. Intended to cultivate the fundamental principles of singing. The psychology of singing and the psychology of the singing voice are considered as they apply to tone production and resonance.

MUED.2470 Introduction to Practical Accompanying (Formerly 73.247) - Credits: 1

This course develops students practical skills in leading and accompanying solo, small and large group performances. Students will accompany their own singing and the singing and performing of others using the piano, guitar, hand percussion, and an original computer arrangement. Original arrangement analysis and production projects will be integrated throughout the semester including realizing lead sheets from sheet music and recordings, performing basic comping, rhythmic, and strumming patterns, and arranging, sequencing and producing accompaniments via computer software. This course culminates in a school or community service-learning performance leading and accompanying youth in singing.

MUED.2490 Progressive Performance and Production Pedagogy (Formerly 73.249) - Credits: 1

This course introduces student to pedagogical approaches supporting music performance and production in progressive music experiences in school and community music settings. Students will develop basic performance technique on common progressive performance instruments such as electric guitar and bass, drum set, and keyboard. Students will also develop basic proficiency in live sound reinforcement, including setting up a PA, vocal microphone techniques, and live mixing and balancing. Students will work in small peer groups designing and facilitating small group performance experiences, including songwriting, analysis, arranging and covering music for acoustic and electronic instruments. Students will have experiences facilitating individual and small group instruction with their peers.

MUED.3000 Observation Lab 3 (Formerly 73.300) - Credits: 0

Pre-Practicum Field and Service learning teaching experiences tied to General Music Methods 1. Students observe and teach in partnership schools under the mentorship of Lowell music teachers and course instructor.

MUED.3010 Technology in Music Education (Formerly 73.301) - Credits: 3

Introduction to the role of computers and technology in music education programs. Course includes the development of computer literacy, including knowledge of word processing, database and spreadsheet applications as essential to educators, and explores MIDI, the Internet, music software, recording, multimedia and other technologies as educational tools.

MUED.3940 Choral Repertoire and Rehearsal Techniques (Formerly 73.394) - Credits: 3

Examination of appropriate choral repertoire for the secondary school level and effective choral rehearsal techniques. Covers auditioning, warmups, choral tone, diction, score preparation, and development of fundamental musicianship skills necessary for a successful choral ensemble. Serves as a choral laboratory setting for the practice of score preparation and rehearsal techniques.

MUED.4000 Observation Lab 4 (Formerly 73.400) - Credits: 0

All students who are registered to 73.430 General Music Methods 2 are required to sign up for Observation Lab 4 and complete 20 hours of school observations outlined by course Instructor.

MUED.4100 Global Music for Classroom (Formerly 73.410/500) - Credits: 3

Focus on the music education profession's response to multiculturalism in education as evidenced through the National Music Standards and an examination of resources and methodologies for teaching and understanding the music of diverse cultures, styles, and genres. As one of the core professional music education courses, the course includes the component of pre-practicum fieldwork. There will be an additional research project for Graduate Students enrolled in 73.500.

MUED.4200 General Music Methods 1 (Formerly 73.420/544) - Credits: 3

A course designed to present the basic fundamentals of general music pedagogy, including lesson planning and the writing of instructional objectives. The course discusses basic principles of curriculum and instruction, assessment, learning styles, and developmental psychology. These are related to state curriculum frameworks and National Music Standards 1-5. As one of the core professional music education courses, the course includes the component of pre-practicum fieldwork in selected settings.

MUED.4300 General Music Methods 2 (Formerly 73.430/545) - Credits: 3

Investigation of some of the most popular methods of teaching general music, including Orff, Kodaly, Dalcroze, and comprehensive musicianship. Discussion of contemporary
issues including music in special education, multicultural music education, and National Music Standards 6-9. As one of the core professional music education courses, the course includes the component of fieldwork in selected settings.

MUED.4920 Instrumental Repertoire and Rehearsal Techniques (Formerly 73.492/542) - Credits: 3

Examination of appropriate instrumental repertoire for the secondary level and effective instrumental rehearsal techniques. Includes study of rehearsal planning, score preparation, and the development of fundamental musicianship skills necessary for a successful instrumental ensemble.

MUED.4930 Instrumental Ensemble Lab (Formerly 73.493) - Credits: 1

Designed to supplement the experiences of the instrumental methods courses. Students gain experience performing on secondary instruments, planning lessons for beginning and intermediate level instrumental ensembles, and conducting in these settings.

MUED.4940 Choral Ensemble Lab (Formerly 73.494) - Credits: 1

Designed to supplement the experiences of the choral and vocal methods courses. Students gain experience by planning lessons for elementary and secondary school level vocal ensembles and conducting in these settings.

MUED.4960 Directed Study: Music Education (Formerly 73.496) - Credits: 3

Individual work under the supervision of a member of the music education faculty on a specific topic approved by the instructor and the music education faculty. Permission of Coordinator of Music Education required.
College of Fine Arts, Humanities & Social Sciences

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A students catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

American Studies

- General Option
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2012 - spring 2015
- Thematic Option
  fall 2015 - spring 2016
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2012 - spring 2015

Art

- Animation & Interactive Media Concentration
  fall 2017 and beyond
- Graphic Design Concentration
  fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Studio Art Concentration
  fall 2022 and beyond

Composition for New Media

- fall 2022 and beyond
- fall 2019 - spring 2022

Criminal Justice

- General Option
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2016
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2012 - spring 2015
- Corrections Option
  fall 2016 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2016
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2012 - spring 2015
- Police Option
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2016
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2012 - spring 2015
- Homeland Security Option
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2016
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2012 - spring 2015
- Violence Option
  fall 2016 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2016
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2012 - spring 2015
- Crime and Mental Health Option
Digital Media

- fall 2021 and beyond

Economics

- fall 2015 and beyond

English

- Literature Concentration
  - fall 2021 and beyond
  - fall 2015 - spring 2021

- Journalism & Professional Writing Concentration
  - fall 2015 and beyond
  - fall 2010 - spring 2015

- Creative Writing Concentration
  - fall 2018 and beyond
  - fall 2015 - spring 2018

- Theatre Arts Concentration
  - fall 2015 and beyond
  - fall 2010 - spring 2015

Graphic Design

- fall 2021 and beyond
- fall 2020 - spring 2021

History

- fall 2020 and beyond
- fall 2015 - spring 2020

Liberal Arts

- fall 2015 and beyond

Music Studies

- General Option fall 2022 and beyond
- instrumental Option fall 2015 - spring 2018
- Voice Option fall 2015 - spring 2018

Music Performance

- Instrumental Option fall 2022 and beyond
- Voice Option fall 2022 and beyond

Music Business

- fall 2022 and beyond
- fall 2015 - spring 2022
- prior to fall 2015

Peace and Conflict Studies

- fall 2021 and beyond
- fall 2015 - spring 2021
Philosophy

- General Option
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Communications & Critical Thinking Option
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Philosophy & Religious Studies Option
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Political Science

- American Politics Concentration fall 2020 and beyond
- International Relations and Comparative Politics Concentration fall 2020 and beyond
- Law and Politics Concentration fall 2020 and beyond
- Political Communication and Public Opinion Concentration fall 2020 and beyond
- Sustainability and Environmental Politics Concentration fall 2022 and beyond

Political Science (prior to fall 2020)

- fall 2015 - spring 2020
- fall 2013 - spring 2015

Psychology

- General Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2017 - spring 2022
  fall 2015 - spring 2017
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2013 - spring 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Behavior Analysis Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2018 - spring 2022
  fall 2017 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Community Social Psychology Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2018 - spring 2022
  fall 2017 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Clinical Psychology Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2018 - spring 2022
  fall 2017 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Developmental Disabilities Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2018 - spring 2022
  fall 2017 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Health Psychology Concentration
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2018 - spring 2022
  fall 2017 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Quantitative Economics

- fall 2022 and beyond

Sociology

- General Concentration fall 2016 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Policy & Social Problems Concentration fall 2021 and
Sample Degree Pathway for Peace and Conflict Studies

For students who entered fall 2021 &beyond.

Freshman Year

Fall Semester

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Spring Semester

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<th>Course Name</th>
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<td>College Writing I / FYSH (CW)</td>
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<tr>
<td>FAHS.1090</td>
<td>First Year Seminar</td>
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<tr>
<td>MATH.xxxx</td>
<td>Math Persp. (MATH) - MATH.2830 (SCL)</td>
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<tr>
<td>WLxx.xxxx</td>
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Total

13

Sophomore Year

Fall Semester

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<th>Course#</th>
<th>Course Name</th>
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Total

15/16
### Spring Semester

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### Spring Semester

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### Senior Year

#### Fall Semester

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**Total Minimum Credits = 120**

1World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) in the undergraduate catalog.

2PCST.5530 (https://www.uml.edu/catalog/courses/PCST/5530) if doing Bachelors to Masters.

3PCS majors meet the Diversity and Cultural Awareness (DCA) ELO through an approved PCS Area B or elective course:

- GNDR.2400 (https://www.uml.edu/catalog/courses/GNDR/2400) Intro to Gender Studies
- PHIL.2960 (https://www.uml.edu/catalog/courses/PHIL/2960) Intro to World Religions
- POLI.1120 (https://www.uml.edu/catalog/courses/POLI/1120) Intro to Comparative Political Systems
- POLI.1210 (https://www.uml.edu/catalog/courses/POLI/1210) Intro to International Relations

4PCS majors meet the Information Literacy (IL) ELO with an approved course outside the major requirements.
Students must see their advisement report in SIS (https://www.uml.edu/Enrollment/SiS/default.aspx) for a list of approved PCS electives.

A major in Peace and Conflict Studies consists of 36 to 45 credits with at least 18 credits at the 3000 level or above (includes required and elective courses).

Students must take at least 1 course in each of the three areas (Area A: Foundations of Peace & Conflict, Area B: Approaches to Peace & Conflict, and Area C: Regions of Peace & Conflict).

Notes:

- A statistics course is highly recommended.
- At least 75 credits must be earned outside of the major including general education requirements, language requirement, and free electives. Elective courses that are used to fulfill Peace and Conflict Studies major requirements cannot also be applied to satisfy a student's general education requirements.

Students transferring to the college and wishing to major in Peace and Conflict Studies must make individual arrangements with the program director regarding satisfaction of major course requirements.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS (https://www.uml.edu/Enrollment/SiS/default.aspx). If you need assistance, please contact your advisor.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last updated: 2/19/2021
PCST.1250 Introduction to Peace and Conflict Studies (Formerly PCS 125) - Credits: 3

This course will focus on the causes of conflict, conflict resolution methods, and ways to sustain peace. The course will explain and define each of those areas. A mid-term will be administered to examine the students' grasp of the concepts and key terminology. The second part of the class will emphasize student participation and the application of concepts learned earlier in class. The final is a take home exam that will require the application of theory and praxis in the field of Peace and Conflict Studies.

PCST.2010 Research Methods in Peace and Conflict Studies - Credits: 3

To introduce students to the different approaches to research (qualitative and quantitative) in Peace and Conflict Studies and to help students differentiate between theory testing and theory building, and to provide a general framework for research design.

PCST.4200 Gender, Work and Peace (Formerly PCS 420) - Credits: 3

"Gender, Work and Peace" will explore the relationship between human rights, gender and nonviolence in the 21st century. We will examine how current and future reality can be shaped by related policies, specifically those on the micro and macro level concerned with gender. Today we live in a period of global transition comparable to the period that followed the Industrial Revolution. It presents us with enormous challenges and opportunities regarding factors we will address in class: economic globalization, government restructuring, work-family balancing, environmental safety at work, gender inequalities and the connection between human rights and dignity at work.

PCST.4530 Integrative Seminar in Peace and Conflict Studies (Formerly PCS 453/553) - Credits: 3

The purpose of the integrative seminar is to assist students in developing a robust and mature understanding of the three PCS core questions as they relate to PCS coursework. With a strong evidence focus, students identify patterns, principles, questions, and dilemmas relevant to the core questions emerge from multiple courses they have taken within the PCS program. Students develop a reflective journal, a series of essays, a portfolio of their accumulated work, and a culminating portfolio presentation. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Written &Oral Communication (WOC).

PCST.4550 Mediation: Theory and Practice (Formerly PCS 455/555) - Credits: 3

Mediation is a form of dispute resolution in which a neutral person helps two or more parties discuss their conflict, explore wants and needs, generate options, and reach an agreement. Mediation has become more prevalent over the past few decades in the courts, community-setting, and schools because it empowers the disputing parties to reach a resolution that works for them. This course introduces mediation in the context of other forms of alternative dispute resolution, teaches the principles and theory behind mediation, and trains students in the fundamentals of the mediation process. Interactive exercises and mediation role-plays will be used to provide experiential practice. Upon completion of the course, students will be connected to opportunities to practice mediation in the local courts or with community organizations.

PCST.4580 Peace and Conflict Field Experience (Formerly PCS 458/558) - Credits: 3

A program of practical experience in the field of Peace and Conflict. Students can work in a variety of areas related to Peace and Conflict Studies. Students meet regularly as a class on campus with the designated instructor to discuss their experiences and to learn more about the settings in which they practice and the challenges that they confront.

PCST.4730 Seminar in Peace and Conflict Studies (Formerly PCS 473/502) - Credits: 3

Offered from time to time to highlight specialized areas of faculty interest and to acquaint the student with new developments from a broad range of theory and research and how these developments might affect the field of Peace and Conflict Studies.

PCST.4750 Community Conflict Resolution (Formerly 57.475) - Credits: 3

This course gives students an understanding of the main issues and solutions involved in community level conflict resolution; e.g., in neighborhoods, workplaces, and other institutions. It develops students' skills in practicing conflict resolution and/or evaluating programs in the field of dispute resolution. It is important to understand why conflict happens and how to resolve conflict.

PCST.4910 Directed Study (Formerly PCS 491) - Credits: 1-3

Through frequent consultation with the instructor, the student carries out the investigation of a particularly specialized area of interest. This course may be repeated for up to a total of 9 credits.
PCST.4960 Practicum in Peace and Conflict Studies
(Formerly PCS 496) - Credits: 1-3

Specific requirements vary, but the Practicum experience enables Junior and Senior level students to work and study in a variety of areas related to Peace and Conflict Studies. Students meet regularly as a class on campus with the designated instructor to discuss their experiences and to learn more about the settings in which they practice and the challenges that they confront. Practicum may be repeated for a maximum of nine credits.
College of Fine Arts, Humanities & Social Sciences

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A student's catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

American Studies

- **General Option**
  - Fall 2015 and beyond
  - [Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- **Thematic Option**
  - Fall 2021 and beyond
  - Fall 2015 - Spring 2021
  - [Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Art

- **Animation & Interactive Media Concentration**
  - Fall 2017 and beyond
- **Graphic Design Concentration**
  - Fall 2015 - Spring 2020
  - [Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- **Studio Art Concentration**
  - Fall 2022 and beyond
  - Fall 2015 - Spring 2022

Composition for New Media

- **Fall 2022 and beyond**
- **Fall 2019 - Spring 2022**

Criminal Justice

- **General Option**
  - Fall 2022 and beyond
  - Fall 2016 - Spring 2022

- **Corrections Option**
  - Fall 2016 and beyond
  - [Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- **Police Option**
  - Fall 2022 and beyond
  - Fall 2016 - Spring 2022
  - [Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- **Homeland Security Option**
  - Fall 2022 and beyond
  - Fall 2016 - Spring 2022
  - [Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- **Violence Option**
  - Fall 2016 and beyond
  - [Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- **Crime and Mental Health Option**
Digital Media
- fall 2021 and beyond

Economics
- fall 2015 and beyond

English
- Literature Concentration
  - fall 2021 and beyond
  - fall 2015 - spring 2021

  - Journalism & Professional Writing Concentration
    - fall 2015 and beyond

  - Creative Writing Concentration
    - fall 2018 and beyond

  - Theatre Arts Concentration
    - fall 2015 and beyond

Graphic Design
- fall 2021 and beyond
- fall 2020 - spring 2021

History
- fall 2020 and beyond
- fall 2015 - spring 2020

Liberal Arts
- fall 2015 and beyond

Music Studies
- General Option fall 2022 and beyond
- Instrumental Option fall 2015 - spring 2018
- Voice Option fall 2015 - spring 2018

Music Performance
- Instrumental Option fall 2022 and beyond
- Voice Option fall 2022 and beyond

Music Business
- fall 2022 and beyond
- fall 2015 - spring 2022
- prior to fall 2015

Peace and Conflict Studies
- fall 2021 and beyond
- fall 2015 - spring 2021
**Philosophy**

- **General Option**
  - fall 2015 and beyond
  - (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- **Communications & Critical Thinking Option**
  - fall 2015 and beyond
  - (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- **Philosophy & Religious Studies Option**
  - fall 2015 and beyond
  - (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

**Political Science**

- **American Politics Concentration**
  - fall 2020 and beyond

- **International Relations and Comparative Politics Concentration**
  - fall 2020 and beyond

- **Law and Politics Concentration**
  - fall 2020 and beyond

- **Political Communication and Public Opinion Concentration**
  - fall 2020 and beyond

- **Sustainability and Environmental Politics Concentration**
  - fall 2022 and beyond

**Political Science (prior to fall 2020)**

- fall 2015 - spring 2020
- fall 2013 - spring 2015

**Psychology**

- **General Concentration**
  - fall 2022 and beyond
  - fall 2017 - spring 2022
  - fall 2015 - spring 2017 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- **Behavior Analysis Concentration**
  - fall 2022 and beyond
  - fall 2018 - spring 2022

- **Community Social Psychology Concentration**
  - fall 2022 and beyond
  - fall 2018 - spring 2022

- **Clinical Psychology Concentration**
  - fall 2022 and beyond
  - fall 2018 - spring 2022

- **Developmental Disabilities Concentration**
  - fall 2022 and beyond
  - fall 2018 - spring 2022

- **Health Psychology Concentration**
  - fall 2022 and beyond
  - fall 2018 - spring 2022

**Quantitative Economics**

- **fall 2022 and beyond**

**Sociology**

- **General Concentration**
  - fall 2016 and beyond
  - (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- **Policy & Social Problems Concentration**
  - fall 2021 and beyond
beyond fall 2016 - spring 2021
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Racial Equity and Inclusion Concentration fall 2021 and beyond

**Sound Recording Technology**

- fall 2022 and beyond
- fall 2019 - spring 2022
- fall 2015 - spring 2019
- prior to fall 2015

**World Languages and Cultures**

- French Option
  fall 2018 and beyond
  fall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- French/Spanish Option fall 2018 and beyond
  fall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Italian/Spanish Option
  fall 2018 and beyond
  fall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Spanish Option
  fall 2018 and beyond
  fall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
PHIL.2010 Introduction to Philosophy (Formerly 45.201) - Credits: 3
Examines some of the typical approaches to philosophical questioning and the issues raised in such inquiry: what is true knowledge, what is reality, what is the good, what is the right political order, what is the nature of religious faith? Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS).

PHIL.2020 Introduction to Logic and Critical Reasoning (Formerly 45.202) - Credits: 3
Studies the methods used to distinguish correct from incorrect reasoning. This course will aim at developing (1) an ability to express one’s ideas clearly and concisely; (2) an increased skill in defining one’s terms; and (3) a capacity to formulate arguments vigorously and to scrutinize them critically. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Quantitative Literacy (QL).

PHIL.2030 Introduction to Ethics (Formerly 45.203) - Credits: 3
Examines the basic issues and problems of ethics and values and a survey of some important alternative answers to the questions raised, on both an individual and a social level, by our necessity to act and to live in a rational and human way. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.2060 Introduction to Political Philosophy (Formerly 45.206) - Credits: 3
Political philosophy is concerned with basic questions about community, public life, and social organization. This course will address issues such as the rights of the individual in relation to the power of the state and society; the nature and legitimacy of political authority and democracy; the significance of power, economics, justice and equality in social life; and the duties and responsibilities of citizens. We will also consider the philosophical meaning of communitarianism, liberalism, and republicanism, individualism, capitalism, and socialism, as well as the role of class, race, and gender in politics.

PHIL.2080 Introduction to Philosophy of Science - Credits: 3
This course is designed to introduce students to fundamental questions in philosophy of science. We will cover both descriptive issues such as how scientific theories become “facts,” and normative questions that ask how we ought to structure scientific inquiry. We will cover a range of scientific disciplines including physics, chemistry, biology, geology, and even paleontology. We’ll also cover disciplines that are more or less controversial as “sciences,” such as economics, mathematics, medicine, and engineering.

PHIL.2200 Philosophy and Christianity (Formerly 45.220) - Credits: 3

PHIL.2250 Introduction to Islam - Credits: 3
The goal of this course is to provide a basic understanding of Islam, the religion of some one-fifth of humankind, in its theological, historical, political, social and human dimensions. The course provides a general introduction to Islam, including the historical dimension, the theological, and the social/political. We will also address issues regarding the relevance of Islam to contemporary political events.

PHIL.2960 Introduction to World Religions (Formerly 45.296) - Credits: 3
A study of religious knowledge and the phenomena of religion from a philosophical standpoint. The course considers explanations for religious behavior, some central issues in religious belief, and the values and goals of religious systems. Various world religions provide specific data for these topics.

PHIL.3010 Ways of Knowing (Formerly 45.301) - Credits: 3
Studies and analyzes various forms and expressions of human knowledge (perception, concept-formation and symbolic functioning, myth, aesthetic creation and interpretation, scientific discovery and understanding) and the individual, social, and historical conditions to which they are subject. The goal of the course is a comprehensive view of the structure of the human mind and its operations.

PHIL.3040 God and Philosophy (Formerly 45.304) - Credits: 3
Studies, historically and systematically, the following topics: a) the origin and content of the idea of God, b) the possibility of affirming God, philosophically and religiously, c) the complex nature of religious language and imagery, and d) God’s relation to the world, history, and the individual.

PHIL.3050 Language Signs and Symbols (Formerly 45.305) - Credits: 3
An examination of the various grammars of human expressions from the point of view of a general theory of signs. Among the topics to be treated are: a) the nature of signs, symbols, and
meaning; b) the structures and functions of language; c) the relations between language, thought, and reality, especially as manifested in metaphor; d) the social dimensions of signification and symbolization; and e) the relations between the different linguistic, sign, and symbol systems.

PHIL.3060 Feminist Theory Politics (Formerly 45.306) - Credits: 3

What is sexist oppression? Is our culture still sexist, or is the need for feminism over? How should we respond to sexism in other cultures? Do men and women have different natures? Are our culture’s sexual representations of women necessarily degrading, and if so, why? We’ll consider these questions, and others, by examining the arguments and methodology of analytic feminism. We’ll start by tracing the historical development of feminism in the 18th, 19th, and 20th centuries, and then turn to several contemporary feminist analyses of sexist oppression. We’ll then use these feminist frameworks to examine more specific issues. Possible topics include: feminist analyses of sexual objectification in pornography, feminist arguments in ethics and social theory, feminist analyses of science, and feminist criticisms of gendered labour. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PHIL.3080 Philosophy of Race and Gender (Formerly 45.308) - Credits: 3

This course will focus on issues of identity and difference. We will discuss the ways in which group identities are formed and break down. We will discuss how differences are constituted and reconstituted. These issues are central to theories of race and gender, racism and sexism. Some of the questions which we will raise are these: What motivates forming group identities? How are they formed? How is identity used within oppressive social structures? How can it be used to transform society? Why do some differences make a difference and others don’t? Can we choose our group identities? Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PHIL.3100 Philosophy of Creative Imagination (Formerly 45.310) - Credits: 3

Focuses first on imagination as a function of mind, placing it in relation to other functions such as perception, emotion, and conceptualization. Attention is then given to the difference between the reproductive and the creative imagination, with special emphasis on the psychological and social/political dimensions of creativity. Topics to be considered include poetical metaphor, theatrical performance, painting, architecture, or photography.

PHIL.3101 Philosophy of Humor and Comedy - Credits: 3

This course examines the phenomenon of humor, laughter, and comedy, inquiring into its nature and function in human life. We explore the leading theories of humor, in attempting to explain what makes something "funny" and why we enjoy humor so much. We also attempt to relate the idea of humor to the related ideas of laughter and comedy. The course will include analysis of the various forms of humor, including the joke, the dramatic comedy, and stand-up comedy.

PHIL.3105 Philosophy of Disability - Credits: 3

Examines the basic issues and problems in the philosophical study of disability, including engagement with the interdisciplinary field of disability studies. Provides a survey of issues relating to the lived experience of disability, disability and well-being, theories of disability, and the concepts of normality, fitness and ableism as they relate to the practice and institutions of medicine, politics, religion, and society more generally.

PHIL.3106 Public Health Ethics - Credits: 3

In this course we examine contemporary issues in public health ethics. Utilizing historical and recent cases we unpack the core conceptual issues and emerging trends in bioethics. In doing so, we’ll discuss issues such as quarantine, surveillance, isolation, behavioral interventions, and criminalization of health. We discuss the ethical and public health implications of nutrition, vaccinations, occupational health, pandemics, and bioterrorism, among many other cases.

PHIL.3107 Animal Ethics - Credits: 3

This course examines the moral status and ethical treatment of non-human animals.

PHIL.3110 Philosophy and Literature (Formerly 45.311) - Credits: 3

This course examines the intersection between philosophy and literature. Course content includes detailed study of philosophical works of literature and works of philosophy about Literature. Featured Topics include competing definitions of Literature, silent and performative reading, models for acquiring literary status, Literature and morality, censorship, the role of truth in literary experience, and the relationship between authors, works, fictional characters, readers, and critics.

PHIL.3130 American Philosophy (Formerly 45.313) - Credits: 3

American philosophy provides a historical approach to
American intellectual history from 1830 to the present. American Transcendentalism and Pragmatism will be the two focal points in the course and students will be acquainted with authors such as Ralph Waldo Emerson, Margaret Fuller, Henry David Thoreau, C.S. Peirce, William James, Jane Addams and John Dewey. The ideas of freedom, self-reliance, community, and moral life are the abiding threads in this tradition and will be explored in the course of the term.

PHIL.3140 Philosophy of the Gothic Imagination  
(Formerly 45.314) - Credits: 3

A philosophical inquiry into science fiction, fantasy, and horror, with special emphasis on film. This course will attempt to provide interpretations of some classic examples from these genres, as well as to inquire into the philosophical significance of these literary categories and their relation to mythology and religion. Questions to be addressed will include the problem of knowledge and rationality and its limits, the nature of the human being, and the moral problem of the role of violence in the social order. The class will attempt to identify a continuous tradition between these modern genres and ancient Greek tragedy and mythology.

PHIL.3141 Dante’s Way from Fear to Peace - Credits: 3

The course will involve close reading of central cantos from all three books of Dante’s Divine Comedy, the Inferno, Purgatorio, and Paradiso. Through we will consider Dante’s place in the history of European literature, in particular, his relationship to Virgil and the epic tradition, our primary focus will be on three philosophical concerns, existential/ethical, metaphysical/ontological, and epistemological/Linguistic.

PHIL.3150 Philosophical Topics (Formerly 45.315) - Credits: 3

A close study of some of the great texts of philosophical literature. In general, one or two major works are selected and subjected to a thorough reading.

PHIL.3160 Philosophy and Film (Formerly 45.316) - Credits: 3

This course examines the political and philosophical values and ideas which constitute cinema. It analyzes film as an historical, cultural, commercial, and artistic endeavor. Students will develop the skills to watch film actively and critically.

PHIL.3210 Theories of Ethics (Formerly 45.321) - Credits: 3

This course examines theories of Philosophical ethics. Possible topics include metaethics (which asks questions such as "What do we mean when we call things 'right' or 'wrong'?", "Are there universal ethical truths or is morality fundamentally relative?", and "What is the relationship between morality and religion?"); normative ethics (which asks whether the right thing to do is determined by considerations such as rights, duties, intentions, consequences, character, or something else) and applied ethics (which applies normative ethical theories to particular concrete problems).
A philosophical analysis of the ethical dimensions and responsibilities of the engineering profession. Specific case studies and ethical issues are analyzed through the application of some of the basic concepts and principles of traditional and contemporary ethical theories. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.3350 Ethical Issues in Technology (Formerly 45.335) - Credits: 3

This course will examine important ethical issues and value conflicts emerging in contemporary science and technology. Through readings and class discussions students will not only have an opportunity to explore the manner in which ethical and technical problems are related, but to develop insight into areas of ethical philosophy and modes of reasoning essential to an intelligent understanding of such issues. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.3360 Early Modern Philosophy - Credits: 3

Examines Early Modern European Philosophy and its religious and scientific context, including movements such as the Mechanical Philosophy, Rationalism, Empiricism, and Transcendental Philosophy. Topics include knowledge and scientific understanding, the human mind and personal identity, and the debate between faith and reason.

PHIL.3390 Poetry and Philosophy After Plato (Formerly 45.339) - Credits: 3

After defining "Neoplatonism" with reference to Plato’s Phaedo, Symposium, and Phaedrus, the course will consider the relationships among Homer’s Odyssey, Plotinus’s Enneads, Virgil’s Aeneid, Augustine’s Confessions, and Dante’s Divine Comedy. The focus will be on coming home to the “source and origin” after having been away and, as the philosopher Plotinus puts it, having been “a stranger in something strange”. Students will be invited to work on other literary and philosophical treatments of this theme in English, Irish or American poetry and writing. A principal concern of the course is language “sung, spoken, and written”. Accordingly, the course will applicable to, and count for the Philosophy and Communications track.

PHIL.3400 Mysticism: East and West (Formerly 45.340) - Credits: 3

This course explores the religious and psychological phenomenon known as the mystical experience, both within the context of organized religion and outside it. We will approach this subject from a comparative standpoint, considering examples from Christianity, Judaism, and Islam and also from Eastern religions such as Buddhism and Taoism. We will make use of philosophy, psychology, theology and literature in order to try to understand mysticism and its relation to religion. Readings include The Upanishads, the Tao Te Ching, the Bible, and Plato. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PHIL.3410 German Philosophy - Credits: 3

In this course, students will be exposed to the rich tradition of German philosophy. Beginning with the emergence of philosophical works written in German in the 14th century, the course follows the historical progression of German philosophy up until the mid-20th century. Along the way, students will be introduced to major and minor figures in the German philosophical tradition. Through this course, students will understand the contributions of German philosophy to German culture and shaping German’s national identity. Additionally, students will recognize connections between German philosophy and the wider Western philosophical tradition.

PHIL.3420 Critical Theory & Society (Formerly 45.342) - Credits: 3

The nature and methods of a critique of society that focuses on the conflicts between the various modes of rationality and rationalization.

PHIL.3470 Greek Tragedy & Philosophy (Formerly 45.347) - Credits: 3

Philosophers such as Plato, Aristotle, Hegel, and Nietzsche have drawn inspiration from, and challenged critically, the great Greek tragedians Aeschylus, Sophocles and Euripides. This course will play off philosophical commentaries against the specific tragedies they have targeted in order to examine the often tense relationship between philosophical discourse and tragic poetry.

PHIL.3480 Eastern Philosophy and Religion (Formerly 45.348) - Credits: 3

A comparative study of the major strand and themes of Eastern thought and philosophies, encompassing principally the Japanese, Chinese, and Indian traditions.

PHIL.3500 World Philosophies (Formerly 45.350) - Credits: 3

This course will fuse the historical and the thematic approaches in order to undertake a comparative examination of the relations of the great philosophical traditions (Chinese, Indian, Western, Islamic, and Japanese) to the perennial issues of
philosophy. The main focus will be the continuing vitality and heuristic fertility of these traditions and their ability to define how human meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PHIL.3510 Problem of Evil (Formerly 45.351) - Credits: 3

Why is there evil and suffering in the world? This course looks at the explanations that have been given in the various religions of the world and considers the strengths and weaknesses of each approach.

PHIL.3520 Existence & Anxiety (Formerly 45.352) - Credits: 3

Explores basic questions of human existence in 19th and 20th Century philosophy and literature. Topics include anxiety and alienation; freedom and responsibility; authenticity and bad faith; individuality and mass society; rationality and the absurd; values and nihilism; and God and meaninglessness. Meets Core Curriculum Essential Learning Outcome for Social Responsibility &Ethics (SRE).

PHIL.3530 Gender and Religion (Formerly 45.353) - Credits: 3

This course examines gender in philosophy of religion and philosophy of theology. Issues addressed include the nature of gender, the divine gender, religious oppression and liberation of women, and LGBTQIA+ issues.

PHIL.3570 Science and Religion (Formerly 45.357) - Credits: 3

A study of the multiple relations between science and religion focusing on the theme of creativity. The problem of the various truth claims of the two systems will be subjected to a close analysis and principles developed to understand how conflicts between the them can be understood and resolved.

PHIL.3610 Equality, Justice and the Law (Formerly 45.361) - Credits: 3

This class investigates the American fascination with the “rule of law.” Questions to be considered include the following: What do we mean by the rule of law? What is the relation between law and morality? How does the rule of law promote justice, and what is its connection with the ideal of equality? What is the role of a written Constitution in protecting the rule of law? Special emphasis will be given to the Equal Protection clause of the Constitution and its role in prohibiting discrimination against disadvantaged groups, including racial minorities, women, and the handicapped. We will also consider in detail some theories of constitutional interpretation, including the Original Intent theory.

PHIL.3620 Democracy and Its Critics (Formerly 45.362) - Credits: 3

Explores the diverse roots of the democratic ideal and the opportunities and dangers associated with democratic politics. The arguments for and against democracy will be analyzed. Meets Core Curriculum Essential Learning Outcome for Social Responsibility &Ethics (SRE).

PHIL.3650 Capitalism and Its Critics (Formerly 45.365) - Credits: 3

This course explores the historical evolution of capitalism, from its early beginnings in the Enlightenment to the most recent debates about the free market and globalization. The focus will be on the debate over the virtues and vices of capitalism as distinct from other modes of economic and political organization. Concepts to be discussed will include freedom, equality and the distribution of wealth. Readings include Adam Smith, Karl Marx, Max Weber, Joseph S, and others.

PHIL.3660 Globalization and Its Critics (Formerly 45.366) - Credits: 3

The course explores globalization as the process of transformation of regional and national phenomena into global ones, analyzing its social, economic, political, and cultural aspects. Supporters view it as the progress of liberalization and democratization that develop peaceful international cooperation; critics see globalization as the expansion of the profit-seeking global corporations that abuse the less developed and vulnerable regions. The course readings include the works of Amartya Sen, Samuel Huntington, Joseph Stiglitz, and other leading economists, sociologists, and philosophers.

PHIL.3670 Feminism and Liberalism (Formerly 45.367) - Credits: 3

Liberalism stresses the importance of protecting individual people’s right to live their lives however they see fit. Feminism strives to show that women are subject to a variety of injustices that prevent them from being able to live lives that are as good as men’s. The aim of this course will be to consider whether liberalism and feminism are compatible, or whether the central ideals of liberalism—ideals like equality, autonomy, and individual rights—actually function to entrench not just sexism but also racism, classism, and other kinds of oppression. Readings will include both historical and contemporary writers such as Isaiah Berlin, Thomas Hobbes, John Locke, Catherine MacKinnon, John Stuart Mill, Martha Nussbaum.
PHIL.3680 The Politics of Food (Formerly 45.368) - Credits: 3
This class will examine the moral and political implications of the food we eat. Topics we’ll cover include genetically modified organisms, factory farming, animal rights and welfare, agricultural pollution, agricultural subsidies, third world hunger, the obesity epidemic, and the industrial food system and its alternatives.

PHIL.3690 History of Moral Philosophy (Formerly 45.369) - Credits: 3
This course explores the history of moral philosophy by examining the writings of key thinkers in the Western philosophical canon, including Leibniz, Hume, Kant and Hegel. We will focus on four basic types of moral reasoning: perfectionism, utilitarianism, intuitionism, and Kantian constructivism. Our goal will be to understand how these thinkers from the modern period of moral philosophy have influenced the way contemporary philosophers think about morality. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.3700 Metaphysics (Formerly 45.370) - Credits: 3
This course examines fundamental issues and topics in contemporary metaphysics. Broadly construed, metaphysics refers to the nature of existence and reality, or more basically, being. Topics in the course include: persistence, personal identity, human ontology, free will, possible worlds and modality, causation and paradoxes.

PHIL.3710 Buddhist and Zen Philosophy (Formerly 45.371) - Credits: 3
Explores Buddhist and Zen philosophy and practice from ancient India through its developments in China and Japan to contemporary America. Attention is given to significant philosophical movements such as Abhidharmika, Madhyamika, Yogacara, Huayen, and Chan (Zen).

PHIL.3720 Chinese Philosophy (Formerly 45.372) - Credits: 3
An introduction to the Chinese philosophical tradition in translation, especially the classical schools of Confucianism, Daoism, Mohism, and Legalism. Later developments in Buddhist and Neo-Confucian thought will also be explored.

PHIL.3730 Arabic and Islamic Philosophy (Formerly 45.373) - Credits: 3
An introductory survey of selected philosophical topics and figures in the Arabic-speaking world, focusing on the development of classical Arabic philosophy (falsafa) through its proponents and critics from al-Kindi (9th century) to Averroes (12th century). The course can also include speculative theology (kalam), mystical philosophy (Sufism), later developments, and contemporary issues.

PHIL.3740 Myth, Ritual and Festival (Formerly 45.374) - Credits: 3
This course aims to analyze the social, cultural, and religious phenomena of the festival or holiday in its connection with myth and ritual. We focus in particular on the groundbreaking work of the Russian literary theorist Mikhail Bakhtin and his analysis of the cross-cultural features of the idea of the festival, for example the Roman Saturnalia, the British May Day festival, and our modern thanksgiving, Christmas, and New Year festivals. We will also consider other important contributions to the study of ritual and festival, including those of James Frazer, Mircea Eliade, and Joseph Campbell. A substantial part of the class will be focused on the sociological and historical aspects of the role of festival in modern society. We will also attempt to place the festival and holiday tradition within a larger framework of the role of myth and ritual in religion.

PHIL.3750 Philosophy of Sex and Love (Formerly 45.375) - Credits: 3
The aim of this course is to introduce students to both historical and contemporary discussions surrounding the topics of sex and love. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PHIL.3760 The Ethics of War and Peace (Formerly 45.376) - Credits: 3
This course examines theories about why human beings engage in mass killing, the history of moral deliberation about war in major religious traditions, and modern philosophical analyses of the diverse moral principles that those traditions have bequeathed to us. The course comprises three broad ethical questions. First when, if ever, is recourse to arms legitimate (jus ad bellum)? Second, what constraints should apply to military conduct (jus in bello)? Third, how should wars end (jus post bellum)? These three questions will be systematically discussed by critically examining a selection of writings by historical and modern secular and religious thinkers.

PHIL.3780 Philosophy of Peace and Nonviolence (Formerly 45.378) - Credits: 3
This course examines philosophical theories of peace, pacifism,
and nonviolence. We will study ancient and modern accounts, secular and religious traditions, as well as feminist perspectives in the philosophy of peace and nonviolence. We will explore philosophical applications of nonviolence toward nonhuman animals and the natural environment, along with specific cases of nonviolent resistance in contemporary global conflicts.

PHIL.3830 Philosophy of Death and Dying (Formerly 45.383) - Credits: 3

This course is a philosophical and interdisciplinary examination of prominent issues concerning the meaning of life and death and the ethical concerns involved with life, death and end of life issues. Topics in the course include: definitions of death, metaphysics and death, cultural meanings of death, the ethics of killing vs. letting die, euthanasia and suicide, and rights of the dying. Meets Core Curriculum Essential Learning Outcome for Social Responsibility &Ethics (SRE).

PHIL.3840 Philosophies of Art and Beauty (Formerly 45.384) - Credits: 3

Examines the views of major philosophers on the beautiful and the nature of artistic creativity. An attempt is made to correlate the views of the thinkers with the works of poets, artists, and composers and the statements the latter have made about their work.

PHIL.3850 Philosophy of Popular Culture (Formerly 45.385) - Credits: 3

This course analyzes those forms of art/entertainment commonly referred to under the umbrella term "popular culture" through a variety of philosophical lenses. After seeking to establish a categorization of "popular culture," students will examine the mediums of music, film, television, advertisements and sports. Throughout the course, students will read/listen/watch various examples of the mediums listed above and attempt to answer various questions about them such as: what societal values make these examples popular at a current moment? What cultural assumptions do these examples reflect? What is the artistic/aesthetic merit of these examples?

PHIL.3860 Ancient Philosophy (Formerly 45.386) - Credits: 3

A survey of the beginnings of philosophy, mainly western, from the Presocratics to Augustine. Studies the emergence of philosophy out of mythical forms of thinking and the development of rational thought in the work of Plato, Aristotle, the Stoics, the Epicureans, and the Neoplatonists.

PHIL.3870 Plato and Beginning of Philosophy (Formerly 45.387) - Credits: 3

It is Plato who first uses the words 'philosopher' and "philosophy", and who, in his dialogs or dramatic discussions, establishes for all subsequent Western thought just was the enterprise of philosophy will be. In our study of these dialogs we will trace the origins in Plato of philosophy's primary questions concerning what is real and true as opposed to mere appearance (ontology, metaphysics), what is knowledge as opposed to mere opinion (epistemology), what is valid argument (logic), what is beautiful (aesthetics), and what is good, just and fair (ethics, politics). Plato foregrounds speech and language in all these considerations. Hence language, as the medium of thought and communication, will be a fundamental concern throughout our study.

PHIL.3880 Latin American Philosophy - Credits: 3

Students in this course will be introduced to current and longstanding debates within Latin American Philosophy. They will also be exposed to many of the principle texts and thinkers within this burgeoning tradition. The class includes a survey of Latin American philosophy ranging from pre-colonial Aztec thought to the debates over the struggle for Latin American independence, and also the question of identity: what constitutes Latin American philosophy.

PHIL.3890 Immigration and Global Justice - Credits: 3

This course addresses the question of justice in regards to immigration policy. We consider a variety of views including Communitarianism, Liberalism, Nationalism, Cosmopolitanism, and Democratic Theory. We will look at how these different positions have answered the following sorts of questions: Do we have duties to strangers of foreigners that are of equal weight to the duties we owe to members of our family, our circle of friends or our nation? Does part of the definition of "self-determined state" include the right to unilaterally reject petitions of inclusion from non-citizens? Does a commitment to equality demand that borders be open?

PHIL.3900 Philosophy of Sport - Credits: 3

This course is an introduction to and survey of the philosophy of sport. In this course, students will consider the nature and existence of sports, as well as the relationship of sports to various games and social practices. Additionally, the ethical implications of various aspects of sports will be presented, with an application of these ethical issues to various real-life problems and examples. Overall, sports will be analyzed as a reflection of human nature and social realities, and its examination will provide important insight to our existence.

PHIL.4010 Bioethics and Genetics Research (Formerly 45.401) - Credits: 3

This course addresses ethical issues that arise in biomedical research and practice including autonomy in the doctor-patient
relationship, the duty of confidentiality, the right to refuse treatment, the right to death with dignity, the ethics of experimentation with human subjects, the ethics of genetic enhancement, and justice in health care distribution. The course will combine theoretical perspectives and concrete case studies that illustrate actual dilemmas that the health care profession has in fact encountered over the years.

PHIL.4910 Directed Studies (Formerly 45.491) -
Credits: 1-4

The student, through regular and frequent consultation with an instructor, pursues a special problem in philosophy, the results of which are presented in a 25-30 page paper.

PHIL.4951 Senior Capstone - Credits: 3

This course is designed to provide philosophy majors with a capstone project involving integration of their coursework in philosophy in the form of an independent research project under the supervision of a faculty member. The capstone will be taken during the senior year (students in the Communications program may take the Practicum instead of the Capstone). The class is designed to meet the Essential Learning Outcomes of Written and Oral Communication, Applied and Integrative Learning, and Information Literacy.

PHIL.4960 Practicum (Formerly 45.496) - Credits: 3

The practicum is a 3-credit internship at a professional site relevant to the student’s course of study. Students are required to write a term paper at the end of their internship.
The Department of Political Science offers a Bachelor of Arts degree with a major in Political Science that allows students to pursue one of the following four concentrations:

- American Politics
- International Relations and Comparative Politics
- Law and Politics
- Political Communication and Public Opinion

To graduate Political Science majors must:

- Fulfill the Core Curriculum requirements (33-38 credits), which all university students must satisfy
- Earn the required Political Science credits (min. credits 36 and max. credits 48) 5 core courses (15 credits) 75-100 hours of internship or service activity (in conjunction with either POLI.4960 or POLI.4970)
- Complete all other requirements that students in the College of Fine Arts, Humanities & Social Sciences must fulfill. At least 72 credits must be for courses taken outside of the Political Science Department.
- Maintain a minimum GPA of 2.0

**American Politics Concentration**

American Politics students examine a wide range of political beliefs and ideologies, political institutions, and citizen engagement in politics from many methodological perspectives. Their career goals might include: federal government agencies, local government, military service, social movement activism, non-profit organizations, public policy.

**International Relations and Comparative Politics Concentration**

Comparative Politics analyzes political and social phenomena within countries, and systematically compares various political and development outcomes. International Relations studies present and past global interactions among state, non-state actors, and international organizations and their impact on issues ranging from foreign policy to human rights and environmental sustainability. Students will explore different world regions (Europe, Latin America, Asia, Middle East, Africa), issues related to global peace, conflict, and security, and substantial economic and social issues. This concentration prepares students for careers in international organizations, NGOs, foreign service, security studies, peace and development studies, private sector, military service.

**Law and Politics Concentration**

Law and Politics students take several courses designed to explain legal concepts, the institutions of American law, and constitutional debates. They develop deep skills of arguing, processing information, clear writing, and effective speaking. The goal of this focus is development of broad skills in addition to political knowledge, admission to law school, success in law school, and preparation for a legal career (e.g. lawyer, paralegal).

**Political Communication and Public Opinion Concentration**

Political Communication and Public Opinion focuses on the flow and content of information and ideas. Students examine public opinion data, strategies of rhetoric, new media (e.g. social media, online news) and examine the influence political messages can have on citizens, their beliefs, and political behaviors. Students who study this concentration may choose careers in political campaign management, journalism, public opinion polling, or public relations.

View all the complete Degree Pathways (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf).

For additional information contact the Political Science Department (https://www.uml.edu/FAHSS/Political-Science/Contact-Us.aspx).

**College of Fine Arts, Humanities & Social Sciences**

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A students catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

**American Studies**

- General Option
  
  fall 2015 and beyond (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

  fall 2012 - spring
• Thematic Option
  fall 2021 and beyond
  fall 2015 - spring 2021

• Graphic Design Concentration
  fall 2015 - spring 2020

• Studio Art Concentration
  fall 2022 and beyond

Composition for New Media

• fall 2022 and beyond
• fall 2019 - spring 2022

Criminal Justice

• General Option
  fall 2022 and beyond
  fall 2016 - spring 2022

• Corrections Option
  fall 2016 and beyond

Digital Media

• fall 2021 and beyond

Economics

• fall 2015 and beyond

English
• Literature Concentration
  fall 2021 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2021
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Journalism & Professional Writing Concentration
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Creative Writing Concentration
  fall 2018 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Theatre Arts Concentration
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2010 - spring 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Graphic Design
  fall 2021 and beyond
  fall 2020 - spring 2021
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• History
  fall 2020 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Liberal Arts
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Music Studies
  General Option
  fall 2022 and beyond
  fall 2018 - spring 2022
  Instrumental Option
  fall 2015 - spring 2018
  Voice Option
  fall 2015 - spring 2018
• Music Performance
  Instrumental Option
  fall 2022 and beyond
  fall 2019 - spring 2022
  Voice Option
  fall 2022 and beyond
  fall 2019 - spring 2022
• Music Business
  fall 2022 and beyond
  fall 2015 - spring 2022
  prior to fall 2015
• Peace and Conflict Studies
  fall 2021 and beyond
  fall 2015 - spring 2021
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  prior to fall 2015
• Philosophy
  General Option
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2011 - spring 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
Communications & Critical Thinking Option
fall 2015 and beyond
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Philosophy & Religious Studies Option
fall 2015 and beyond
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Political Science

- American Politics Concentration fall 2020 and beyond
- International Relations and Comparative Politics Concentration fall 2020 and beyond
- Law and Politics Concentration fall 2020 and beyond
- Political Communication and Public Opinion Concentration fall 2020 and beyond
- Sustainability and Environmental Politics Concentration fall 2022 and beyond

Political Science (prior to fall 2020)

- fall 2015 - spring 2020
- fall 2013 - spring 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Psychology

- General Concentration
- Behavior Analysis Concentration

Psychology

- Community Social Psychology Concentration
- Clinical Psychology Concentration
- Developmental Disabilities Concentration
- Health Psychology Concentration fall 2022 and beyondfall 2018 - spring 2022fall 2017 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Quantitative Economics

- fall 2022 and beyond

Sociology

- General Concentration fall 2016 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Policy & Social Problems Concentration fall 2021 and beyondfall 2016 - spring 2021
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Racial Equity and Inclusion Concentration fall 2021 and beyond

Sound Recording Technology

- fall 2022 and beyond
- fall 2019 - spring 2022
- fall 2015 - spring 2019
- prior to fall 2015

World Languages and Cultures
Sample Degree Pathway for Political Science

For students who entered fall 2015 to spring 2020.

Note: Majors must choose a focus area.1

Freshman Year

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<td>FAHS.1090</td>
<td>First Year Seminar</td>
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<td>ENGL.1010</td>
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<td>Social Sciences Persp. (SS)</td>
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Total 16

Spring Semester

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<td>Language 2 &amp;Culture</td>
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Total 16

Sophomore Year

Fall Semester

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<td>Science with/Lab Persp. (SCL)</td>
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<td>Language 3 &amp;Culture or World Ready Elective</td>
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<td>Math Persp. (MATH) - MATH.2830 (<a href="https://www.uml.edu/catalog/courses/MATH/2830">https://www.uml.edu/catalog/courses/MATH/2830</a>) recommended</td>
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Total 16

Spring Semester
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**Junior Year**

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**Spring Semester**

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**Senior Year**

**Fall Semester**

<table>
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<tr>
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<tbody>
<tr>
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<tr>
<td>xxxx.xxxx</td>
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<tr>
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</tr>
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**Spring Semester**

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<tr>
<td>xxxx.xxxx</td>
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<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
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<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
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<tr>
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</tbody>
</table>

**Total Minimum Credits = 120**

Minimum Political Science Credits: 36

Maximum Political Science Credits That Can Be Counted Toward Graduation: 45

Minimum Upper Level Credits: 18 with a minimum of 6 at 400 level plus 12 at 300 Level or higher (POLI.3010, POLI.4960 or POLI.4970) count toward these requirements. One of these advanced courses must be a Seminar, which is a small class of advanced students, focused on more intensive writing than usual classes. The topics of seminar courses will vary each semester with the interests of department faculty. An alternative to a standard Seminar course is to select POLI.4010 Research
Seminar in Political Science after prior discussion with a professor. This individualized course requires an extensive research paper. The course can be taken in conjunction with a regular course in the same or subsequent semester, working with that professor to produce a research project in addition to the normal work of that course.

You should meet with your faculty advisor to determine how you will meet the Political Science and Core Curriculum requirements.

The department focuses on four main fields within the discipline: American Politics, International Politics, Law &Politics, and Political Communication. Majors choose one area of focus, in which they take the following courses:

• American Politics, Government, and Policy: at least 5 courses in this area, at least 1 International course, and 1 additional course in any area of political science.
• International Relations &Comparative Politics: at least 5 courses in this area, at least 1 American Course (or a Law &Politics Course or Political Communication &Public Opinion Course with an American focus), and 1 additional course in any area of political science.
• Law &Politics: at least 5 courses in this area, at least 1 International course (or Political Communication &Public Opinion Course with an International focus), and 1 additional course in any area of political science.
• Political Communication &Public Opinion: at least 5 courses in this area, at least 1 International course (or a Law &Politics Course with an International focus), and 1 additional course in any area of political science.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details.

World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements in the undergraduate catalog.

Political Science majors satisfy the Written and Oral Communication (WOC) ELO by taking an approved, 4000-level Political Science seminar course. See your Advisement Report or the WOC Course Listing for a current list of approved courses.

Current UMass Lowell students should be using their Advisement Report in SiS. If you need assistance, please contact your advisor.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

American Politics, Government, and Policy

• POLL.1010 Introduction to American Politics
• POLL.1050 Introduction to Public Policy
• POLL.1750 Introduction to Environmental Politics
• POLL.2120 American Media and Politics
• POLL.2180 Introduction to Politics and Sports
• POLL.2300 Law &the Legal System
- POLI.2650 (https://www.uml.edu/catalog/courses/POLI/2650) State & Local Politics
- POLI.3070 (https://www.uml.edu/catalog/courses/POLI/3070) American Political Thought
- POLI.3090 (https://www.uml.edu/catalog/courses/POLI/3090) Political Psychology
- POLI.3100 (https://www.uml.edu/catalog/courses/POLI/3100) 'Isms' in American Politics
- POLI.3110 (https://www.uml.edu/catalog/courses/POLI/3110) Foundations of Law
- POLI.3120 (https://www.uml.edu/catalog/courses/POLI/3120) Campaign and Election Law
- POLI.3130 (https://www.uml.edu/catalog/courses/POLI/3130) Electoral Politics
- POLI.3140 (https://www.uml.edu/catalog/courses/POLI/3140) Parties and Interest Groups
- POLI.3200 (https://www.uml.edu/catalog/courses/POLI/3200) Gender Law & Politics
- POLI.3240 (https://www.uml.edu/catalog/courses/POLI/3240) Politics of Pro Football
- POLI.3350 (https://www.uml.edu/catalog/courses/POLI/3350) Constitutional Law and Politics
- POLI.3370 (https://www.uml.edu/catalog/courses/POLI/3370) Civil Liberties Law & Politics
- POLI.3380 (https://www.uml.edu/catalog/courses/POLI/3380) Political Participation
- POLI.3390 (https://www.uml.edu/catalog/courses/POLI/3390) Judicial Review Seminar
- POLI.3430 (https://www.uml.edu/catalog/courses/POLI/3430) Congress
- POLI.3440 (https://www.uml.edu/catalog/courses/POLI/3440) American Presidency
- POLI.3550 (https://www.uml.edu/catalog/courses/POLI/3550) Government Fiscal Policy
- POLI.3560 (https://www.uml.edu/catalog/courses/POLI/3560) Public Policy Analysis
- POLI.3570 (https://www.uml.edu/catalog/courses/POLI/3570) Thoreau in Our Time
- POLI.3800 (https://www.uml.edu/catalog/courses/POLI/3800) American Foreign Policy
- POLI.4110 (https://www.uml.edu/catalog/courses/POLI/4110) Dynamics, Power, and Authority
- POLI.4220 (https://www.uml.edu/catalog/courses/POLI/4220) Political Communication and Media Studies

**International Relations & Comparative Politics**

- POLI.1120 (https://www.uml.edu/catalog/courses/POLI/1120) Introduction to Comparative Politics
- POLI.1210
Introduction to International Relations
- POLI.1250

Introduction to Peace & Conflict Studies
- POLI.2110

Media and Politics Around the World
- POLI.2150

African Politics
- POLI.3040

Politics of Development
- POLI.3210

Soccer and Politics
- POLI.3340

Islam & Politics
- POLI.3510

Irish Politics
- POLI.3580

Global Environmental Policy
- POLI.3590

British Politics
- POLI.3600

European Politics
- POLI.3630

Politics of China
- POLI.3660

Russian Politics
- POLI.3680

Middle Eastern Politics
- POLI.3700

Latin American Politics
- POLI.3710

Caribbean Politics
- POLI.3720

Crime, Security, and Democracy in Latin America
- POLI.3750

Politics of the Pacific Rim
- POLI.3780

International Political Economy
- POLI.3800

American Foreign Policy
- POLI.3840

International Politics of Human Rights
- POLI.3870

Politics of International Organizations
- POLI.3950

International Law & Politics
- POLI.3980

The War on Drugs
- POLI.4020

Women in Islam
- POLI.4060

The Politics of Identity in the Middle East
- POLI.4450
Politics of Repression and Dissent

- POLI.4470
  (https://www.uml.edu/catalog/courses/POLI/4470) Theories of Political and Criminal Violence
- POLI.4900
  (https://www.uml.edu/catalog/courses/POLI/4900) War and Peace in the Sovereign State System

Law & Politics

*International Focus*

- POLI.2310
  (https://www.uml.edu/catalog/courses/POLI/2310) Introduction to Political Thought
- POLI.3950
  (https://www.uml.edu/catalog/courses/POLI/3950) International Law & Politics

*American Focus*

- POLI.2300
  (https://www.uml.edu/catalog/courses/POLI/2300) Law & the Legal System
- POLI.3110
  (https://www.uml.edu/catalog/courses/POLI/3110) Foundations of Law
- POLI.3120
  (https://www.uml.edu/catalog/courses/POLI/3120) Campaign and Election Law
- POLI.3200
  (https://www.uml.edu/catalog/courses/POLI/3200) Gender Law & Politics
- POLI.3350
  (https://www.uml.edu/catalog/courses/POLI/3350) Constitutional Law and Politics
- POLI.3370
  (https://www.uml.edu/catalog/courses/POLI/3370) Civil Liberties Law & Politics
- POLI.3390
  (https://www.uml.edu/catalog/courses/POLI/3390) Judicial Review Seminar

*Political Communication & Public Opinion*

*International Focus*

- POLI.2110
  (https://www.uml.edu/catalog/courses/POLI/2110) Media and Politics Around the World
- POLI.4220
  (https://www.uml.edu/catalog/courses/POLI/4220) Political Communication and Media Studies
- POLI.4450
  (https://www.uml.edu/catalog/courses/POLI/4450) Politics of Repression and Dissent

*American Focus*

- POLI.2120
  (https://www.uml.edu/catalog/courses/POLI/2120) American Media and Politics
- POLI.3090
  (https://www.uml.edu/catalog/courses/POLI/3090) Political Psychology
- POLI.3130
  (https://www.uml.edu/catalog/courses/POLI/3130) Electoral Politics
- POLI.3140
  (https://www.uml.edu/catalog/courses/POLI/3140) Parties and Interest Groups
- POLI.3160
  (https://www.uml.edu/catalog/courses/POLI/3160) Politics and Film
- POLI.3170
  (https://www.uml.edu/catalog/courses/POLI/3170) Politics and Music
- POLI.3190
  (https://www.uml.edu/catalog/courses/POLI/3190) Survey Research
- POLI.3380
  (https://www.uml.edu/catalog/courses/POLI/3380) Political Participation
Sample Degree Pathway for Political Science - American Politics Concentration

For students who entered fall 2020 and beyond.

Freshman Year

### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>POLI.1010</td>
<td>Introduction to American Politics (SRE)</td>
<td>3</td>
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<tr>
<td>FAHS.1090</td>
<td>First Year Seminar</td>
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<tr>
<td>ENGL.1010 / HONR.1100</td>
<td>College Writing I / FYSH (CW)</td>
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<td>Language 1 &amp;Culture</td>
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<tr>
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<td>Social Sciences Persp. (SS)</td>
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Total: 16

### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>POLI.1120 / POLI.1210</td>
<td>Introduction to Comparative Politics / Introduction to International Relations (DCA)</td>
<td>3</td>
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<tr>
<td>WLxx.xxxx</td>
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Sophomore Year

### Fall Semester

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<td>POLI.2010</td>
<td>Research Methods (IL)</td>
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<td>Arts and Hum. Persp. (AH)</td>
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<td>Science with/Lab Persp. (SCL)</td>
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<td>Math Persp. (MATH) - MATH.2830 recommended</td>
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Total: 16

### Spring Semester

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Total: 16
### Junior Year

#### Fall Semester

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#### Spring Semester

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<tr>
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**Total Minimum Credits = 120**

Minimum Political Science Credits: 36

Maximum Political Science Credits That Can Be Counted Toward Graduation: 45

Minimum Upper Level Credits: 18 with a minimum of 6 at 4000 level plus 12 at 3000 level or higher (POLI.3010, POLI.4960, POLI.4970) count toward these requirements. One of these advanced courses must be a seminar, which is a small class of advanced students, focused on more intensive writing than usual classes. The topics of seminar courses will vary each semester with the interests of department faculty.

You should meet with your faculty advisor to determine how you will meet the Political Science and Core Curriculum requirements.

1. No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details.

2. World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements in the undergraduate catalog.

3. Political Science majors satisfy the Written and Oral Communication (WOC) ELO by taking an approved, 4000-
level Political Science seminar course. See your Advisement Report or the WOC Course Listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a current list of approved courses.

4American Politics Concentration Elective Sophomore Spring semester, course list includes:

- **POLI.2120** (https://www.uml.edu/catalog/courses/POLI/2120) American Media and Politics
- **POLI.2180** (https://www.uml.edu/catalog/courses/POLI/2180) Introduction to Politics & Sports
- **POLI.2310** (https://www.uml.edu/catalog/courses/POLI/2310) Introduction to Political Thought
- **POLI.2650** (https://www.uml.edu/catalog/courses/POLI/2650) State & Local Politics

5American Politics Concentration Elective Junior year, course list includes:

- **POLI.3070** (https://www.uml.edu/catalog/courses/POLI/3070) American Political Thought
- **POLI.3090** (https://www.uml.edu/catalog/courses/POLI/3090) Political Psychology
- **POLI.3130** (https://www.uml.edu/catalog/courses/POLI/3130) Electoral Politics
- **POLI.3140** (https://www.uml.edu/catalog/courses/POLI/3140) Parties and Interest Groups
- **POLI.3160** (https://www.uml.edu/catalog/courses/POLI/3160) Politics and Film
- **POLI.3190** (https://www.uml.edu/catalog/courses/POLI/3190) Survey Research
- **POLI.3210** (https://www.uml.edu/catalog/courses/POLI/3210) Politics and Soccer
- **POLI.3290** (https://www.uml.edu/catalog/courses/POLI/3290) Politics of College Sports
- **POLI.3380** (https://www.uml.edu/catalog/courses/POLI/3380) Political Participation
- **POLI.3390** (https://www.uml.edu/catalog/courses/POLI/3390) Supreme Court Seminar
- **POLI.3490** (https://www.uml.edu/catalog/courses/POLI/3490) The Politics of Race and Ethnicity
- **POLI.3800** (https://www.uml.edu/catalog/courses/POLI/3800) American Foreign Policy

6Approved 4000-level Seminar:

- **POLI.4020** (https://www.uml.edu/catalog/courses/POLI/4020) Women in Islam
- **POLI.4060** (https://www.uml.edu/catalog/courses/POLI/4060) The Politics of Identity in the Middle East
- **POLI.4220** (https://www.uml.edu/catalog/courses/POLI/4220) Political Communication and Media Studies
- **POLI.4400** (https://www.uml.edu/catalog/courses/POLI/4400) Comparative National Security
- **POLI.4450**
Politics of Repression and Dissent

- POLI.4470

Theories of Political and Criminal Violence

Current UMass Lowell students should use their Advisement Report in SIS. Political Science majors will also be assigned to a faculty advisor who guides students through their studies. The department strongly suggests scheduling an advising meeting once per semester.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

Last updated: 7/13/2020

Sample Degree Pathway for Political Science - International Relations and Comparative Politics Concentration

For students who entered fall 2020 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
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<tr>
<td>POLI.1010</td>
<td>Introduction to American Politics (SRE)</td>
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<td>FAHS.1090</td>
<td>First Year Seminar</td>
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<tr>
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<td>Language 1 &amp;Culture</td>
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<td>xxxx.xxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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<tr>
<td>xxxx.xxx</td>
<td>Social Sciences Persp. (SS)1</td>
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Total: 16

Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENGL.1020</td>
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<td>POLI.1120</td>
<td>Introduction to Comparative Politics / Introduction to International Relations (DCA)</td>
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Total: 15 / 16

Sophomore Year

Fall Semester

<table>
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<tr>
<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>POLI.2010</td>
<td>Research Methods (IL)</td>
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<td>Arts and Hum. Persp. (AH)</td>
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### Junior Year

#### Fall Semester

<table>
<thead>
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<tbody>
<tr>
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<td>International Relations and Comparative Politics Concentration Elective</td>
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<tr>
<td>xxxxxx.xxxx</td>
<td>Language 4 &amp; Culture or World Ready Elective</td>
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<td>xxxxxx.xxxx</td>
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#### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tr>
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</table>

Total Minimum Credits = 15

### Senior Year

#### Fall Semester

<table>
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<tr>
<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>xxxxxx.xxxx</td>
<td>Political Science or Free Elective</td>
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#### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
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<tbody>
<tr>
<td>xxxxxx.xxxx</td>
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</table>

Total Minimum Credits = 15

Minimum Political Science Credits: 36

Maximum Political Science Credits That Can Be Counted Toward Graduation: 45

Minimum Upper Level Credits: 18 with a minimum of 6 at 4000 level plus 12 at 3000 level or higher (POLI.3010 (https://www.uml.edu/catalog/courses/POLI/3010), POLI.4960 (https://www.uml.edu/catalog/courses/POLI/4960) or POLI.497...
You should meet with your faculty advisor to determine how you will meet the Political Science and Core Curriculum requirements.

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3. Political Science majors satisfy the Written and Oral Communication (WOC) ELO by taking an approved, 4000-level Political Science seminar course. See your Advisement Report or the WOC Course Listing for a current list of approved courses.

4. International Relations and Comparative Politics Concentration Elective Sophomore Spring semester, course list includes:
   - POLI.1750 Introduction to Environmental Politics
   - POLI.2110 Media and Politics Around the World
   - POLI.2180 Introduction to Politics and Sports
   - POLI.2210 Introduction to Global Security
   - POLI.2510 Politics of Identity

5. International Relations and Comparative Politics Concentration Elective Junior year, course list includes:
   - POLI.3040 Politics of Development
   - POLI.3340 Islam & Politics
   - POLI.3490 The Politics of Race and Ethnicity
   - POLI.3580 Global Environmental Policy
   - POLI.3610 Southeast Asian Politics
   - POLI.3680 Middle East Politics
   - POLI.3720 Crime, Security, and Democracy in Latin America
   - POLI.3780 International Political Economy
   - POLI.3800 American Foreign Policy
   - POLI.3840 International Politics of Human Rights
   - POLI.3870 Politics of International Organizations
   - POLI.3980
The War on Drugs

Approved 4000-level Seminar:

- POLI.4020 (https://www.uml.edu/catalog/courses/POLI/4020) Women in Islam
- POLI.4060 (https://www.uml.edu/catalog/courses/POLI/4060) The Politics of Identity in the Middle East
- POLI.4220 (https://www.uml.edu/catalog/courses/POLI/4220) Political Communication and Media Studies
- POLI.4400 (https://www.uml.edu/catalog/courses/POLI/4400) Comparative National Security
- POLI.4450 (https://www.uml.edu/catalog/courses/POLI/4450) Politics of Repression and Dissent
- POLI.4470 (https://www.uml.edu/catalog/courses/POLI/4470) Theories of Political and Criminal Violence

Current UMass Lowell students should use their Advisement Report in SiS (https://www.uml.edu/Enrollment/SiS/default.aspx). Political Science majors will also be assigned to a faculty advisor who guides students through their studies. The department strongly suggests scheduling an advising meeting once per semester.

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Sample Degree Pathway for Political Science - Law & Politics Concentration

For students who entered fall 2020 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
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<tbody>
<tr>
<td>POLI.1010</td>
<td>Introduction to American Politics (SRE)</td>
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<td>FAHS.1090</td>
<td>First Year Seminar</td>
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<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
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<td>Language 1 &amp; Culture</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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Total 16

Spring Semester

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</tr>
<tr>
<td>POLI.1120</td>
<td>Introduction to Comparative Politics / Introduction to International Relations (DCA)</td>
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<td>Science with/Lab Persp. (SCL)</td>
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### sophomore Year

#### Fall Semester

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#### Spring Semester

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<th>Course Name</th>
<th>Cr.</th>
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<td>POLI.xxxx <a href="https://www.uml.edu/catalog/courses/POLI">https://www.uml.edu/catalog/courses/POLI</a></td>
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<td>STEM Persp. (STEM)</td>
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### Junior Year

#### Fall Semester

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<tr>
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<td>XXXX.XXXX</td>
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<td>XXXX.XXXX</td>
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#### Spring Semester

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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
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<tr>
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<tr>
<td>XXXX.XXXX</td>
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### Senior Year

#### Fall Semester

<table>
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<tbody>
<tr>
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<td>XXXX.XXXX</td>
<td>Political Science or Free Elective</td>
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<tr>
<td>XXXX.XXXX</td>
<td>Free Elective</td>
<td>3</td>
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<td>XXXX.XXXX</td>
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#### Spring Semester

<table>
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<tr>
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<td>Credits</td>
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<td>POLI.4960</td>
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<tr>
<td>xxxx.xxxx</td>
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<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
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<td>3</td>
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</tbody>
</table>

**Total Minimum Credits = 120**

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4Law &Politics Concentration Elective Sophomore Spring semester, course list includes:

- POLI.2180 Introduction to Politics &Sports
- POLI.2310 Introduction to Political Thought
- POLI.2510 Politics of Identity

5Law &Politics Concentration Elective Junior year, course list includes:

- POLI.3100 Foundations of Law
- POLI.3290 Politics of College Sports
- POLI.3350 Constitutional Law: Powers &Principles
- POLI.3370 Constitutional Law: Rights &Liberties
- POLI.3390 Supreme Court Seminar
- POLI.3490 The Politics of Race and Ethnicity
- POLI.3840 International Politics of Human Rights
- POLI.3870
Politics of International Organizations
- POLI.3950
  (https://www.uml.edu/catalog/courses/POLI/3950) International Law & Politics
- POLI.3980
  (https://www.uml.edu/catalog/courses/POLI/3980) The War on Drugs

6 Approved 4000-level Seminar:
- POLI.4020
  (https://www.uml.edu/catalog/courses/POLI/4020) Women in Islam
- POLI.4060
  (https://www.uml.edu/catalog/courses/POLI/4060) The Politics of Identity in the Middle East
- POLI.4220
  (https://www.uml.edu/catalog/courses/POLI/4220) Political Communication and Media Studies
- POLI.4400
  (https://www.uml.edu/catalog/courses/POLI/4400) Comparative National Security
- POLI.4450
  (https://www.uml.edu/catalog/courses/POLI/4450) Politics of Repression and Dissent
- POLI.4470
  (https://www.uml.edu/catalog/courses/POLI/4470) Theories of Political and Criminal Violence

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for details.

Last updated: 7/13/2020

Sample Degree Pathway for Political Science - Political Communication & Public Opinion Concentration

For students who entered fall 2020 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Crs</th>
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<tr>
<td>POLI.1010</td>
<td>Introduction to American Politics (SRE)</td>
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<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
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<tr>
<td>FAHS.1090</td>
<td>First Year Seminar</td>
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<tr>
<td>PSYC.1010</td>
<td>Politics of Identity in the Middle East</td>
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<tr>
<td>WLxx.xxxx</td>
<td>Language I &amp; Culture</td>
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<tr>
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Spring Semester

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<tr>
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<td>POLI.1120</td>
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### Sophomore Year

#### Fall Semester

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<tr>
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#### Spring Semester

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<tbody>
<tr>
<td>POLI.2010</td>
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<td>xxxxxxx</td>
<td>Science with/Lab Persp. (SCL)1</td>
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<tr>
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### Junior Year

#### Fall Semester

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<tr>
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<tr>
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<td>Political Communication &amp; Public Opinion Concentration Elective</td>
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<td>xxxxxxx</td>
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<tr>
<td>xxxxxxx</td>
<td>Arts and Hum. Persp. (AH)1</td>
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#### Spring Semester

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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>POLIxxxx</td>
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<tr>
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### Senior Year

#### Fall Semester

<table>
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### Spring Semester

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<td></td>
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</table>

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4. Political Communication & Public Opinion Concentration Elective Sophomore Spring semester, course list includes:
   - POLI.2110 Media and Politics Around the World
   - POLI.2120 American Media and Politics

5. Political Communication & Public Opinion Concentration Elective Junior year, course list includes:
   - POLI.3190 Survey Research
   - POLI.3090 Political Psychology
   - POLI.3130 Electoral Politics
   - POLI.3140 Parties and Interest Groups
   - POLI.3380 Political Participation
   - POLI.3490 The Politics of Race and Ethnicity

6. Approved 4000-level Seminar:
Sustainability and Environmental Politics Concentration

For students who entered fall 2022 and beyond.

Freshman Year

Fall Semester

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<th>Course Name</th>
<th>Credits</th>
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<td>FAH.1090</td>
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<tr>
<td>POLI.1010</td>
<td>Introduction to American Politics</td>
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<tr>
<td>****.xxxx</td>
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<td>xxxx.xxxx</td>
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Spring Semester

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<td>POLI.1120</td>
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Sophomore Year

Fall Semester
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**Spring Semester**

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<td>Sustainability and Environmental Politics Elective4</td>
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<td>Language 4 &amp; Culture or World Ready Elective2</td>
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**Junior Year**

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**Senior Year**

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**Total Minimum Credits = 120**

Minimum Political Science credits: 40

Maximum Political Science credits that can be counted toward graduation: 45

Minimum upper level credits: 18 with a minimum of 6 at 4000 level plus 12 at 3000 level or higher (POLI.3010 (https://www.uml.edu/catalog/courses/POLI/3010), POLI.4960 (https://www.uml.edu/catalog/courses/POLI/4960) or POLI.4970 (https://www.uml.edu/catalog/courses/POLI/4970) count toward these requirements). One of these advanced courses
must be a seminar, which is a small class of advanced students, focused on more intensive writing than usual classes. The topics of seminar courses will vary each semester with the interests of department faculty.

You should meet with your faculty advisor to determine how you will meet the Political Science and Core Curriculum requirements.

1 No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details.

2 World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements in the undergraduate catalog.

3 Political Science majors satisfy the Written and Oral Communication (WOC) ELO by taking an approved, 4000-level Political Science seminar course. See your Advisement Report or the WOC Course Listing for a current list of approved courses.

4 Sustainability and Environmental Politics Electives (Sophomore):

   • POLI.1050
     (https://www.uml.edu/catalog/courses/POLI/1050) Introduction to Public Policy
   • POLI.1750
     (https://www.uml.edu/catalog/courses/POLI/1750) Introduction to Environmental Politics
   • POLI.2001
     (https://www.uml.edu/catalog/courses/POLI/2001) Comparative Environmental Politics
   • POLI.2650
     (https://www.uml.edu/catalog/courses/POLI/2650) State and Local Politics

5 Sustainability and Environmental Politics Electives (Junior):

   • POLI.3001
   • POLI.3002
     (https://www.uml.edu/catalog/courses/POLI/3002) Environmental Security
   • POLI.3320
     (https://www.uml.edu/catalog/courses/POLI/3320) Climate Change Communication
   • POLI.3580
     (https://www.uml.edu/catalog/courses/POLI/3580) Global Environmental Policy
   • POLI.3780
     (https://www.uml.edu/catalog/courses/POLI/3780) International Political Economy
   • POLI.4001
     (https://www.uml.edu/catalog/courses/POLI/4001) Environment, Racism, and Justice

6 Approved 4000-level Seminar:

   • POLI.4020
     (https://www.uml.edu/catalog/courses/POLI/4020) Women in Islam
   • POLI.4060
     (https://www.uml.edu/catalog/courses/POLI/4060) The Politics of Identity in the Middle East
   • POLI.4220
     (https://www.uml.edu/catalog/courses/POLI/4220) Comparative National Security
   • POLI.4400
     (https://www.uml.edu/catalog/courses/POLI/4400) Comparative National Security
   • POLI.4450
     (https://www.uml.edu/catalog/courses/POLI/4450) Politics of Repression and Dissent
   • POLI.4470
     (https://www.uml.edu/catalog/courses/POLI/4470) Theories of Political and Criminal Violence

Current UMass Lowell students should use their Advisement Report insis
Political Science majors will also be assigned to a faculty advisor who guides students through their studies. The department strongly suggests scheduling an advising meeting once per semester.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

_Last updated: 3/11/2022_
POLI.1010 Introduction to American Politics (Formerly 46.101) - Credits: 3

POLI.1010SI Supplemental Instruction for Political Science - Navitas Only (Formerly 46.101SI) - Credits: 1
Supplemental Instruction for Political Science - Navitas Only. Credits do not count toward degree requirements.

POLI.1050 Introduction to Public Policy (Formerly 46.105) - Credits: 3
An introductory survey of the major forces and processes involved in the development of public policy; contemporary issues in public policy will also be considered.

POLI.1100 Introduction to Politics (Formerly 46.110) - Credits: 3
An introductory exploration of basic political concepts, ideologies, and themes. Stresses the importance of understanding politics for everyday life.

POLI.1110 Election of 2012 (Formerly 46.111) - Credits: 3
An examination of the American election process in this presidential election year. Attention especially is given to candidates, political issues, political parties, and financing, among other factors, within the process and their influence in the election outcome. Strengths and weaknesses of the election process and reform proposals and prospects will also be addressed.

POLI.1120 Introduction to Comparative Politics (Formerly 46.112) - Credits: 3
What is democracy? What factors explain the demise of some authoritarian regimes? How can we explain the persistent underdevelopment of certain countries? What factors explain why civil war emerges in some weak states but not in others? These are the kinds of questions that Comparative Politics seeks to answer and this class will introduce central topics and theories in comparative politics. It will also analyze variations in similarities across regions of the world using in-depth analysis and systematic comparison across and within countries. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

POLI.1210 Introduction to International Relations (Formerly 46.121) - Credits: 3
Surveys some recent methods and approaches used in the study of international politics and provides an introduction to current problems of foreign policies of major world powers. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

POLI.1750 Introduction to Environmental Politics (Formerly 46.175) - Credits: 3
This course introduces major concepts in environmental politics to provide a comprehensive understanding of the formation of environmental policy in the United States. Throughout the course, particular attention is paid to the role of government and markets in creating environmental crises and shaping policy responses.

POLI.2001 Comparative Environmental Politics - Credits: 3
This course focuses on how differences in political institutions, culture, regulatory style, and economic structure play in shaping environmental policies; the impact these differences have on the ability of states to achieve cooperative solutions to common environmental problems; and how international environmental interactions shape domestic environmental policy.

POLI.2010 Research Methods in Political Science (Formerly 46.201) - Credits: 3
Introduces the Political Science major to the scope of politics as a discipline. Highlights value questions through analysis of the political, socio-demographic and constitutional background of selected contemporary public issues and policies.

POLI.2110 Media and Politics Around the World (Formerly 46.211) - Credits: 3
For centuries, politicians have depended on media to reach and persuade citizens, yet the role of media in politics remains much debated. This course introduces students to the theories on the relationship between media and politics using a case study approach. Because much of what we know about the media comes from studying media in the United States, we will start with cases in the U.S., but because much of what we need to know about media and politics involves media in other countries, we will spend much of the course looking at media and politics in developing and democratizing countries.

POLI.2120 American Media and Politics (Formerly
46.212) - Credits: 3
This course explores the role of the media in American politics and the role of politics in the American media. We focus first on the historical evolution of newspapers, radio, television, and the internet as vehicles of political news reporting. Next, we look at instances of journalistic bias and distortion in order to explore how corporate consolidation and commercial competition have affected the news industry. Finally, by studying a selection of major stories in depth, we will gain a better understanding of the factors involved in the conversion of political events and developments into seemingly significant news.

POLI.2150 African Politics (Formerly 46/57.225) - Credits: 3
The images of Africa most commonly seen in the US flood our minds with inconsistent messages. Africa is portrayed and discussed as a locus of ancient tribal conflicts, disease, famine, and suffering. While struggles do occur - just as they do in all places - understanding the diverse experiences of the peoples of Africa requires engagement with the cultures, politics, religions, and perspectives of people in more than fifty countries across a vast continent. While such engagement can hardly be accomplished in a semester, we will attempt to scratch at the surface in different ways that reveal ideas, experiences, and thoughts that reflect political life and culture in Africa south of the Sahara in a more reflective manner. Throughout this course, I challenge you to remember that politics as we usually conceive them - the policies, programs, and posturing of government and public organizations - are a backdrop to the way real people live their lives every day. Policies and political systems are less important for the fact that they exist than for the ways in which they affect the lives of those they govern. With this approach, I hope we will be able to pick apart government structures, political organizations, and policy issues in ways that will shed light on the construction and culture of African politics. This requires a focus on power - who has it, how they use it, and to what ends.

POLI.2180 Introduction to Politics and Sports (Formerly 46.218) - Credits: 3
Analyzes the growing importance of sports in American life. Examines the psychological, political and social impact of sports on society. Discusses how sports have been shaped by such monumental events as war, the civil rights movement, and the changing economy.

POLI.2210 Introduction to Global Security - Credits: 3
This course offers a solid grounding in the various theoretical approaches to international security and explores a variety of international security issues.

POLI.2220 Politics of the Internet (Formerly 46.222) - Credits: 3
This course will examine the influence social media and web connectivity have had on political campaigns, campaign fundraising, political mobilization, and the recent proliferation of democratic movements.

POLI.2300 Law and the Legal System (Formerly 46.230) - Credits: 3
Presents an introduction to the nature of the legal process and the operation of the American legal system. Also discusses considerations of its political and social functions.

POLI.2310 Introduction Political Thought (Formerly 46.231) - Credits: 3
A critical survey of the history of Western political thought from Plato to the present.

POLI.2400 Contemporary Political Theory - Credits: 3
Examines major ideological currents in the contemporary world. Topics include communism, fascism, anarchism, socialism, nationalism, liberalism, and utilitarianism.

POLI.2510 Politics of Identity (Formerly 46.251) - Credits: 3
This interdisciplinary course considers the way we construct self-identity through our affiliation with various cultural and political groups- from the “Red Sox nation” to linguistic, economic, nationalistic and ethnic groups. It examines the central role of nationalism; its symbols, traditions and expectations; the role of the media; and the benefits and risks of our allegiance to these groups.

POLI.2530 Introduction to Public Administration and Policy (Formerly 46.253) - Credits: 3
An examination of the little studied fourth branch of government. Bureaucratic power in the American political system is reconsidered.

POLI.2650 State and Local Politics (Formerly 46.265) - Credits: 3
Examination and study of politics and government at the state and local levels, with emphasis on Massachusetts and New England. Practitioners from state and local government will meet with the class.
POLI.3001 Environmental Security - Credits: 3

The central goals of this course are (1) to give students a solid grounding in various analytical approaches to environmental security, and (2) to explore a variety of environmental security issues. This is a heavily analytical course; critical thinking is required equipment.

POLI.3002 Climate Change Communication - Credits: 3

This course examines climate change communication and its role in achieving climate change policy goals. Together we will study the ethical issues that shape and stem from science communication, climate change communication more specifically, and community engagement strategies. Among the ethical issues we will discuss are how best to achieve an informed citizenry, the role of informed consent, what it means for government to protect citizens, and the role of precaution in government risk management. The course also examines the practical aspects of how climate change is communicated, the theories behind current practices, and the scientific evidence regarding the effects of different practices.

POLI.3010 Quantitative Methods in Political Science (Formerly 46.301) - Credits: 3

This is a course in designing Quantitative Research and applying statistics for Political Scientific. Meets Core Curriculum Essential Learning Outcome for Critical Thinking &Problem Solving (CTPS) and Quantitative Literacy (QL).

POLI.3020 Research and Writing for Political Science (Formerly 46.302) - Credits: 3

This course provides political science majors with opportunities to hone their research and writing skills. Students analyze representative scholarly and popular sources, explore writing for various venues; and practice editing and revising their work. With prior arrangements students may use this course to complete an honors thesis, pursue an independent research project, or revise and expand an especially promising research paper submitted in a previous course.

POLI.3021 The Age of Nixon - Credits: 3

Explores the political impact, cultural legacy, and historical placement of politician Richard M. Nixon (1913-1994). Using the methodologies of history and political science, this course considers Nixon's political and personal trajectory, his domestic and foreign policies, and his impact on the world during his lifetime and posthumously. Attention and debate will also focus on the revised view and legacy of Nixon's reputation and his actions both reviled (Watergate, Invasion of Cambodia) and championed (Creation of the EPA, Opening of diplomacy with Communist China).

POLI.3040 Politics of Development (Formerly 46.304) - Credits: 3

This course considers the politics of the global development process, the actors involved and the contexts within which development occurs.

POLI.3070 American Political Thought (Formerly 46.307) - Credits: 3

A survey of the historical development of American political thought from the colonial era to the present.

POLI.3090 Political Psychology (Formerly 46.309) - Credits: 3

An in-depth examination of the acquisition and role of political attitudes, values, belief systems, and other psychological mechanisms in shaping political behavior and conflict.

POLI.3100 'Isms' in American Politics (Formerly 46.310) - Credits: 3

An examination of major ideological, philosophical and social currents.

POLI.3110 Foundations of Law: Process & Skills (Formerly 46.311) - Credits: 3

Foundations of Law, Process & Skills" presents a comprehensive introduction to the skills, process, expectations, and substantive law presented in the first year of law school. Many students in the social sciences consider the idea of pursuing law school, but have no meaningful avenue to explore the true flavor of the experience, or the commitment they would be taking on. Law School can be immensely rewarding, yet requires a substantial investment of time, personal dedication and financial obligation. The course will provide everything students need to know about the law school experience, while gaining invaluable academic skills in the process, whether or not they choose the law school path.

POLI.3120 Campaign and Election law (Formerly 46.312) - Credits: 3

This course instructs students on campaign and election law; including all relevant cases, statutes and regulations. Students will gain knowledge and skills useful for both future political campaign activity and postgraduate study.

POLI.3130 Electoral Politics (Formerly 46.313) -
Credits: 3
This course will examine voting behavior in American elections: how voters make decisions, the changing nature of campaigns, the influence of money, media, and polling, and related matters.

POLI.3140 Parties and Interest Groups (Formerly 46.314) - Credits: 3
An examination of party systems and coalitions in the US, their changing nature over time, the history of realignment, and the relationship of parties to interest groups.

POLI.3160 Politics and Film (Formerly 46.316) - Credits: 3
Analysis of the role of film in creating, expressing, revealing, and responding to social and political ideas and values. Examines a variety of film and film styles and introduces students to elements of film theory, the theory of popular culture and the role of film in forming our ideas about the world.

POLI.3190 Survey Research (Formerly 46.319) - Credits: 3
The techniques, methods and uses of Survey Research in contemporary Politics and Policy.

POLI.3200 Gender Law and Politics (Formerly 46.320) - Credits: 3
Explores legal constructions of gender by examining Supreme Court cases, federal legislation, historical documents, news stories, and scholarly essays on sexual inequality in the United States. Topics include the evolution of the family as a legal (and illegal) reality; political regulation of reproduction and sexual activity; feminist critiques of economic inequality; the rise and fall of affirmative action; the changing role of gender in class consolidation; and ongoing debates about the relationships between public and private life.

POLI.3210 Soccer and Politics (Formerly 46.321) - Credits: 3
This course analyzes the social, political and business aspects of the World Cup, the most popular sporting event in the world. The course will study the evolution of the World Cup, from the 1930's when fascist regimes used the Cup to buttress their doctrines to the emergence of new soccer powers like the U.S.

POLI.3230 Politics and Baseball (Formerly 46.323) - Credits: 3
Introductory look at the interaction between the world of baseball and the social and political structures which influence the sport.

POLI.3240 Politics of Football (Formerly 46.324) - Credits: 3
How the rise of pro football’s popularity reflects changes in American society during the 20th century. An examination of how politics, economics and television created a sport that has become an American obsession, and some argue, a new religion.

POLI.3290 Politics of College Sports (Formerly 46.329) - Credits: 3
Current controversies over the role of college sports within an academic environment with particular attention to Title IX, the pivotal law that altered gender in college sports.

POLI.3310 Animal Rights and Animal Welfare (Formerly 46.331) - Credits: 3
This course examines how the structure of the human/non-human animal relationship affects or determines the nature of public policy formation on issues with impacts on non-human animals, both nationally and internationally.

POLI.3320 The Politics of Food (Formerly 46.332) - Credits: 3
The course will examine current debates in food politics over: regulatory politics and the appropriate reach of the state in food labeling, safety, and oversight; genetically modified food, organic and sustainable agriculture, the effects of economic globalization of the food supply chain and the future of the world food system.

POLI.3340 Islam and Politics (Formerly 46.334) - Credits: 3
The course will explain the nature of the relationship between Islam and Politics by examining the rise of the first modern Islamic movement, and by examining other Islamic movements that spread throughout the Muslim world.

POLI.3350 Constitutional Law: Powers & Principles (Formerly 46.335) - Credits: 3
A study of constitutional law focused on the powers and principles of American government. We will discuss the
Declaration of Independence and Revolution, separation of powers, federalism, natural rights, and ordered liberty, emphasizing the case law on the origins of judicial review, the Commerce Clause, war powers, executive privilege, elections, criminal procedure, and search under the Fourth Amendment. Political Science offers two courses in constitutional law for students from any major who are preparing for law school or seeking a background in how constitutional law influences American politics and culture. POLI.3330 or POLI.3370 can be taken alone or both courses in either sequence. On campus and online versions are identical, so students can take each course in either format.

POLI.3370 Constitutional Law: Rights & Liberties (Formerly 46.337) - Credits: 3
A study of constitutional law focused on rights and liberties. We will discuss the balance of liberty and authority under the Constitution, the Bill of Rights, the Fourteenth Amendment, due process, and equal protection, emphasizing the case law on freedom of religion, speech, press, gun rights, LBGT rights, race, abortion, gender, and the death penalty. Political Science offers two courses in constitutional law for students form any major who are preparing for law school or seeking a background in how constitutional law influences American politics and culture. POLI.3350 or POLI.3370 can be taken alone or both courses in either sequence. On campus and online versions are identical, so students can take each course in either format.

POLI.3380 Political Participation (Formerly 46.338) - Credits: 3
Political movements; voting and elections, parties and interest groups; civil disobedience in American politics. Consideration of causes, fluctuations and trends.

POLI.3390 Judicial Review Seminar (Formerly 46.339) - Credits: 3
An advanced examination of the contemporary controversy over judicial activism and constitutional interpretation.

POLI.3400 American Politics And Law (Formerly 46.340) - Credits: 3
Perspectives on American Politics and Law. Advanced study involving extensive reading, writing and discussion seeking understanding of the major transformations impacting contemporary American Society, Politics, Law, Economics and Culture; consideration of different interpretations of these changes, and the ways in which they are manifested in shifting political attitudes and coalitions, and new problems and conflicts.

POLI.3430 Congress (Formerly 46.343) - Credits: 3
Legislative Politics. An advanced study of representation, campaigns and elections, and the functioning of the American national congress within the American political system.

POLI.3440 American Presidency (Formerly 46.344) - Credits: 3
An examination of the nature of the American presidency and its functioning within the American political system. Specific attention is given to the problems and evolution of the presidency since World War I.

POLI.3490 Politics of Race and Ethnicity (Formerly 46.349) - Credits: 3
A study of the politics of race and ethnicity, focusing primarily on American society, and the racial and ethnic groups of the region.

POLI.3500 Urban Politics and Policy (Formerly 46.350) - Credits: 3
A study of political power in, and the political structures of urban areas and the major issues and conflicts currently confronting them.

POLI.3510 Irish Politics (Formerly 46.351) - Credits: 3
For students of Politics, Ireland is perhaps one of the most fascinating examples of a territory that has undergone, and continues to undergo dramatic transformations in its governing structures, its passionate struggles for freedom, civil wars, colonial resistance and modern nationalism. This class will study the political history of Ireland before and during its time as a part of the United Kingdom, through the partition of the island into two states, and up to the modern politics of both the Republic of Ireland and the British state of Northern Ireland. We will examine the results of the 1998 “Good Friday Agreement”. Then we will dissect and evaluate modern Irish institutions of government, in the Republic and in the North. Students will research the competing ideologies and present arguments supporting the parties and organizations that propound these ideologies, like Sinn Fein, the IRA, the Uster Unionist Party and Unionist paramilitaries in the North; the Fine Gael and Fianna Fail in the South.

POLI.3530 Public Policy and Administration (Formerly 46.353) - Credits: 3
An examination of the little studied fourth branch of government. Bureaucratic power in the American political system is reconsidered.
POLI.3550 Government Fiscal Policy (Formerly 46.355) - Credits: 3
An examination of government's budgetary, taxation and expenditure decisions and activities.

POLI.3560 Public Policy Analysis (Formerly 46.356) - Credits: 3
This course examine issues in and techniques utilized in public policy analysis.

POLI.3570 Thoreau in Our Time (Formerly 46.357) - Credits: 3
This course traces Henry David Thoreau's influence on major social and political transformations in American history from the abolitionist movement to the present day. We will focus first on Thoreau's writings on slavery, commercial development, environmental history, and individual liberty. Then we will study his formative role in the civil rights and environmental movements of the twentieth century. Finally, through a mix of outside speakers and student presentations, we will explore how his writings continue to shape ongoing struggles to contend with climate change, advance social justice, and promote a greater sense of fairness in American life. The course will involve at least one trip to Walden Pond and a tour of Thoreau's birthplace in Concord, Massachusetts. Course page: http://faculty.uml.edu/sgallagher/Thoreau_in_Our_Time.html.

POLI.3580 Global Environmental Policy (Formerly 46.358) - Credits: 3
This course explores contemporary international environmental issues from both theoretical and policy perspectives; consideration too of broader forces impacting international environmental politics.

POLI.3590 British Politics (Formerly 46.359) - Credits: 3
The context, background and forces shaping the contemporary politics of Great Britain.

POLI.3600 European Politics (Formerly 46.360) - Credits: 3
An analytical examination of selected modern European political systems, emphasizing similarities and differences in political culture, behavior, institutions, and performance.

POLI.3610 Southeast Asian Politics (Formerly 46.361) - Credits: 3
A study of Southeast Asian countries, their anti-colonial struggles and their patterns of political development. Attention is also given to the recent struggle among the former Indochinese states and the broader international involvement in the region.

POLI.3630 Politics of China (Formerly 46.363) - Credits: 3
A study of the recent development of governmental institutions, parties, and ideology in China. Emphasis is placed on the processes of nation-building in the post World War II period.

POLI.3660 Russian Politics (Formerly 46.366) - Credits: 3
Conflict and Change in the former Soviet Union. An examination of the relationship of politics to the functioning of post-Soviet societies. The influence of politics on economy, education, family life, religion, etc.

POLI.3680 Middle East Politics (Formerly 46.368) - Credits: 3
The region will be analyzed using a comparativist lens, whereby the historical context of creating nation states in the region and the effect of colonialism will be applied to contemporary politics. Women, religious/ethnic minorities and the dynamics of the Arab Spring will also be addressed comparatively.

POLI.3700 Latin American Politics (Formerly 46.370) - Credits: 3
The context, background and forces shaping the contemporary politics of the Latin American region.

POLI.3740 Democracy and Development (Formerly 46.374) - Credits: 3
Explores the theories and experiences of countries newly converting to democracy in Asia, Africa, Latin America and the former Eastern Bloc. Also examines the strategies and prospects for development among the same countries.

POLI.3750 Politics of Pacific Rim (Formerly 46.375) - Credits: 3
An examination of the politics, policies and institutions of Japan, the "four tigers" and other countries of the Pacific rim area.
POLI.3780 International Political Economy (Formerly 46.378) - Credits: 3
An examination of the politics of global economic relations stressing the role of international institutions, multinational corporations and other international actors on the policies of the nation-state.

POLI.3800 American Foreign Policy (Formerly 46.380) - Credits: 3
A study of the processes of American foreign policy in the contemporary world.

POLI.3840 International Politics of Human Rights (Formerly 46.384) - Credits: 3
This course will address the history, content, structure, law, and politics of international human rights. Using interactive participatory class format students will learn analytical and critical thinking skills as well as written and oral communication skills.

POLI.3870 Politics of International Organizations (Formerly 46.387) - Credits: 3
This course will address the history, functioning, structure and politics of international organizations in world politics. International Governmental Organizations as well as Non-Governmental Organizations on the global and regional level will be analyzed and discussed. In a participatory and interactive class format students will develop analytical and critical thinking skills.

POLI.3900 Defense and Disarmament (Last Term 1994 Spring)(Formerly 45.390) - Credits: 3
An advanced study of the international security policies currently pursued by the United States, its allies and its adversaries; evaluation and analysis of the criticism of these policies and of the possibilities of achieving disarmament.

POLI.3980 The War on Drugs (Formerly 46.398) - Credits: 3
The war against drugs stands as both a major foreign policy priority for the US and the International community in general, and as a constant source of debate and contention. The aim of this course is to provide students with analytical tools, concepts, and information, which will enable them to critically evaluate the war on drugs beyond the common myths and misconceptions that often surround this highly controversial topic. By analyzing a wide range of countries around the world, students would gain an in depth and nuanced perspective of the relation between drug trade, violence, corruption, development, and democracy. Students will also gauge arguments and possible impacts on different drug policy options.

POLI.4001 Environment, Racism, and Justice - Credits: 3
Environment, Racism, and Justice

POLI.4010 Research Seminar (Formerly 46.401) - Credits: 3
Requires the writing of a substantial paper (or production of an equivalent project.) Typically, students should select a 300 level seminar course from among Departmental offerings that are of interest, all of which involve the writing of one or several papers, and select one paper or topic to expand upon. The student should then register in the Research Seminar section for the appropriate supervising instructor and expand the paper into a more substantial form.

POLI.4020 Women in Islam (Formerly 46.402) - Credits: 3
Focusing upon one of the most important topics in Islam, this course will go beyond conventional stereotypes and explore woman’s many and varied roles within Islamic cultures and societies.

POLI.4060 The Politics of Identity in the Middle East (Formerly 46.406) - Credits: 3
The course will examine the ethnic, political, religious and social changes in the modern Middle East. The course will start with an introduction to the diverse identities all over the Middle East and then it will comparatively examine a number of those identities.

POLI.4110 Dynamics Power and Authority (Formerly 46.411/57.511) - Credits: 3
This course surveys theories of power, authority, participation, and politics. Building on these theories, students will examine changing social, political, and economic patterns of inequality based on class, race (and related divisions of ethnicity, religion, caste, nationality), and gender. Reviews various approaches to altering these dynamics (business strategy, public policy, community and social movements). Cuts across units of firm, community, region, and nation, along with corresponding governmental institutions, and links theoretical analysis with study of practical problem solving. Instructor-initiated cases drawn from a variety of national experiences. Students will
learn techniques of power analysis and prepare a power analysis project.

POLI.4200 Reading and Simulation Experience International Organization (Formerly 46.420) - Credits: 3

Students take part in a simulation of the proceedings of a regional or international organization, e.g., U.N., O.A.S., O.A.U., or the Arab League. They study all aspects of the selected institution but concentrate on key economic, social and security issues discussed in the body’s debates. The course aims to give the student a clearer understanding of the forces and constraints which shape the foreign policies of individual states.

POLI.4220 SMR: Political communication and Media Studies (Formerly 46.422) - Credits: 3

Advanced study in contemporary issues in Political Communication and Media Studies.

POLI.4390 Justice and Trade in the Global Economy (Formerly 46.439) - Credits: 3

We know that we are part of a global economy and that many of the things we buy and consume are produced in other countries. But what do we know of how they are made? Do we understand that there may be hidden costs in the price we pay for goods at the supermarket, in a department store? Understanding the nature of global trade is critical for us to be effective citizens in the world. Perhaps more important is that we understand how goods are produced and traded - what many think of as “fair” trade. The subject of Fair Trade isn’t simply limited to the production and sale of coffee and chocolate. Fair Trade principles encompass environmental issues, human rights, and politics. Once aware of the ramifications of consumerism on all parts of the world, including the United States, people can make informed choices about the products they buy, the companies that employ them, and the political views they support. By the end of this course students should understand the major ideas and tools used to comprehend complex international and global trade relations. Students will understand the way in which goods are produced for global markets and the possible human and environmental costs such production entails.

POLI.4400 Comparative National Security - Credits: 3

The central goals of this course are two fold. The first is to explore the national security concerns and perspectives for the major countries and regions of the world. The second is to understand the connection between alternative constructions of national security and the security policies of nation-states. This is a heavily analytical course; critical thinking is required equipment. Students are expected to take the concepts and theories discussed in class and use them to analyze issues confronting societies and the policy responses mounted by political leaders.

POLI.4440 Advanced Research Methods (Formerly 46.444) - Credits: 3

Both quantitative and qualitative methods will be examined with a focus on locating and utilizing available data to study social questions.

POLI.4450 Politics of Repression and Dissent (Formerly 46.445) - Credits: 3

A focus on the dark side of politics - political repression, including politically motivated imprisonment, torture, murder, and disappearance- and the struggle of critics to bring about change through non-violent and violent demonstrations, general strikes and armed resistance.

POLI.4460 The Politics of Discord between the Arab East and The West (Formerly 46.446) - Credits: 3

The course examines the roots of political discord in the Arab East starting with colonialism and progressing to the contemporary state of dissension. Throughout the course the stress on the effect of this discord on comparative domestic politics and international relations in the region will be examined.

POLI.4470 Theories of Political and Criminal Violence (Formerly 46.447) - Credits: 3

The study of violence has been a central piece of debates in comparative politics that range from the causes of revolution to the analysis of civil wars. This course aims to provide a broad overview of different bodies of research on violence. The class will also revisit crucial debates in the study of violence, such as the problems of separating criminal and political violence (such as interstate wars). By the end of the class, students will be able to identify major theoretical and methodological approaches to violence, major debates and concepts, as well as key cases across the world.

POLI.4900 War and Peace in the Sovereign State System (Formerly 46.490) - Credits: 3

Despite much effort to limit the occurrence of interstate and intrastate war, such violence is still prevalent in the sovereign state system. This course will focus on the causes, dynamics, and outcomes of interstate and intrastate conflict and ways to sustain peace. We will examine the foundational works in the
area of conflict before moving quickly into more recent research. The class will emphasize student participation and the application of concepts we learn in class. Students are asked to write a final paper exploring a concept of war and peace in the sovereign state system.

POLI.4910 Directed Study (Formerly 46.491) -
Credits: 1-3
Directed study offers the opportunity to engage in an independent study or research project under the supervision of a department member. Working closely with the instructor, students define and investigate a research problem in an area of special interest and present the results of their investigation through a combination of readings and papers and/or a significant research paper.

POLI.4920 Directed Study In International Organizations (Formerly 46.492) - Credits: 3
Advanced and intensive reading and other activity in connection with the study of selected international organizations.

POLI.4960 Experiential Learning in Political Science (Formerly 46.496) - Credits: 3-9
This course provides students with a practical appreciation for the work of politics emphasizing a universal skill set for polycentric, experiential learning. The course is designed to help ease the transition from a political science degree to a variety of academic and professional paths.

POLI.4970 Practicum in the Law Requirement. (Formerly 46.497) - Credits: 3
A program of study and research which includes involvement in and first-hand knowledge and observation of the legal system and legal practice. Open only to political science majors and, with certain restrictions, legal studies minors. The course will be graded S (satisfactory) or U (unsatisfactory). Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL).

POLI.4980 Research and Internship/Service Experience Politics/Law (Formerly 46.498) - Credits: 3
Extensive Research/Writing undertaken in conjunction with an Internship/Service Experience in Politics and/or Law, by special arrangement and with permission of the instructor.
College of Fine Arts, Humanities & Social Sciences

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A student's catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

**American Studies**

- **General Option**
  - Fall 2015 and beyond
  - [Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- **Thematic Option**
  - Fall 2021 and beyond
  - Fall 2015 - spring 2021
  - [Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

**Art**

- **Animation & Interactive Media Concentration**
  - Fall 2017 and beyond
- **Graphic Design Concentration**
  - Fall 2015 - spring 2020
  - [Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- **Studio Art Concentration**
  - Fall 2022 and beyond
  - Fall 2015 - spring 2022

**Composition for New Media**

- **Fall 2022 and beyond**
- **Fall 2019 - spring 2022**

**Criminal Justice**

- **General Option**
  - Fall 2022 and beyond
  - Fall 2016 - spring 2022
- **Violence Option**
  - Fall 2016 and beyond
  - Fall 2015 - spring 2016
  - [Link](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- **Crime and Mental Health Option**
Digital Media
- fall 2021 and beyond

Economics
- fall 2015 and beyond

English
- Literature Concentration
  fall 2021 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Journalism & Professional Writing Concentration
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Creative Writing Concentration
  fall 2018 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Theatre Arts Concentration
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

History
- fall 2020 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Liberal Arts
- fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Music Studies
- General Option fall 2022 and beyond
  fall 2018 - spring 2022
- Instrumental Option fall 2015 - spring 2018
  prior to fall 2015
- Voice Option fall 2015 - spring 2018
  prior to fall 2015

Music Performance
- Instrumental Option fall 2022 and beyond
  fall 2019 - spring 2022
- Voice Option fall 2022 and beyond
  fall 2019 - spring 2022
  prior to fall 2015

Music Business
- fall 2022 and beyond
- fall 2015 - spring 2022
- prior to fall 2015

Peace and Conflict Studies
- fall 2021 and beyond
- fall 2015 - spring 2021
**Academic Catalog 2021 - 2022 / Psychology - General Information**

(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- prior to fall 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

**Philosophy**

- General Option  
  fall 2015 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Communications & Critical Thinking Option  
  fall 2015 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Philosophy & Religious Studies Option  
  fall 2015 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

**Political Science**

- American Politics Concentration fall 2020 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- International Relations and Comparative Politics Concentration fall 2020 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Law and Politics Concentration fall 2020 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Political Communication and Public Opinion Concentration fall 2020 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Sustainability and Environmental Politics Concentration fall 2022 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

**Political Science (prior to fall 2020)**

- fall 2015 - spring 2020
- fall 2013 - spring 2015

(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

**Psychology**

- General Concentration  
  fall 2022 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Behavior Analysis Concentration  
  fall 2022 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Community Social Psychology Concentration  
  fall 2022 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Clinical Psychology Concentration  
  fall 2022 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Developmental Disabilities Concentration  
  fall 2022 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Health Psychology Concentration fall 2022 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

**Quantitative Economics**

- fall 2022 and beyond

**Sociology**

- General Concentration fall 2016 and beyond  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Policy & Social Problems Concentration fall 2021 and beyond
beyondfall 2016 - spring 2021
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Racial Equity and Inclusion Concentration fall 2021 and beyond

Sound Recording Technology
• fall 2022 and beyond
• fall 2019 - spring 2022
• fall 2015 - spring 2019
• prior to fall 2015

World Languages and Cultures
• French Option
  fall 2018 and beyondfall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• French/Spanish Option fall 2018 and beyondfall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Italian/Spanish Option
  fall 2018 and beyondfall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Spanish Option
  fall 2018 and beyondfall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Degree Pathways
Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university.

Psychology
• General Concentration fall 2022 and beyondfall 2017 - spring 2022fall 2015 - spring 2017
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Sample Degree Pathway for Psychology - General Concentration

For students who entered fall 2017 to spring 2022.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr</th>
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### Sophomore Year

#### Fall Semester

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<tbody>
<tr>
<td>PSYC.2690</td>
<td>Research I: Methods (IL)</td>
<td>3</td>
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<tr>
<td>PSYC.2320</td>
<td>Personality or Abnormal Psych</td>
<td>3</td>
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<tr>
<td>xxxxxxx</td>
<td>Social Sciences Persp. (SS)</td>
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#### Spring Semester

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<tr>
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<tbody>
<tr>
<td>PSYC.2550</td>
<td>Social Psych. / Community Psych. (DCA)</td>
<td>3</td>
</tr>
<tr>
<td>PSYC.27xx</td>
<td>Basic Processes Elective2</td>
<td>3</td>
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<tr>
<td>xxxxxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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<tr>
<td>xxxxxxx</td>
<td>STEM Persp. (STEM)</td>
<td>3</td>
</tr>
<tr>
<td>xxxxxxx</td>
<td>Language 4 &amp; Culture or World Ready Elective 3</td>
<td>3</td>
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### Junior Year

#### Fall Semester

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<tbody>
<tr>
<td>PSYC.3690</td>
<td>Research II: Statistics (QL)</td>
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<tr>
<td>xxxxxxx</td>
<td>Psych. or Free Elective</td>
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<tr>
<td>xxxxxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
</tr>
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<td>xxxxxxx</td>
<td>Social Sciences Persp. (SS)</td>
<td>3</td>
</tr>
<tr>
<td>xxxxxxx</td>
<td>World Ready Elective3 or Free Elective</td>
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#### Spring Semester

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<tr>
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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
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<td>Social Sciences Persp. (SS)</td>
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### Senior Year

#### Fall Semester

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<tbody>
<tr>
<td>PSYC.47xx</td>
<td>Advanced Seminar (SRE), (WOC)</td>
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<tr>
<td>PSYC.3/4xx</td>
<td>Upper-Level Psychology Elective</td>
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<td>xxx.xxxxx</td>
<td>Psych. or Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxx.xxxxx</td>
<td>Psych. or Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxx.xxxxx</td>
<td>Free Elective</td>
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</table>

#### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>C r.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC.4xxx</td>
<td>Advanced Psychology</td>
<td>3</td>
</tr>
<tr>
<td>xxx.x/4xxx</td>
<td>Upper-Level Non-Psychology Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxx.xxxxx</td>
<td>Psych. or Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxx.xxxxx</td>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
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</tr>
</tbody>
</table>

**Total Minimum Credits = 120**

1. Students must earn a grade of C or higher.


3. World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) in the undergraduate catalog. The World Language requirement for Psychology majors can be met with sign language courses taken at Northern Essex Community College (NECC). More information about this policy is available on the Psychology Department website (https://www.uml.edu/FAHSS/Psychology/Current-Students/Advising.aspx). For information about the sign language courses and program at NECC, please visit NECC website (https://www.necc.mass.edu/). As with all off-campus courses, students taking sign language courses at NECC must complete a Prior Authorization for Off Campus Courses form (https://www.uml.edu/thesolutioncenter/Forms/Academic-Forms.aspx).

4. Required for entering Freshmen in the College of Fine Arts, Humanities & Social Sciences.


A major in Psychology consists of 36-54 psychology credits with at least 18 credits at the 3000 level or higher. Students transferring to the college and wishing to major in Psychology must make individual arrangements with the department chairperson regarding satisfaction of major course requirements. To graduate with a Psychology degree, students must have a 2.2 GPA in psychology courses and an overall minimum GPA of 2.0.

**Core Curriculum Essential Learning Outcomes in the major are met as follows:**

- Diversity and Cultural Awareness (DCA) is met by taking PSYC.2090 (https://www.uml.edu/catalog/courses/PSYC/2090) or PSYC.2550 (https://www.uml.edu/catalog/courses/PSYC/2550).
- Information Literacy (IL) is met by taking PSYC.2690 (https://www.uml.edu/catalog/courses/PSYC/2690).
- Social Responsibility and Ethics (SRE) is met by taking
Written and Oral Communication (emphasizing Writing in the Discipline) (WOC) is met by taking PSYC.47xx (https://www.uml.edu/catalog/courses/PSYC)

Critical Thinking and Problem Solving (CTPS) is met by taking PSYC.3750 (https://www.uml.edu/catalog/courses/PSYC/3750)

Applied and Integrative Learning (AIL) is met by taking PSYC.3750 (https://www.uml.edu/catalog/courses/PSYC/3750)

Quantitative Literacy (QL) is met by taking PSYC.3690 (https://www.uml.edu/catalog/courses/PSYC/3690)

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should be using their Advisement Report in SiS (http://www.uml.edu/enrollment/sis/default.aspx). If you need assistance, please contact your adviser.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

*Last updated: 3/15/2019*

**Sample Degree Pathway for Psychology - Behavior Analysis Concentration**

**For students who entered fall 2018 to spring 2022.**

**Freshman Year**

**Fall Semester**

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing 1 / FYSH (CW)</td>
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<tr>
<td>FAHS.1090</td>
<td>First Year Seminar3</td>
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<tr>
<td>PSYC.1010</td>
<td>Intro to Psychologica Science</td>
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<tr>
<td>MATH.xxxx</td>
<td>Math Persp. (MATH)</td>
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<td>WLxx.xxxx</td>
<td>Language 1 &amp;Culture</td>
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<td>Social Sciences Persp. (SS)</td>
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**Spring Semester**

<table>
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<tr>
<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
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<tr>
<td>PSYC.2600</td>
<td>Child and Adolescent Dev.</td>
</tr>
<tr>
<td>xxxxxxxx</td>
<td>Science with Lab Persp. (SCL)</td>
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**Sophomore Year**

**Fall Semester**

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<tr>
<td>PSYC.2690</td>
<td>Research I: Methods (IL)1</td>
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<td>PSYC.2320</td>
<td>Personality or Abnormal Psych</td>
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### Spring Semester

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<tr>
<td>PSYC.2010 [<a href="https://www.uml.edu/catalog/courses/PSYC/2010">https://www.uml.edu/catalog/courses/PSYC/2010</a>]</td>
<td>Professional Development in Psychology</td>
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<td>Theories of Learning</td>
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<td>STEM Persp. (STEM)</td>
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</tr>
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<td>xxxx.xxxx</td>
<td>Language 3 &amp; Culture or World Ready Elective2</td>
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### Senior Year

**Fall Semester**

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<td>PSYC.479x [<a href="https://www.uml.edu/catalog/courses/PSYC">https://www.uml.edu/catalog/courses/PSYC</a>]</td>
<td>Seminar in Behavioral Psychology (SRE), (WOC)</td>
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<td>PSYC.4800 [<a href="https://www.uml.edu/catalog/courses/PSYC/4800">https://www.uml.edu/catalog/courses/PSYC/4800</a>]</td>
<td>Concentration Practicum I</td>
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### Junior Year

**Fall Semester**

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<td>PSYC.3690 [<a href="https://www.uml.edu/catalog/courses/PSYC/3690">https://www.uml.edu/catalog/courses/PSYC/3690</a>]</td>
<td>Research II: Statistics (QL)</td>
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<td>PSYC.3120 [<a href="https://www.uml.edu/catalog/courses/PSYC/3120">https://www.uml.edu/catalog/courses/PSYC/3120</a>]</td>
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### Spring Semester

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<th>Cr.</th>
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<tbody>
<tr>
<td>PSYC.3xxx [<a href="https://www.uml.edu/catalog/courses/PSYC">https://www.uml.edu/catalog/courses/PSYC</a>]</td>
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</table>

Total Minimum Credits = 121

1Students must earn a grade of C or higher.
2World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) in the undergraduate catalog. The World Language requirement for Psychology majors can be met with sign language courses taken at Northern Essex Community College (NECC). More information about this policy is available on the Psychology Department website (https://www.uml.edu/FAHSS/Psychology/Current-Students/Advising.aspx). For information about the sign language courses and program at NECC, please visit NECC website (https://www.necc.mass.edu/). As with all off-campus courses, students taking sign language courses at NECC must complete a Prior Authorization for Off Campus Courses form (https://www.uml.edu/thesolutioncenter/Forms/Academic-Forms.aspx).

3Required for entering Freshmen in the College of Fine Arts, Humanities & Social Sciences.

A major in Psychology consists of 36-54 psychology credits with at least 18 credits at the 3000 level or higher. Students transferring to the college and wishing to major in Psychology must make individual arrangements with the department chairperson regarding satisfaction of major course requirements. To graduate with a concentration as part of the Psychology degree, student must have both an overall GPA and a Psychology GPA of at least a 3.0.

Core Curriculum Essential Learning Outcomes in the major are met as follows:

- Diversity and Cultural Awareness (DCA) is met by taking PSYC.2090 (https://www.uml.edu/catalog/courses/PSYC/2090) or PSYC.2550 (https://www.uml.edu/catalog/courses/PSYC/2550)
- Information Literacy (IL) is met by taking PSYC.2690 (https://www.uml.edu/catalog/courses/PSYC/2690)
- Social Responsibility and Ethics (SRE) is met by taking PSYC.47xx (https://www.uml.edu/catalog/courses/PSYC)
- Written and Oral Communication (emphasizing Writing in the Discipline) (WOC) is met by taking PSYC.47xx (https://www.uml.edu/catalog/courses/PSYC)
- Critical Thinking and Problem Solving (CTPS) is met by taking PSYC.3750 (https://www.uml.edu/catalog/courses/PSYC/3750)
- Applied and Integrative Learning (AIL) is met by taking PSYC.3750 (https://www.uml.edu/catalog/courses/PSYC/3750)
- Quantitative Literacy (QL) is met by taking PSYC.3690 (https://www.uml.edu/catalog/courses/PSYC/3690)

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements.

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Last updated: 3/14/2019

Sample Degree Pathway for Psychology - Community Social Psychology Concentration

For students who entered fall 2018 to spring 2022.

Freshman Year

Fall Semester

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<tr>
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<tr>
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<tr>
<td>HONR.1100</td>
<td>First Year Seminar4</td>
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<td>FAHS.1090</td>
<td>Intro to</td>
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### Spring Semester

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### Sophomore Year

#### Fall Semester

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<td>Child and Adolescent Dev.</td>
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<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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<td>Science with Lab Persp. (SCL)</td>
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#### Spring Semester

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<td>Research III: Laboratory (CTPS), (AIL)</td>
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<tr>
<td>PSYC.2720</td>
<td>Psychology 3000-level Elective5</td>
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### Fall Semester

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<tr>
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<td>Psychology 3000-level Elective5</td>
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### Junior Year

#### Spring Semester

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<td>PSYC.2090</td>
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**Spring Semester**

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**Total Minimum Credits = 121**

1. Students must earn a grade of C or higher.

2. Choose from PSYC.2730, PSYC.2760, PSYC.2770, or PSYC.2780.

3. World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements in the undergraduate catalog. The World Language requirement for Psychology majors can be met with sign language courses taken at Northern Essex Community College (NECC). More information about this policy is available on the Psychology Department website. For information about the sign language courses and program at NECC, please visit NECC website. As with all off-campus courses, students taking sign language courses at NECC must complete a Prior Authorization for Off Campus Courses form.

4. Required for entering freshmen in the College of Fine Arts, Humanities, & Social Sciences.

5. Choose from PSYC.3050, PSYC.3080, PSYC.3360, or PSYC.3450.

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- Social Responsibility and Ethics (SRE) is met by taking PSYC.47xx.
- Written and Oral Communication (emphasizing Writing in the Discipline) (WOC) is met by taking PSYC.47xx.
- Critical Thinking and Problem Solving (CTPS) is met by taking PSYC.3750.
• Applied and Integrative Learning (AIL) is met by taking PSYC.3750
  (https://www.uml.edu/catalog/courses/PSYC/3750)
• Quantitative Literacy (QL) is met by taking PSYC.3690
  (https://www.uml.edu/catalog/courses/PSYC/3690)

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Last updated: 3/15/2019

Sample Degree Pathway for Psychology - Clinical Psychology Concentration

For students who entered fall 2018 to spring 2022.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
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<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
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<td>FAHS.1090</td>
<td>First Year Seminar 3</td>
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<td>PSYC.1010</td>
<td>Intro to Psychological Science</td>
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<td>MATH.xxxx</td>
<td>Math Persp.</td>
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Spring Semester

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<tbody>
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<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
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<td>PSYC.2600</td>
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<td>WLxx.xxxx</td>
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<td>Science with Lab Persp. (SCL)</td>
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Total 16

Sophomore Year

Fall Semester

<table>
<thead>
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<tr>
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<td>PSYC.2720</td>
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<td>Science with Lab Persp. (SCL)</td>
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<td>xxxx.xxxx</td>
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Total 7

Spring Semester

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<th>Course Name</th>
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### Fall Semester

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<tr>
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<td>PSYC.3610</td>
<td>Developmental Psychopathology</td>
<td>3</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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</tr>
<tr>
<td>xxxx.xxxx</td>
<td>World Ready Elective or Free Elective</td>
<td>3</td>
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### Spring Semester

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<tbody>
<tr>
<td>PSYC.4690</td>
<td>Research III: Laboratory (CTPS), (AIL)</td>
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<tr>
<td>PSYC.475x</td>
<td>Seminar in Clinical Psychology (SRE), (WOC)</td>
<td>3</td>
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<tr>
<td>xxxx.3/4xxx</td>
<td>Upper-Level Non-Psychology Elective</td>
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<td>xxxx.xxxx</td>
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**Total Minimum Credits = 121**

1. Students must earn a grade of C or higher.

2. World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements in the undergraduate catalog. The World Language requirement for Psychology majors can be met with sign language courses taken at Northern Essex Community College (NECC). More information about this policy is available on the Psychology Department website. For information about the sign language courses and program at NECC, please visit NECC website. As with all off-campus courses, students taking sign language courses at NECC must complete a Prior Authorization for Off Campus Courses form.
3 Required for entering Freshmen in the College of Fine Arts, Humanities & Social Sciences.

A major in Psychology consists of 36-54 psychology credits with at least 18 credits at the 3000 level or higher. The Clinical concentration consists of 37 required credits and 3 elective credits, for a total of 40 credits. Students may take up to 54 credits in the major. Students transferring to the college and wishing to major in Psychology must make individual arrangements with the department chairperson regarding satisfaction of major course requirements. To graduate with a concentration as part of the Psychology degree, student must have both an overall GPA and a Psychology GPA of at least a 3.0.

Core Curriculum Essential Learning Outcomes in the major are met as follows:

- Diversity and Cultural Awareness (DCA) is met by taking PSYC.2090 (https://www.uml.edu/catalog/courses/PSYC/2090) or PSYC.2550 (https://www.uml.edu/catalog/courses/PSYC/2550)
- Information Literacy (IL) is met by taking PSYC.2690 (https://www.uml.edu/catalog/courses/PSYC/2690)
- Social Responsibility and Ethics (SRE) is met by taking PSYC.47xx (https://www.uml.edu/catalog/courses/PSYC)
- Written and Oral Communication (emphasizing Writing in the Discipline) (WOC) is met by taking PSYC.47xx (https://www.uml.edu/catalog/courses/PSYC)
- Critical Thinking and Problem Solving (CTPS) is met by taking PSYC.3750 (https://www.uml.edu/catalog/courses/PSYC/3750)
- Applied and Integrative Learning (AIL) is met by taking PSYC.3750 (https://www.uml.edu/catalog/courses/PSYC/3750)
- Quantitative Literacy (QL) is met by taking PSYC.3690 (https://www.uml.edu/catalog/courses/PSYC/3690)

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the CoreCurriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should be using their Advisement Report in SiS (http://www.uml.edu/enrollment/sis/default.aspx). If you need assistance, please contact your adviser.

Restriction on off-campus study:

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Last updated: 3/15/2019

Sample Degree Pathway for Psychology - Developmental Disabilities Concentration

For students who entered fall 2018 to spring 2022.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
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<td>College Writing I / FYSH (CW)</td>
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<tr>
<td>HONR.1100</td>
<td>First Year Seminar4</td>
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<tr>
<td>FAHS.1090</td>
<td>Intro to Psychologic al Science</td>
<td>3</td>
</tr>
<tr>
<td>PSYC.1010</td>
<td>Math Persp. (MATH)</td>
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<tr>
<td>WLxx.xxxx</td>
<td>Language 1 &amp;Culture</td>
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Spring Semester

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### Sophomore Year

#### Fall Semester

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<tr>
<td>PSYC.2690</td>
<td>Research I: Methods (IL)1</td>
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<tr>
<td>PSYC.2320 / PSYC.2720</td>
<td>Personality or Abnormal Psych5</td>
<td>3</td>
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<td>xxxxxx</td>
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<td>Science with Lab Persp. (SCL)</td>
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<td>xxxxxx</td>
<td>Language 3 &amp;Culture or World Ready Elective3</td>
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#### Spring Semester

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<tr>
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<th>Course Name</th>
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<tbody>
<tr>
<td>PSYC.2090 / PSYC.2550</td>
<td>Social Psych. / Community Psych. (DCA)</td>
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<td>PSYC.2010 / PSYC.27xx</td>
<td>Professional Development in Psychology</td>
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<td>xxxxxx</td>
<td>Basic Processes</td>
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## Junior Year

#### Fall Semester

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<tbody>
<tr>
<td>PSYC.3690</td>
<td>Research II: Statistics (QL)</td>
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<tr>
<td>PSYC.3600 / PSYC.3610</td>
<td>Adult Dev. &amp;Aging / Develop. Psychopathology5</td>
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<td>xxxxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
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#### Spring Semester

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<tr>
<td>PSYC.4690</td>
<td>Research III: Laboratory (CTPS), (AIL)</td>
<td>3</td>
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<tr>
<td>PSYC.3630</td>
<td>Introduction to Disability Studies</td>
<td>3</td>
</tr>
<tr>
<td>PSYC.3620</td>
<td>Psychology of Developmental Disabilities</td>
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<td>Free Elective</td>
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### Senior Year

#### Fall Semester

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<th>Course#</th>
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<tbody>
<tr>
<td>PSYC.4800</td>
<td><a href="https://www.uml.edu/catalog/courses/PSYC/4800">Concentration Practicum 1</a></td>
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<tr>
<td>PSYC.47xx</td>
<td><a href="https://www.uml.edu/catalog/courses/PSYC">Advanced Seminar (with relevance to field of disability) (SRE), (WOC)</a></td>
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<tr>
<td>xxxxx.3/4xxx</td>
<td>Free Elective</td>
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<td>Psych. or Free Elective</td>
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<tr>
<td>xxxxx.xxx</td>
<td>Free Elective</td>
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#### Spring Semester

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<th>Course#</th>
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<tr>
<td>xxxxx.3/4xxx</td>
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<tr>
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<td><strong>Total</strong></td>
<td></td>
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</table>

**Total Minimum Credits = 121**

1. Students must earn a grade of C or higher.

2. Choose from [PSYC.2730](https://www.uml.edu/catalog/courses/PSYC/2730), [PSYC.2760](https://www.uml.edu/catalog/courses/PSYC/2760), [PSYC.2770](https://www.uml.edu/catalog/courses/PSYC/2770) or [PSYC.2780](https://www.uml.edu/catalog/courses/PSYC/2780).

3. World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements in the undergraduate catalog. The World Language requirement for Psychology majors can be met with sign language courses taken at Northern Essex Community College (NECC). More information about this policy is available on the Psychology Department website [here](https://www.uml.edu/FAHSS/Psychology/Current-Students/Advising.aspx). For information about the sign language courses and program at NECC, please visit [NECC website](https://www.necc.mass.edu/). As with all off-campus courses, students taking sign language courses at NECC must complete [Prior Authorization for Off Campus Courses form](https://www.uml.edu/thesolutioncenter/Forms/Academic-Forms.aspx).

4. Required for entering Freshmen in the College of Fine Arts, Humanities & Social Sciences.

5. Students who choose to focus on adults select [PSYC.2720](https://www.uml.edu/catalog/courses/PSYC/2720) and [PSYC.3600](https://www.uml.edu/catalog/courses/PSYC/3600); students who choose to focus on children and adolescents select [PSYC.2320](https://www.uml.edu/catalog/courses/PSYC/2320) or [PSYC.2720](https://www.uml.edu/catalog/courses/PSYC/2720) and select [PSYC.3610](https://www.uml.edu/catalog/courses/PSYC/3610).

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**Core Curriculum Essential Learning Outcomes in the major are met as follows:**

- Diversity and Cultural Awareness (DCA) is met by taking [PSYC.2090](https://www.uml.edu/catalog/courses/PSYC/2090) or [PSYC.2550](https://www.uml.edu/catalog/courses/PSYC/2550).
- Information Literacy (IL) is met by taking [PSYC.2690](https://www.uml.edu/catalog/courses/PSYC/2690).
- Social Responsibility and Ethics (SRE) is met by taking [PSYC.47xx](https://www.uml.edu/catalog/courses/PSYC).
- Written and Oral Communication (emphasizing Writing in the Discipline) (WOC) is met by taking [PSYC.47xx](https://www.uml.edu/catalog/courses/PSYC).
- Critical Thinking and Problem Solving (CTPS) is met by taking [PSYC.3750](https://www.uml.edu/catalog/courses/PSYC/3750).
- Applied and Integrative Learning (AIL) is met by taking [PSYC.3750](https://www.uml.edu/catalog/courses/PSYC/3750).
Quantitative Literacy (QL) is met by taking PSYC.3690
(https://www.uml.edu/catalog/courses/PSYC/3690).

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Last updated: 3/15/2019

Sample Degree Pathway for Psychology - Health Psychology Concentration

For students who entered fall 2018 to spring 2022.

Freshman Year

Fall Semester

<table>
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<th>Cr.</th>
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<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
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<tr>
<td>HONR.1100</td>
<td>First Year Seminar</td>
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<tr>
<td>FAHS.1090</td>
<td>Intro to Psychological Science</td>
<td>3</td>
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<td>PSYC.1010</td>
<td>Research I: Methods (IL1)</td>
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<td>MATH.xxxx</td>
<td>Math Persp. (MATH)</td>
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<td>WLxx.xxxx</td>
<td>Language I &amp; Culture</td>
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Spring Semester

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<td>PSYC.2600</td>
<td>Child and Adolescent Dev.</td>
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<td>WLxx.xxxx</td>
<td>Language 2 &amp; Culture</td>
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Sophomore Year

Fall Semester

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<td>Abnormal Psych</td>
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Spring Semester

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### Senior Year

#### Fall Semester

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<td>Upper-Level Non-Psychology Elective</td>
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#### Spring Semester

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<th>Course Name</th>
<th>Cr.</th>
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</table>

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- Information Literacy (IL) is met by taking PSYC.2690 (https://www.uml.edu/catalog/courses/PSYC/2690)
- Social Responsibility and Ethics (SRE) is met by taking PSYC.47xx
- Written and Oral Communication (emphasizing Writing in the Discipline) (WOC) is met by taking PSYC.47xx (https://www.uml.edu/catalog/courses/PSYC)
- Critical Thinking and Problem Solving (CTPS) is met by taking PSYC.3750 (https://www.uml.edu/catalog/courses/PSYC/3750)
- Applied and Integrative Learning (AIL) is met by taking PSYC.3750 (https://www.uml.edu/catalog/courses/PSYC/3750)
- Quantitative Literacy (QL) is met by taking PSYC.3690 (https://www.uml.edu/catalog/courses/PSYC/3690)

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should be using their Advisement Report in SiS (http://www.uml.edu/enrollment/sis/default.aspx). If you need assistance, please contact your adviser.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last updated: 3/15/2019

Sample Degree Pathway for Psychology - General Concentration

For students who entered fall 2022 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
</tr>
<tr>
<td>HONR.1100</td>
<td>First Year Experience Seminar</td>
<td>1</td>
</tr>
<tr>
<td>FAHS.1090</td>
<td>Introduction to Psychological Science</td>
<td>3</td>
</tr>
<tr>
<td>PSYC.1010</td>
<td>Math Persp. (MATH)</td>
<td>3</td>
</tr>
<tr>
<td>MATH.xxxx</td>
<td>Language 1</td>
<td>3</td>
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### Spring Semester

<table>
<thead>
<tr>
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<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
<td>3</td>
</tr>
<tr>
<td>PSYC.2600</td>
<td>Child and Adolescent Development (SRE)</td>
<td>3</td>
</tr>
<tr>
<td>WLxx.xxxx</td>
<td>Language 2 &amp; Culture</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Science with Lab Persp. (SCL)</td>
<td>4</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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### Sophomore Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC.2690</td>
<td>Research I: Methods (IL), (CTPS)</td>
<td>3</td>
</tr>
<tr>
<td>PSYC.2320 / PSYC.2720</td>
<td>Psychology of Personality / Abnormal Psychology</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Science with Lab Persp. (SCL)</td>
<td>4</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Language 3 &amp; Culture or World Ready Elective3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

#### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC.2090</td>
<td>Social Psychology / Community Psychology (DCA)</td>
<td>3</td>
</tr>
<tr>
<td>PSYC.27xx</td>
<td>Basic Processes Elective2</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>STEM Persp. (STEM)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Language 4 &amp; Culture or World Ready Elective3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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### Junior Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>PSYC.3690</td>
<td>Research II: Statistics (QL)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>World Ready Elective3 or Free Elective</td>
<td>3</td>
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<tr>
<td><strong>Total</strong></td>
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#### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC.3/4xxx</td>
<td>Psychology Elective</td>
<td>3</td>
</tr>
<tr>
<td>PSYC.3/4xxx</td>
<td>Psychology Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

### Senior Year

#### Fall Semester
### Course # | Course Name | Credits
---|---|---
PSYC.47xx  
([https://www.uml.edu/catalog/courses/PSYC](https://www.uml.edu/catalog/courses/PSYC)) | Advanced Seminar (AIL), (WOC) | 5
PSYC.3/4xx  
([https://www.uml.edu/catalog/courses/PSYC](https://www.uml.edu/catalog/courses/PSYC)) | Psychology Elective | 3
xxx.x/4xxx | Free Elective | 3
xxx.xxxx | Free Elective | 3
xxx.xxxx | Free Elective | 3
Total | | 15

### Spring Semester

| Course # | Course Name | Credits |
---|---|---|
PSYC.4xxx  
([https://www.uml.edu/catalog/courses/PSYC](https://www.uml.edu/catalog/courses/PSYC)) | Psychology Elective | 3
xxx.x/4xxx | Free Elective | 3
xxx.xxxx | Free Elective | 3
xxx.xxxx | Free Elective | 3
xxx.xxxx | Free Elective | 3
Total | | 15

**Total Minimum Credits = 120**

1. Students must earn a grade of C or higher.
2. Choose from PSYC.2730  
([https://www.uml.edu/catalog/courses/PSYC/2730](https://www.uml.edu/catalog/courses/PSYC/2730)), PSYC.2760  
([https://www.uml.edu/catalog/courses/PSYC/2760](https://www.uml.edu/catalog/courses/PSYC/2760)), PSYC.2770  
([https://www.uml.edu/catalog/courses/PSYC/2770](https://www.uml.edu/catalog/courses/PSYC/2770)) or PSYC.2780  
([https://www.uml.edu/catalog/courses/PSYC/2780](https://www.uml.edu/catalog/courses/PSYC/2780)).
3. World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements  
([https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)) in the undergraduate catalog. The World Language requirement for Psychology majors can be met with sign language courses taken at Northern Essex Community College (NECC). More information about this policy is available on the Psychology Department website  
([https://www.uml.edu/FAHSS/Psychology/Current-Students/Advising.aspx](https://www.uml.edu/FAHSS/Psychology/Current-Students/Advising.aspx)). For information about the sign language courses and program at NECC, please visit NECC website  
([https://www.necc.mass.edu/](https://www.necc.mass.edu/)). As with all off-campus courses, students taking sign language courses at NECC must complete a Prior Authorization for Off Campus Courses form  
([https://www.uml.edu/thesolutioncenter/Forms/Academic-Forms.aspx](https://www.uml.edu/thesolutioncenter/Forms/Academic-Forms.aspx)).

4. Required for entering Freshmen in the College of Fine Arts, Humanities & Social Sciences.
5. Choose from PSYC.4710  
([https://www.uml.edu/catalog/courses/PSYC/4710](https://www.uml.edu/catalog/courses/PSYC/4710)), PSYC.4730  
([https://www.uml.edu/catalog/courses/PSYC/4730](https://www.uml.edu/catalog/courses/PSYC/4730)), PSYC.4740  
([https://www.uml.edu/catalog/courses/PSYC/4740](https://www.uml.edu/catalog/courses/PSYC/4740)), PSYC.4750  
([https://www.uml.edu/catalog/courses/PSYC/4750](https://www.uml.edu/catalog/courses/PSYC/4750)), PSYC.4770  
([https://www.uml.edu/catalog/courses/PSYC/4770](https://www.uml.edu/catalog/courses/PSYC/4770)), PSYC.4780  
([https://www.uml.edu/catalog/courses/PSYC/4780](https://www.uml.edu/catalog/courses/PSYC/4780)) or PSYC.4790  
([https://www.uml.edu/catalog/courses/PSYC/4790](https://www.uml.edu/catalog/courses/PSYC/4790)).

A major in Psychology consists of 36-54 psychology credits with at least 18 credits at the 3000 level or higher. Students transferring to the college and wishing to major in Psychology must make individual arrangements with the department chairperson regarding satisfaction of major course requirements. To graduate with a Psychology degree, students must have a 2.2 GPA in psychology courses and an overall minimum GPA of 2.0.

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([https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)) policy for further details. You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should be using their Advisement Report in SiS  
([http://www.uml.edu/enrollment/sis/default.aspx](http://www.uml.edu/enrollment/sis/default.aspx)). If you need assistance, please contact your adviser.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved  
([https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf](https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf)) prior to enrollment. See the catalog policy  

**Last updated: 3/24/2022**

### Sample Degree Pathway for Psychology - Behavior Analysis Concentration

**For students who entered fall 2022 and beyond.**

#### Freshman Year

**Fall Semester**

| Course # | Course Name | Credits |
---|---|---|

### Academic Catalog 2021 - 2022 / Psychology - General Information

#### Sophomore Year

**Fall Semester**

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
</tr>
<tr>
<td>HONR.1100</td>
<td>First Year Experience Seminar3</td>
<td>1</td>
</tr>
<tr>
<td>PSYC.1010</td>
<td>Introduction to Psychological Science</td>
<td>3</td>
</tr>
<tr>
<td>MATH.xxxx</td>
<td>Math Persp. (MATH)</td>
<td>3</td>
</tr>
<tr>
<td>WLxx.xxxx</td>
<td>Language 1 &amp;Culture</td>
<td>3</td>
</tr>
<tr>
<td>xxxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
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<td>16</td>
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#### Spring Semester

<table>
<thead>
<tr>
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<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>PSYC.2720</td>
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<tr>
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<tr>
<td>xxxxx.xxxx</td>
<td>Science with Lab Persp. (SCL)</td>
<td>4</td>
</tr>
<tr>
<td>xxxxx.xxxx</td>
<td>Language 3 &amp;Culture or World Ready Elective2</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
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<td>16</td>
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</tbody>
</table>

### Junior Year

**Fall Semester**

<table>
<thead>
<tr>
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<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC.2010</td>
<td>Professional Development in Psychology</td>
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</tr>
<tr>
<td>PSYC.2090</td>
<td>Social Psychology / Community Psychology (DCA)</td>
<td>3</td>
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<tr>
<td>PSYC.2760</td>
<td>Theories of Learning</td>
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<tr>
<td>xxxxx.xxxx</td>
<td>STEM Persp. (STEM)</td>
<td>3</td>
</tr>
<tr>
<td>xxxxx.xxxx</td>
<td>Language 4 &amp;Culture or World Ready Elective2</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
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**Spring Semester**

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC.3690</td>
<td>Research II: Statistics (QL)</td>
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</tr>
<tr>
<td>PSYC.3120</td>
<td>Learning and Behavior</td>
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</tr>
<tr>
<td>xxxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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Social Sciences Persp. (SS) 3
World Ready Elective 3
Total 15

Spring Semester

<table>
<thead>
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<tbody>
<tr>
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<td>Psychology Elective</td>
<td>3</td>
</tr>
<tr>
<td>PSYC.3/4xxx [(<a href="https://www.uml.edu/catalog/courses/PSYC">https://www.uml.edu/catalog/courses/PSYC</a>)]</td>
<td>Psychology Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
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</table>

Senior Year

Fall Semester

<table>
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<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>PSYC.3/4xx [(<a href="https://www.uml.edu/catalog/courses/PSYC">https://www.uml.edu/catalog/courses/PSYC</a>)]</td>
<td>Psychology Elective</td>
<td>3</td>
</tr>
<tr>
<td>PSYC.4790 [(<a href="https://www.uml.edu/catalog/courses/PSYC/4790">https://www.uml.edu/catalog/courses/PSYC/4790</a>)]</td>
<td>Seminar in Behavioral Psychology (WOC), (AIL)</td>
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<tr>
<td>xxxx.3/4xxx</td>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
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<tr>
<td>Total</td>
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<td>15</td>
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Spring Semester

<table>
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<tr>
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<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC.4800 [(<a href="https://www.uml.edu/catalog/courses/PSYC/4800">https://www.uml.edu/catalog/courses/PSYC/4800</a>)]</td>
<td>Concentration Practicum I</td>
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<tr>
<td>xxxx.3/4xxx</td>
<td>Free Elective</td>
<td>3</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
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</tr>
<tr>
<td>Total</td>
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</tbody>
</table>

Total Minimum Credits = 121

1Students must earn a grade of C or higher.
2World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements [(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)] in the undergraduate catalog. The World Language requirement for Psychology majors can be met with sign language courses taken at Northern Essex Community College (NECC). More information about this policy is available on the Psychology Department website [(https://www.uml.edu/FAHSS/Psychology/Current-Students/Advising.aspx)]. For information about the sign language courses and program at NECC, please visit NECC website [(https://www.necc.mass.edu/)]. As with all off-campus courses, students taking sign language courses at NECC must complete a Prior Authorization for Off Campus Courses form [(https://www.uml.edu/thesolutioncenter/Forms/Academic-Forms.aspx)].

3Required for entering Freshmen in the College of Fine Arts, Humanities & Social Sciences.

A major in Psychology consists of 36-54 psychology credits with at least 18 credits at the 3000 level or higher. Students transferring to the college and wishing to major in Psychology must make individual arrangements with the department chairperson regarding satisfaction of major course requirements. To graduate with a concentration as part of the Psychology degree, student must have both an overall GPA and a Psychology GPA of at least a 3.0.

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Last updated: 4/04/2022

Sample Degree Pathway for Psychology -
Community Social Psychology Concentration

For students who entered fall 2022 and beyond.

Freshman Year

| Fall Semester |
|---------------|---------------|
| **Course#**   | **Course Name** | **Credits** |
| ENGL.1010     | College Writing I / FYSH (CW) | 3 |
| HONR.1100     | First Year Experience Seminar | 1 |
| FAHS.1090     | Introduction to Psychological Science | 3 |
| PSYC.1010     | Math Persp. (MATH) | 3 |
| WLxx.xxxx     | Language 1 &Culture | 3 |
| Social Sciences Persp. (SS) | 3 |
| Total         | 16 |

Sophomore Year

| Fall Semester |
|---------------|---------------|
| **Course#**   | **Course Name** | **Credits** |
| ENGL.1020     | College Writing II (CW) | 3 |
| PSYC.2550     | Community Psychology (DCA) | 3 |
| WLxx.xxxx     | Language 2 &Culture | 3 |
| xxxx.xxxx     | Science with Lab Persp. (SCL) | 4 |
| xxxx.xxxx     | Arts and Hum. Persp. (AH) | 3 |
| Total         | 16 |

Junior Year

| Fall Semester |
|---------------|---------------|
| **Course#**   | **Course Name** | **Credits** |
| PSYC.3690     | Research II: Statistics (QL) | 3 |
| PSYC.3xxx     | Psychology Elective | 3 |
| xxxx.xxxx     | Arts and Hum. Persp. (AH) | 3 |
| xxxx.xxxx     | Social Sciences Persp. (SS) | 3 |
| xxxx.xxxx     | World Ready Elective or Free Elective | 3 |
| Total         | 15 |
### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC.2320</td>
<td>Psychology of Personality / Abnormal Psychology</td>
<td>3</td>
</tr>
<tr>
<td>PSYC.2720</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSYC.3/4xxx</td>
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<tr>
<td>PSYC.3xxx</td>
<td>Elective</td>
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<tr>
<td>xxxx.3/4xxx</td>
<td>Free Elective</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
<td>3</td>
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<tr>
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### Senior Year

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<tr>
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<td>Advanced Seminar (AIL, (WOC)</td>
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<td>xxxx.3/4xxx</td>
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### Fall Semester

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### Spring Semester

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<td><strong>Total</strong></td>
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**Total Minimum Credits = 121**

1. Students must earn a grade of C or higher.
2. Choose from PSYC.2730, PSYC.2760, PSYC.2770 or
3. World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements in the undergraduate catalog. The World Language requirement for Psychology majors can be met with sign language courses taken at Northern Essex Community College (NECC). More information about this policy is available on the Psychology Department website. For information about the sign language courses and program at NECC, please visit NECC website. As with all off-campus courses, students taking sign language courses at NECC must complete a Prior Authorization for Off Campus Courses form.
4. Required for entering freshmen in the College of Fine Arts, Humanities, & Social Sciences.
5. Choose from PSYC.3050, PSYC.3080, PSYC.3360, or PSYC.3450.

A major in Psychology consists of 36-54 psychology credits with at least 18 credits at the 3000 level or higher. Students transferring to the college and wishing to major in Psychology must make individual arrangements with the department chairperson regarding satisfaction of major course requirements. To graduate with a concentration as part of the Psychology degree, student must have both an overall GPA and a Psychology GPA of at least a 3.0.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should be using their Advisement Report in SiS. If you need assistance, please contact your adviser.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved.
Sample Degree Pathway for Psychology - Clinical Psychology Concentration

For students who entered fall 2022 and beyond.

Freshman Year

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Sophomore Year

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Junior Year

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### Senior Year

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<td>World Ready Elective or Free Elective</td>
<td></td>
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<tr>
<td>PSYC.4800</td>
<td>Concentration Practicum I</td>
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</table>

**Total Minimum Credits = 121**

1. Students must earn a grade of C or higher.

2. World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements ([https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)) in the undergraduate catalog. The World Language requirement for Psychology majors can be met with sign language courses taken at Northern Essex Community College (NECC). More information about this policy is available on the Psychology Department website ([https://www.uml.edu/FAHSS/Psychology/Current-Students/Advising.aspx](https://www.uml.edu/FAHSS/Psychology/Current-Students/Advising.aspx)), For information about the sign language courses and program at NECC, please visit NECC website ([https://www.necc.mass.edu/](https://www.necc.mass.edu/)). As with all off-campus courses, students taking sign language courses at NECC must complete a Prior Authorization for Off Campus Courses form ([https://www.uml.edu/thesolutioncenter/Forms/Academic-Forms.aspx](https://www.uml.edu/thesolutioncenter/Forms/Academic-Forms.aspx)).

3. Required for entering Freshmen in the College of Fine Arts, Humanities & Social Sciences.

A major in Psychology consists of 36-54 psychology credits with at least 18 credits at the 3000 level or higher. The Clinical concentration consists of 37 required credits and 3 elective credits, for a total of 40 credits. Students may take up to 54 credits in the major. Students transferring to the college and wishing to major in Psychology must make individual arrangements with the department chairperson regarding satisfaction of major course requirements. To graduate with a concentration as part of the Psychology degree, student must have both an overall GPA and a Psychology GPA of at least a 3.0.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum ([https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)) policy for further details. You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should be using their Advisement Report in SiS ([http://www.uml.edu/enrollment/sis/default.aspx](http://www.uml.edu/enrollment/sis/default.aspx)). If you need assistance, please contact your adviser.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be
formally approved prior to enrollment. See the catalog policy for details.

Last updated: 3/28/2022

Sample Degree Pathway for Psychology - Developmental Disabilities Concentration

For students who entered fall 2022 and beyond.

**Freshman Year**

**Fall Semester**

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<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
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<td>FAHS.1090</td>
<td>First Year Experience Seminar4</td>
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<tr>
<td>PSYC.1010</td>
<td>Introduction to Psychological Science</td>
<td>3</td>
</tr>
<tr>
<td>MATH.xxxx</td>
<td>Math Persp. (MATH)</td>
<td>3</td>
</tr>
<tr>
<td>WLxx.xxxx</td>
<td>Language 1 &amp;Culture</td>
<td>3</td>
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<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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**Spring Semester**

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<tr>
<td>PSYC.2600</td>
<td>Child and Adolescent Development (SRE)</td>
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**Sophomore Year**

**Fall Semester**

<table>
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<th>Course#</th>
<th>Course Name</th>
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<tr>
<td>PSYC.2690</td>
<td>Research I: Methods (II), (CTPS)</td>
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<tr>
<td>PSYC.2320</td>
<td>Psychology of Personality / Abnormal Psychology</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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<td>Science with Lab Persp. (SCL)</td>
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**Spring Semester**

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<td>Social Psychology / Community Psychology (DCA)</td>
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<td>PSYC.2550</td>
<td>Professional Development in Psychology</td>
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<td>Basic Processes Elective2</td>
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### Junior Year

#### Fall Semester

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<tr>
<td>PSYC.3690</td>
<td>Research II: Statistics (QL-1)</td>
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<tr>
<td>PSYC.3600</td>
<td>Adult Development and Aging / Developmental Psychopathology</td>
<td>3</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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<td>xxxx.xxxx</td>
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#### Spring Semester

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<td>Psychology of Developmental Disabilities</td>
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<tr>
<td>PSYC.3/4xxx</td>
<td>Psychology Elective</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
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<td>xxxx.xxxx</td>
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<td><strong>Total</strong></td>
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</tbody>
</table>

**Total Minimum Credits = 121**

1. Students must earn a grade of C or higher.
2. Choose from PSYC.2730, PSYC.2760, PSYC.2770 or PSYC.2780.
3. World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements in the undergraduate catalog. The World Language requirement for Psychology majors can be met with sign language courses taken at Northern Essex Community College (NECC). More information about this policy is available on the Psychology Department website.
4. Required for entering Freshmen in the College of Fine Arts, Humanities & Social Sciences.
Students who choose to focus on adults select PSYC.2720 (https://www.uml.edu/catalog/courses/PSYC/2720) and PSYC.3600 (https://www.uml.edu/catalog/courses/PSYC/3600); students who choose to focus on children and adolescents select PSYC.2320 (https://www.uml.edu/catalog/courses/PSYC/2320) or PSYC.2720 (https://www.uml.edu/catalog/courses/PSYC/2720) and select PSYC.3610 (https://www.uml.edu/catalog/courses/PSYC/3610).

A major in Psychology consists of 36-54 psychology credits with at least 18 credits at the 3000 level or higher. Students transferring to the college and wishing to major in Psychology must make individual arrangements with the department chairperson regarding satisfaction of major course requirements. To graduate with a concentration as part of the Psychology degree, student must have both an overall GPA and a Psychology GPA of at least a 3.0.

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Restriction on off-campus study:

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Last updated: 3/30/2022

Sample Degree Pathway for Psychology - Health Psychology Concentration

For students who entered fall 2022 and beyond.

Freshman Year

Fall Semester

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<tr>
<td>FAHS.1090</td>
<td>Introduction to Psychological Science</td>
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<tr>
<td>PSYC.1010</td>
<td>Math Persp. (MATH)</td>
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</tr>
<tr>
<td>MATH.xxxx</td>
<td>Language 1 &amp;Culture</td>
<td>3</td>
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<td>WLxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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Spring Semester

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<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
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<td>Child and Adolescent Development (SRE)</td>
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<td>WLxx.xxxx</td>
<td>Language 2 &amp;Culture</td>
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Sophomore Year

Fall Semester

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<tr>
<td>PSYC.2720</td>
<td>Abnormal Psychology</td>
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<td>PSYC.2010</td>
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### Junior Year

#### Fall Semester

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#### Spring Semester

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### Senior Year

#### Fall Semester

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<th>Credits</th>
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<td>Concentration Practicum I</td>
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<td>Free Elective</td>
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#### Spring Semester

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<tr>
<td>PSYC.48xx</td>
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### Total Minimum Credits = 121

1. Students must earn a grade of C or higher.
2. World Ready Language Track (WR track) requires successful completion of a two course sequence in a World Language (depending on placement) and three approved courses on the culture/history/literature/film related to that language, but taught in English. (Total of 15 credits.) For detailed information refer to Policies - Language Requirements in the undergraduate catalog. The World Language requirement for Psychology majors can be met with sign language courses taken at Northern Essex Community College (NECC). More
information about this policy is available on the Psychology Department website (https://www.uml.edu/FAHSS/Psychology/Current-Students/Advising.aspx). For information about the sign language courses and program at NECC, please visit NECC website (https://www.necc.mass.edu/). As with all off-campus courses, students taking sign language courses at NECC must complete a Prior Authorization for Off Campus Courses form (https://www.uml.edu/thesolutioncenter/Forms/Academic-Forms.aspx).

3 Required for entering Freshmen in the College of Fine Arts, Humanities & Social Sciences.


A major in Psychology consists of 36-54 psychology credits with at least 18 credits at the 3000 level or higher. Students transferring to the college and wishing to major in Psychology must make individual arrangements with the department chairperson regarding satisfaction of major course requirements. To graduate with a concentration as part of the Psychology degree, student must have both an overall GPA and a Psychology GPA of at least a 3.0.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should be using their Advisement Report in SiS (http://www.uml.edu/enrollment/sis/default.aspx). If you need assistance, please contact your adviser.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

_Last updated: 4/04/2022_
PSYC.1010 Introduction to Psychological Science (Formerly 47.101) - Credits: 3
An introduction course that focuses on application of the scientific method to major areas of psychology: biological, cognitive, developmental, social and personality, and mental and physical health. The course addresses the importance of social and cultural diversity, ethics, variations in human functioning, and applications to life and social action both within these areas and integrated across them. The research basis for knowledge in the field is emphasized.

PSYC.2010 Professional Development in Psychology (Formerly 47.201) - Credits: 1
This course in intended for psychology majors to explore pathways to success as an undergraduate in psychology, especially including information about psychology as an empirical science, and careers and graduate school in psychology. Opportunities for research and service learning will be discussed. The course is required for all students who are planning to apply to one of the Concentrations in Psychology. (Prerequisite: 9 credits of coursework in Psychology)

PSYC.2090 Social Psychology (Formerly 47.209) - Credits: 3
Presents an introduction to the study of social behavior in interpersonal relationships, groups, organizations, and the community: Diversity in regard to groups of peoples, cultures, and views is emphasized. Topics include non-verbal communication, social attraction, attitudes and attitude change, group dynamics, prejudice, labeling, stereotyping, interpersonal influence, and applications to social problems. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PSYC.2320 Psychology of Personality (Formerly 47.232) - Credits: 3
An introduction to the study of human personality. This course uses both theory and contemporary empirical evidence to examine approaches to understanding individual differences. Theoretical approaches include psychoanalytic, humanistic, cognitive, trait, type, and behavioral. Applications to topics such as self-concept, anxiety, adjustment, and achievement motivation will be considered.

PSYC.2550 Community Psychology (Formerly 47.255) - Credits: 3
Surveys the field of community psychology, including principles of social justice, diversity, and social change. The course reviews historical antecedents, paradigms, conceptual models, strategies and tactics of social and community change and action; examples from selected contexts and social systems, including education, mental health, community organizations, the workplace, health care, justice system, and social services will be employed. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PSYC.2600 Child and Adolescent Development (Formerly 47.260) - Credits: 3
The developmental science of childhood and adolescence. Major theoretical perspectives, research methods, and ethical issues are presented with respect to prenatal development, infancy, childhood, adolescence, and the transition to adulthood. Empirical evidence for development in relevant contexts across biological, psychological, and social domains is examined.

PSYC.2690 Research I: Methods (Formerly 47.269) - Credits: 3
An introductory course on the fundamentals of empirical research in psychological science. Instruction will promote understanding and competence in the basic vocabulary of psychological research, addressing information literacy, measurement, reliability, and validity in observed variables and unobserved constructs. Students will learn critical components of experimental, quasi-experimental, and correlational designs, as well as the basics of descriptive statistics, hypothesis and statistical testing, and matching design to analysis strategies. Students will demonstrate this knowledge through preparation of a research proposal. Finally, this course will provide students a strong basis from which to pursue advanced coursework in a variety of methodological approaches to psychological research. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).
Surveys issues and topics dealing with the physiological and evolutionary bases of behavior. Biological systems and processes that influence behavior are considered, with particular emphasis on brain mechanisms. Recent discoveries in the neurosciences will be presented. Methods of research are reviewed.

PSYC.2760 Theories of Learning (Formerly 47.276) - Credits: 3
This course provides an introduction to key concepts, theories, and experimental paradigms for studying learning and behavior in both human and non-human animals. Behavioral, cognitive, and physiological approaches are compared. You will learn about the scientific study of learning with an emphasis on how behavior changes as a function of experience. We will examine historical and current perspectives on a range of current issues of importance in the study of learning.

PSYC.2770 Sensation and Perception (Formerly 47.277) - Credits: 3
The course focuses on human sensations and perceptions. Students will examine how people know the objects and events of the world through hearing, seeing, smelling, tasting, moving, and touching. Students will also examine the foundations of experiences which correspond to independent measures of the world (veridical) and those which do not (illusory).

PSYC.2780 Cognitive Psychology (Formerly 47.278) - Credits: 3
Provides an introductory overview of the research on mental processes including but not limited to: attention, perception, memory, learning and decision-making. The course will also connect cognitive psychological research to other branches of study, as well as real world domains such as education, law, and health.

PSYC.3050 Psychology and Law (Formerly 47.305) - Credits: 3
This course is an introduction to many topics representing major fields of study within psychology and law. Topics may include: eyewitness testimony, lie detection, jury selection, child protection, forensic interviews, and the death penalty. In this course, students will be exposed to the diversity of interests among legal psychologists as well as innovative and important ideas, theories, and scientific research findings. Through readings, the study of actual cases, and presentations from guest speakers, students will gain more understanding of how psychologists study and contribute to the legal system.

PSYC.3280 Dynamics of Interpersonal Relations (Formerly 47.328) - Credits: 3
Examines various methods and techniques suitable for the modification of human behavior, based on the principles and findings of experimental studies of animal and human behavior. Considers how such methods can be used in education, mental health and corrections, and self-directed personal change.

PSYC.3330 Psychology of Consciousness (Formerly 47.333) - Credits: 3
Introduces students to psychological theories and studies of the mind-body dualism, mind-brain identity, and the emergence of mind. Studies of psychosomatic disease and healing imagery, sleep and hypnosis, "subconscious" perception and "extra sensory" perception, multiple personalities and "split brain" patients are discussed. The questions of animal awareness and computer consciousness are also considered.
47.335) - Credits: 3
Considers such topics as: the psychology of sex differences; biological bases of psychological sex differences; the nature of female sexuality; clinical theory and practice concerning women; women as mental patients and mental health consumers; implications for psychology and for women's status.

PSYC.3360 Culture and Psychology (Formerly 47.336) - Credits: 3
Provides an analysis to the impact of culture, socio-historical, and social influences on psychological processes and outcomes. Students will also learn about techniques for studying the influence of culture including cross-cultural methods and population-specific methods. Through careful analysis of research literature, this class will examine a variety of contexts within the U.S. and internationally. Topics will include identity development, immigration, acculturation, socialization, and social interactions among groups.

PSYC.3370 Community & Social Change - Credits: 3
The course uses a community social psychology framework to help students envision and become active participants in community and social change processes. In this course, the term social change refers to intentional and active efforts to address social inequalities/oppression and promote psychosocial wellbeing. We will define and analyze social problems using social justice and strengths-based approaches, understand and evaluate various community and social change strategies, and learn how to become effective change agents. These topics will be examined through intersecting lenses of race, ethnicity, culture, gender, class, sexualities, abilities, and globalization. Particular emphasis will be placed on conceptualizing and engaging in social change efforts alongside marginalized and historically underrepresented groups.

PSYC.3450 Health Psychology (Formerly 47.345) - Credits: 3
An examination of psychological aspects of human health, both physical and mental, and the processes of adjustment and growth. Consideration is given to the interplay of health and illness with emphasis on psychological methods of overcoming and preventing illness and of enhancing physical and emotional well-being.

PSYC.3510 Human Sexuality (Formerly 47.351) - Credits: 3
Addresses the biological, psychosocial, and attitudinal aspects of human sexuality through lectures, discussions, films from a variety of perspectives.

PSYC.3520 Psychological Testing (Formerly 47.352) - Credits: 3
A survey of major tests and techniques used to assess cognitive abilities, personality and vocational interests; an introduction to the various professional settings in which testing and assessment methods are used (e.g. school/education, mental health, rehabilitation, employment and personnel selection, criminal justice). Students learn to administer, score, and interpret specific tests and learn how to develop a case study or report based on test data and related information.

PSYC.3550 Sport and Exercise Psychology (Formerly 47.355) - Credits: 3
The course will cover topics such as motivation, arousal and anxiety in performance, performance enhancement, youth sport and family interactions, leadership, cooperation and competition, team cohesion, gender issues, exercise and mental health, and psychological factors in injury prevention and rehabilitation.

PSYC.3600 Adult Development and Aging (Formerly 47.360) - Credits: 3
Begins with an overview of recent theoretical perspectives on adult development and aging. In chronological sequence, it presents the stages of adulthood and concludes with death and dying. Topics covered include personal, family, and vocational development through adulthood, gender pattern differences, and the impact of changing demographics, including the lengthening of the life span.

PSYC.3610 Developmental Psychopathology (Formerly 47.361) - Credits: 3
Examines behavior problems of childhood and adolescence across developmental transitions with a focus on the interaction of risk and protective factors in the child and his or her social context (e.g., family, school, friendships). Problems such as depression, anxiety, conduct disorder, ADHD, learning disabilities, and the consequences of trauma and maltreatment are addressed.

PSYC.3620 Psychology of Developmental Disabilities (Formerly 47.362) - Credits: 3
This course examines a range of developmental disabilities, their etiology, consideration of underlying brain function, assessment procedures, and current diagnostic, treatment and educational approaches. In addition, the impact of disability on individuals and the families of those affected, cultural and social aspects of disability, and current practices in service provision will be considered.
PSYC.3630 Introduction to Disability Studies (Formerly 47.363) - Credits: 3
This course provides students with a wide range of interests and backgrounds with the opportunity to examine their own mental model (attitudes/values/ assumptions) of disability. It includes an overview of the nature of intellectual disability and other disabilities and it provides opportunities to explore and understand the historical social response to disability. Students will look at a range of strategies for providing support and intervention and they will learn about how to effect change through a variety of strategies, including advocacy.

PSYC.3640 Family Systems - Credits: 3
This course presents a systems model in considering families as they influence, and are influenced by, their members. We will explore theoretical foundations and examine empirical evidence to consider a variety of family systems, structures, and dynamics in the social context and across development, including topics such as culture, gender, sexual orientation, socioeconomic status, disability, foster care, adoption, education, work, and community.

PSYC.3680 Psychology of Decision-Making - Credits: 3
We spend billions of dollars every year to address issues caused by poor decisions: jurors convict innocent defendants, employees do not adequately contribute to retirement accounts, young adults smoke cigarettes, etc. Why do people make irrational decisions? This course will provide a comprehensive overview of decision making with an emphasis on applying psychological theory and research to tackle issues in the areas of law, economics, health, etc. Students will learn theoretical concepts to improve their own decision-making as well as help them to positively influence the decisions of others.

PSYC.3690 Research II: Statistics (Formerly 47.369) - Credits: 3
An intermediate level course building on competence in quantitative reasoning skills and the fundamentals of research methods, and focusing on descriptive and inferential statistics and their application and interpretation. The course will include basic computational approaches; the primary goal is for students to develop the ability to articulate and apply statistical concepts, and communicate statistical results. The course includes topics in basic inferential statistics from z-scores up to and including chi-square and factorial ANOVA. Students will learn to use a database and conduct statistical analyses using standard software packages. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

PSYC.3720 Comparative Psychology: Animal Behavior (Formerly 47.372) - Credits: 3
Comparative psychology is a discipline that explores the behavior of animals, both human and non-human, using evolutionary theory as a unifying principle. The contributions of evolutionary pressures, genetics, development, learning, and social influence will be explored in variety of animal species and cross-species comparisons made where appropriate. Specific topics covered will include causes and development of behavior, control and organization of behavior, behavioral adaptations, mating systems and reproduction, parental care, defensive behaviors, aggression, foraging, communication, and animal cognition. Students will be required to complete a behavioral observation of a non-human species by traveling to a local zoo or using another live animal observation approach approved by the instructor. (e.g., a zoo’s live animal webcam).”

PSYC.4690 Research III: Laboratory (Formerly 47.375 and PSYC.3750) - Credits: 3
An advanced course in which students design and carry out an empirical research project from start to finish, resulting in an individually written research report using APA style and an oral presentation. The primary goal is for students to experience discovery by completing an original study that reasonably extends the prior research literature. Topics may vary, reflecting the interests of the instructor. Students will perform literature reviews; formulate a research question; operationalize variables; develop research designs; obtain ethical review and approval; and collect, analyze, and interpret data. Students will also demonstrate knowledge of the research process in assessments that may include assignments, quizzes, or exams. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Critical Thinking & Problem Solving (CTPS).

PSYC.4710 Seminar in Community Psychology - Credits: 3
An advanced seminar to consider special topics in community psychology with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as racism, diversity, empowerment, and social change in the context of social and community life. This is a writing intensive course.

PSYC.4711 Seminar in Community Psychology: Racism - Credits: 3
An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and
empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is racism. In this course we will investigate roots of racism, kinds of racism, reasons for perpetuation of racism, possible solutions to ending racism. Many believer that racism is a thing of the past. Yet, research shows that many of us are unconsciously racist and hurt communities of color without any malicious intent. We will explore our own posting in terms of racism. This is a writing-intensive course.

**PSYC.4712 Seminar in Community Psychology: Immigration - Credits: 3**

An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is immigration, a very important issue in the United States and around the world. In this seminar we will study the complex process of migration from a community social psychological point of view. Motivations, expectations, acculturation, immigrant status, deportations, policy and more will be covered. This is a writing-intensive course.

**PSYC.4713 Seminar in Community Psychology: Prevent Youth Violence - Credits: 3**

An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is youth violence, which continues to be a major public health concern in the United States. Preventing youth violence is an important component of creating peaceful and safe neighborhoods and just communities. In this course, we will use ecological and multicultural perspectives to understand different types of youth violence, the contexts in which they occur, and intervention strategies to address the violence. This is a writing-intensive course.

**PSYC.4714 Seminar in Community Psychology: Bridging Differences - Credits: 3**

An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course explores dilemmas that can emerge when working to bridge diverse groups in community-based work. The seminar will be organized around narratives that address multiple dimensions of diversity including race, ethnicity, gender, class, sexual orientation, disability, and religion. Too often, guidelines for addressing very complex diversity dynamics are presented as neatly packaged lists of recommendations. However, it is within the stories of the challenges and dilemmas that the complexity of the political, historical, social, and psychological dynamics of diversity are most evident. Students will explore examples of everyday diversity challenges and utilize psychological theories to better understand how the challenges can be shaped by struggles over limited resources, deep historical conflicts between groups, privilege dynamics, intragroup dynamics, organizational cultural norms, and/or other issues. This is a writing-intensive course.

**PSYC.4720 Seminar in Personality Psychology (Formerly 47.472) - Credits: 3**

Focuses on a variety of theoretical conceptualizations of the productive personality, psychodiagnostic tools and techniques and case histories. Students develop and enhance their professional skills with respect to presentation of self, writing, and psychological diagnostic techniques.

**PSYC.4730 Seminar in Social Psychology (Formerly 47.473) - Credits: 3**

An advanced seminar to consider special topics in social psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as social aspects of health and illness; inequalities in education; the impact of globalization; attitude formation and prejudice; and psychology of sex roles. This is a writing intensive course.

**PSYC.4731 Seminar in Social Psychology: Social (In)justice - Credits: 3**

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is social injustice, its causes, manifestations, explanations, and social psychological theories that help us understand them. We will explore how and why social injustice prevails in today’s world full of resources; why small number of people own majority of world’s wealth; why some countries are poorer than others. We will study our own standpoints and where they come from and we will work on possible remedies that could lead to a more just world.

**PSYC.4732 Seminar in Social Psychology: Achievement Motivation - Credits: 3**
An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course will cover psychological theory and research on the various factors that explain people's motivation to achieve and their performance in different domains. These factors include emotions, needs, personality, efficiency, group membership, identity, goal type, and context. Course goals include honing students' ability to understand, critique, write about, and discuss theoretical and empirical papers within psychology. Students will also develop their skills in generating testable hypotheses. This is a writing-intensive course.

PSYC.4733 Seminar in Social Psychology: the Mind-Body Perspective in Communication - Credits: 3

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on the role communication processes (including Intra-Personal, interpersonal, and Mediated-Communication) play in a variety of health related contexts, effects, and processes. Included will be: Self-regulation theories; placebo and nocebo effects; unconscious processes; biofeedback effects and mechanisms; hypnosis; imagery; pain management; emotion regulation; well-being; and the ability to consciously influence autonomic processes such as the immune and endocrine systems. This is a writing-intensive course.

PSYC.4734 Seminar in Social Psychology: Health Campaigns - Credits: 3

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will review the state of the science and art of effective medial health campaigns in light of how they are developed, delivered, and evaluated. Seminar participants will discuss and critically analyze campaigns relative to their effects on health-related awareness, knowledge, attitudes, and behaviors. This is a writing-intensive course.

PSYC.4735 Seminar in Social Psychology: Workplace Diversity - Credits: 3

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Over the course of our lives, many of us will be working in organizations that include diverse workers, and thus it is important to understand the issues that shape interpersonal and system dynamics within such settings. In this seminar, we review theories and research relevant to how race, ethnicity, class, gender, sexual orientation, and disability dynamics affect workplace systems. Classes will be highly interactive and discussion-oriented as students learn about the challenges diverse organizations face in fostering positive working relationships and about strategies adopted to enhance the effectiveness of the diverse workplace. This is a writing-intensive course.

PSYC.4736 Seminar in Social Psychology: Psychology of Sustainability - Credits: 3

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. In this course we will explore unequal distribution of resources and power and the culture of consumerism in all parts of the world, including the United States. Once people are aware can make informed choices about what and why and how much they buy, about the companies that produce and sell the products and the political views they support. This is a writing-intensive course.

PSYC.4740 Seminar in Developmental Psychology (Formerly 47.474) - Credits: 3

An advanced seminar to consider special topics in developmental psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as psychology of the family and parent-child relations; infant development; adjustment during adulthood; and death and dying. This is a writing intensive course.

PSYC.4741 Seminar in Developmental Psychology: Adolescent Identity - Credits: 3

An advanced seminar to consider special topics in developmental psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will explore the phenomenon of adolescent identity development, beginning with Erik Erikson’s seminal work on the subject and continuing through contemporary treatments. We will examine development of identity from extended consciousness, a sense of autobiographical self (1-2 years), to a theory of mind (4-5 years), conception of a personal fable (10-14 years), and the emergence of full life stories (17-25 years).
Specific issues of focus will include ethnic, social class, and gender role identity development, identity crises and resolutions, and representations of relationships with family, friends, school, and work. Students will write and analyze their own life stories, as well as lead discussions, and prepare a research paper. This is a writing-intensive course.

PSYC.4742 Seminar in Developmental Psychology: Psychology of Education - Credits: 3

An advanced seminar to consider special topics in developmental psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar takes an intensive look at the psychology of education and of learning. We will read about theories of education, research on learning, and study some historical and current trends in both formal education (school) and informal learning environments (hobby subcultures, museums, camps, etc). Readings will include both historical examples (John Dewey, Jane Addams, Paolo Friere) and schooling systems, and policymakers in higher education. In addition to reading, class discussion, and engaging hands on exercises, students will plan and deliver a term-length creative project on the psychology of learning and education. This is a writing-intensive course.

PSYC.4743 Seminar in Developmental Psychology: Trauma in Child Development - Credits: 3

An advanced seminar to consider special topics in developmental psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Trauma is a relatively common experience of childhood. Far too many children and youth in the US are witnesses to domestic violence and victims of abuse, neglect, and other violent crimes. Worldwide, millions of children have been disabled, injured, orphaned, or recruited as child soldiers in armed conflicts. When natural disasters strike, children are often among those affected most severely. How do these experiences influence subsequent growth and development? This seminar examines the role of trauma in child development form an ecological perspective with a focus on neurophysiological, affective, and relational systems. This is a writing-intensive course.

PSYC.4750 Seminar in Clinical Psychology (Formerly 47.475) - Credits: 3

An advanced seminar to consider special topics in clinical psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as health psychology and behavioral medicine; the nature and causes of or interventions for specific psychological disorders (e.g., autism spectrum disorder, schizophrenia); the community mental health movement; clinical methods of assessment. This is a writing intensive course.

PSYC.4751 Seminar in Clinical Psychology: Women's Health - Credits: 3

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Physical health and illness do not occur in a vacuum. Rather, they are embedded in a complex and dynamic system. This biological (e.g., disease process), psychological (e.g., mental health status) and social (e.g., culture) factors. Topics will include reproductive health, cardiovascular illness, substance use, and eating behaviors. Sexual orientation, race, socioeconomic status and other issues of diversity will be integrated throughout the semester. Students will learn from reading and discussing scholarly articles and book chapters, critically watching relevant videos, and writing individual literature review papers. This is a writing-intensive course.

PSYC.4752 Seminar in Clinical Psychology: Autism - Credits: 3

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Autism spectrum disorder (ASD) is a complex neurological disorder that typically appears before the age of three and immediately and profoundly affects a young child's ability to communicate, develop language, form social relationships and respond appropriately to environmental cues. Over the last 15-20 years, autism has received an increasing level of attention in both scientific arenas and the popular press. Most recent estimates are that about 1 in 50 children are affected. This seminar will examine issues in the etiology, characteristics and treatment of autism and related developmental disabilities. The seminar will also explore some of the more prominent theories and controversies surrounding these disorders. Much of the seminar will be focused on a behavioral approach to understanding and treating children with autism and significant intellectual challenges. This is a writing-intensive course.

PSYC.4753 Seminar in Clinical Psychology & Behavioral Medicine - Credits: 3

An advanced seminar to consider special topics in clinical
psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course examines physical health and illness by integrating information about biological processes, psychological characteristics, and social contexts. We will discuss the following topics throughout the course: the roles of personality, emotion, mental health, and human development in physical well-being; the relationship between health psychology and other disciplines such as nursing, anthropology and genetics; the significance of prevention and public policy in physical health; and the ways in which health psychology is important in a variety of health problems, such as heart disease, cancer, and obesity. This is a writing-intensive course.

PSYC.4754 Seminar in Clinical Psychology: Language Assessment and Intervention in Autism - Credits: 3

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course is designed to provide students with a working knowledge of behavioral language assessments and empirically validated interventions to improve language and communication for young children with autism and related disabilities. Successful completion of the course will help prepare students for a position as a behavior technician. Students will participate in class discussions, presentations, and application activities throughout the semester. This is a writing-intensive course.

PSYC.4755 Seminar in Clinical Psychology: Autism in Adolescents & Young Adults - Credits: 3

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on adolescents and young adults on the "high-functioning" end of the autism spectrum. Students will learn the behavioral and psychological characteristics associated with this population, diagnostic procedures, etiology, consider various interventions for this population, and discuss current controversies in the field. We will also consider the impact of autism spectrum disorders (ASD) on individual and their families. This is a writing-intensive course.

PSYC.4756 Seminar in Clinical Psychology: Sexual Offending - Credits: 3

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The purpose of this course is to examine current psychological theory and research relating to the causes and consequences of sexual aggression. It is designed to acquaint you with some of the key issues, questions, and findings in this field, as well as to allow you to develop some of the critical skills needed by research psychologists. The course is organized topically. We begin by reading and thinking about the social construction of masculinity and femininity (especially through representations in the media) and how these constructions might contribute to sexual aggression. The bulk of the course is devoted to an examination of psychological processes related to victimization and perpetration. The course concludes with a discussion of several special topics and an examination of rape prevention and education. Special topics may include a focus on juvenile and female offenders, specific risk factors for perpetration, campus sexual assault, pedophilia, child maltreatment, pornography, recidivism rates, offender laws, and victim testimonies. This is a writing-intensive course.

PSYC.4770 Seminar in Contemporary Trends (Formerly 47.477) - Credits: 3

An advanced seminar to consider current trends in psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as contemporary models of addictive behavior; the interaction of psychology and law; existential psychology; psychology of technological change. This is a writing intensive course.

PSYC.4771 Seminar in Contemporary Trends: Addictions - Credits: 3

An advanced seminar to consider special current topics in psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The focus of this seminar is on the psychology of addictions. Drawing upon current theory and research, we will look at the nature and causes of the problem behaviors associated with alcohol and drug use. We will also consider whether problems in such areas as shopping, eating, gambling, sex, video games, and the Internet can be understood as forms of addictions. In addition, we will examine the implications of whether or not such addictions should be viewed as diseases, and we will evaluate the relative importance of biological, psychological and socio-cultural factors. This is a writing-intensive course.

PSYC.4772 Seminar in Contemporary Trends: Psychology & Law - Credits: 3
An advanced seminar to consider special current topics in psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course is designed to give you an in-depth look into the impact of cognitive psychology on education. We will look at basic processes, including those of attention, memory, and motivation, starting first from basic theoretical principles. We will then read papers that have taken these theoretical principles as a starting point and applied them to real-life issues in education, such as exam performance and students’ self-evaluations of their own performance. This is a writing-intensive course.

**PSYC.4781 Seminar in Cognitive Psychology:**
**Educational Applications - Credits: 3**

An advanced seminar to consider special topics in cognitive psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as attention and memory; mental imagery; decision-making; language; applications of cognitive psychology to education. This is a writing intensive course.

**PSYC.4773 Seminar in Contemporary Trends:**
**Generational Identities and Relations - Credits: 3**

An advanced seminar to consider special current topics in psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on generational identities and intergenerational relations. Generation is an important dimension of human experience in modern societies and a key aspect of self-identity, but it is also linked to tensions and misunderstandings between people of different ages. Specific topics to be addressed include: cultural and historical differences in ideas about generation and cohort; the development of generational identities: generation, mass marketing, and consumerism; the politics of generation and intergenerational tensions; bilateral socialization and positive intergenerational exchange; similarities and differences between Baby Boomers, Gen-Xers, and Millennials; ageism and age segregation, and; generativity and the future of our planet. This is a writing-intensive course.

**PSYC.4774 Seminar in Contemporary Trends:**
**Psychology of Globalization - Credits: 3**

An advanced seminar to consider special current topics in psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on the social and psychological effects of globalization. Specifically, we will address how processes of globalization impact psychological functioning and development (including in the areas of identity, personality, mental health, and aging), social relations, and organizational and community dynamics. We will also explore the implications of global economic and environmental change for human rights and social and economic justice. This is a writing-intensive course.

**PSYC.4780 Seminar in Cognitive Psychology**

(Formerly 47.478) - Credits: 3

An advanced seminar to consider special topics in cognitive psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as attention and memory; mental imagery; decision-making; language; applications of cognitive psychology to education. This is a writing intensive course.
structures, responding to work related stress, and understanding how the science of psychology applies to the placement. Students will also integrate their placement experiences with the empirical literature from their respective concentrations by identifying and reviewing empirical work that addresses some aspect of their practicum.

PSYC.4810 Concentration Practicum II (Formerly 47.481) - Credits: 3

This is the second course in the two-course sequence that accompanies the required field placement for undergraduate psychology majors who are registered in a concentration. This course can only be taken after the successful completion of PSYC.4800 Concentration Practicum I, in the previous term. The field placement may either be a research or a service practicum. This is a general course, which will fulfill the requirement for students in any concentration. The second course will focus developing a research paper that integrates the empirical literature with the placement experience. The course will continue to focus on topics including working in diverse environments, working within organizations, responding to work related stress, understanding how the science of psychology applies to the placement, and writing informally and formally about placement experiences.

PSYC.4820 Dvptl Disabilities Fieldwork: Service Provision - Credits: 3

In this fieldwork course we explore standards for support and service provision within human services and compare experiences in field placements with these standards, seeking to understand the forces that support or interfere with realizing best practices in disability services. The foundation for this blended learning course (half the classes meet in-person, half online) will be 60 hours fieldwork with an individual with an intellectual/developmental disability. This course integrates course material with field placement experiences through presentation, discussion, group work, case study, and video materials. That addresses course objectives. Each student will have the time to develop an understanding of a person with IDD, and how individualized planning can facilitate social inclusion.

PSYC.4830 Dvptl Disabilities Fieldwork: Leadership & Advoc - Credits: 3

In this fieldwork course we explore standards for support and service provision within formal services and compare experiences in field placements with these standards, seeking to understand the forces that support of interfere with realizing best practices. The foundation for this blended learning course (half the classes meet in person, half online) will be 60 hours of fieldwork within a human service organization or educational setting for people with an intellectual/developmental disability. This course provides a critical examination of the nature of organizations and the impact of leadership and advocacy on the lives of people with disabilities through integrating course material with fieldwork experiences through presentation, discussion, group work, case study, and video materials.

PSYC.4860 Community Service Learning (1, 2, or 3 credits) (Formerly 47.486/586) - Credits: 1-3

Students will take an applied role in the community where they will have the opportunity to provide some form of meaningful service to individuals, groups or communities. Students will meet regularly with a designated faculty member on campus to consider their experiences in the context of current psychological thought. In some instances, the commitment to community service may extend over the course of a full year. Graded as Satisfactory or Unsatisfactory. 1, 2 or 3 credits. This course may be repeated but no more than 12 credits total from any combination of PSYC.4860, PSYC.4880 and PSYC.4910 may be counted toward the degree.

PSYC.4880 Research Service Learning (Formerly 47.488) - Credits: 1-3

Students will take an applied role in faculty supervised research where they will provide a meaningful contribution to a research program or particular study. Students will meet regularly with a designated faculty member to discuss the research process and rationale for relevant components of the project including literature review, research design, procedures, data collection, entry, and analysis. In some instances the commitment to research may extend over the course of a full year. Graded as Satisfactory or Unsatisfactory. 1, 2, or 3 credits. This course may be repeated but no more than 12 credits total from any combination of psy.4860, PSYC.4880, and PSYC.4910 may be counted toward the degree.

PSYC.4910 Directed Study: Psychology (Formerly 47.491) - Credits: 3

Through frequent consultation with the instructor, the student carries out the investigation of a particularly specialized area of interest. This course may be repeated, but no more than 12 credits from any combination of PSYC.486, PSYC.488, and PSYC.491 may be counted toward the degree.

PSYC.4920 Undergraduate Thesis in Psychology I - Credits: 3

For undergraduate students actively engaged in research leading toward the submission of a written thesis. Under faculty supervision, students will conceptualize and conduct an original, empirical study, refining and sharpening their research, presentation, and writing skills. A program of supervised work will be arranged between the student and a
faculty supervisor, leading to the completion of an introduction and literature review, research plan, and IRB proposal.

**PSYC.4930 Undergraduate Thesis in Psychology II** -
**Credits: 3**

For undergraduate students actively engaged in research leading toward the submission of a written thesis. Under faculty supervision, students will conceptualize and conduct an original, empirical study, refining and sharpening their research, presentation, and writing skills. A program of supervised work will be arranged between the student and a faculty supervisor, leading to the completion and presentation of a written thesis.

**PSYC.4960 Practicum in Psychology (Formerly 47.496)** - **Credits: 3**

A program of practical experience for Psychology majors only. Specific requirements vary, but the Practicum experience enables Junior and Senior level students to work and study in a variety of areas related to psychological practice and research (mental health agencies, community agencies and groups, work settings, schools, prisons, group homes, etc.). Students meet regularly as a class on campus with the designated instructor to discuss their experiences and to learn more about the settings in which psychologists practice and the challenges that psychologists confront. Practicum may be repeated for a maximum of nine credits. Graded Satisfactory or Unsatisfactory. (Field Placement Required)

**PSYC.6921 Directed Study in Applied Behavior Analysis I** - **Credits: 1-3**

This directed study will serve as a bridge course for students who are seeking certification as Board Certified Behavior Analysts (BCBA) and who have completed some or all coursework in one of UMass Lowell’s certificates in Applied Behavior Analysis, but do not have all of the required content hours to sit for the BCBA exam. The directed study will assist them in gaining mastery of a designated set of content hours that they are missing.
A minor in Criminal Justice will provide students with knowledge of the different components of the criminal justice system (the police, the courts, and corrections), and about the different stages in the criminal justice process. Students will also develop an understanding of the different etiological bases and patterns of crime and the relationship between the causes of crime and the social control apparatus. All criminal justice courses seek to instill critical thinking, the importance of ethical decision making and an understanding of diversity.

The minor in Criminal Justice requires six courses (18 credits), including four lower-level courses which are also required for majors.

### Required Courses (12 credits)

- CRIM.1010
  [The Criminal Justice System](https://www.uml.edu/catalog/courses/CRIM/1010)
- CRIM.1410
  [Introduction to Policing](https://www.uml.edu/catalog/courses/CRIM/1410)
- CRIM.1510
  [Introduction to Corrections](https://www.uml.edu/catalog/courses/CRIM/1510)
- CRIM.2210
  [Criminology](https://www.uml.edu/catalog/courses/CRIM/2210)

### Electives Courses (6 credits)

Choose two of the following upper-level courses:

- CRIM.3230
  [White Collar and Elite Deviance](https://www.uml.edu/catalog/courses/CRIM/3230)
- CRIM.3260
  [Hate Crime](https://www.uml.edu/catalog/courses/CRIM/3260)
- CRIM.3270
  [Violence in America](https://www.uml.edu/catalog/courses/CRIM/3270)
- CRIM.3420
  [Criminal Profiling](https://www.uml.edu/catalog/courses/CRIM/3420)
- CRIM.3430
  [Forensic Psychology](https://www.uml.edu/catalog/courses/CRIM/3430)
- CRIM.3600
  [Gender, Race, and Crime](https://www.uml.edu/catalog/courses/CRIM/3600)
- CRIM.3850
  [Crime and Mental Illness](https://www.uml.edu/catalog/courses/CRIM/3850)
- CRIM.3870
  [Criminal Mind and Behavior](https://www.uml.edu/catalog/courses/CRIM/3870)
- CRIM.3880
  [Criminal Psychopathology](https://www.uml.edu/catalog/courses/CRIM/3880)
- CRIM.4010
  [Substance Abuse and Crime](https://www.uml.edu/catalog/courses/CRIM/4010)
- CRIM.4220
  [Victimology](https://www.uml.edu/catalog/courses/CRIM/4220)
- CRIM.4770
  [Intimate Partner Violence](https://www.uml.edu/catalog/courses/CRIM/4770)
- CRIM.4780
  [Child Maltreatment](https://www.uml.edu/catalog/courses/CRIM/4780)

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**College of Fine Arts, Humanities & Social Sciences**

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A students catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.
American Studies

- General Option
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Thematic Option
  fall 2015 - spring 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Art

- Animation & Interactive Media Concentration
  fall 2017 and beyond
- Graphic Design Concentration
  fall 2015 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Studio Art Concentration
  fall 2022 and beyond

Composition for New Media

- fall 2017 and beyond
- fall 2019 - spring 2022

Criminal Justice

- General Option
  fall 2015 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Corrections Option
  fall 2016 and beyond

- Police Option
  fall 2016 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Homeland Security Option
  fall 2016 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Violence Option
  fall 2016 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Crime and Mental Health Option
  fall 2022 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Digital Media

- fall 2021 and beyond
Economics
- fall 2015 and beyond

English
- Literature Concentration
  fall 2021 and beyondfall 2015 - spring 2021
  fall 2010 - spring 2015
- Journalism & Professional Writing Concentration
  fall 2015 and beyond
  fall 2014 - spring 2015
- Creative Writing Concentration
  fall 2018 and beyond
  fall 2013 - spring 2015
- Theatre Arts Concentration
  fall 2015 and beyond
  fall 2010 - spring 2015

Graphic Design
- fall 2021 and beyond
- fall 2020 - spring 2021

History
- fall 2020 and beyond

Liberal Arts
- fall 2015 and beyond

Music Studies
- General Option fall 2022 and beyondfall 2018 - spring 2022
- Instrumental Option fall 2015 - spring 2018prior to fall 2015
- Voice Option fall 2015 - spring 2018prior to fall 2015

Music Performance
- Instrumental Option fall 2022 and beyondfall 2019 - spring 2022fall 2015 - spring 2019prior to fall 2015
- Voice Option fall 2022 and beyondfall 2019 - spring 2022fall 2015 - spring 2019prior to fall 2015

Music Business
- fall 2022 and beyond
- fall 2015 - spring 2022
- prior to fall 2015

Peace and Conflict Studies
- fall 2021 and beyond
- fall 2015 - spring 2021
- prior to fall 2015

Philosophy
- General Option
Political Science

- American Politics Concentration fall 2020 and beyond
- International Relations and Comparative Politics Concentration fall 2020 and beyond
- Law and Politics Concentration fall 2020 and beyond
- Political Communication and Public Opinion Concentration fall 2020 and beyond
- Sustainability and Environmental Politics Concentration fall 2020 and beyond

Political Science (prior to fall 2020)

- fall 2015 - spring 2020
- fall 2013 - spring 2015

Psychology

- General Concentration fall 2022 and beyondfall 2017 - spring 2022fall 2015 - spring 2017

Quantitative Economics

- fall 2022 and beyond

Sociology

- General Concentration fall 2016 and beyond
- Policy & Social Problems Concentration fall 2021 and beyondfall 2016 - spring 2021
- Racial Equity and Inclusion Concentration fall 2021 and beyond

Sound Recording Technology

- fall 2022 and beyond
Sample Degree Pathway for Criminal Justice - Crime and Mental Health Option

For students who entered fall 2022 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.1010</td>
<td>The Criminal Justice System (DCA)</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.2210</td>
<td>Criminology</td>
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<td>FAHS.1090</td>
<td>First Year Experience Seminar</td>
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Spring Semester

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<tr>
<td>MATH.2830</td>
<td>Introduction to Statistics (MATH), (QL)</td>
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Total 15/16

Sophomore Year

Fall Semester

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<td>Systemic Issues in Criminal Justice</td>
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Total 15/16

Spring Semester

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<tbody>
<tr>
<td>CRIM.3430</td>
<td>Forensic Psychology</td>
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### Criminal Justice/Social Sciences/Minor Elective

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<td>CRIM.3850</td>
<td>Crime and Mental Illness</td>
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<td>CRIM.3900</td>
<td>Criminal Justice Research Methods (IL), (SRE)</td>
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### Junior Year

#### Fall Semester

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<td>Criminal Mind and Behavior</td>
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<tr>
<td>CRIM.3880</td>
<td>Forensic Psychopathology</td>
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<td>CRIM.3950</td>
<td>Statistics in Criminal Justice</td>
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<td>CRIM.3970</td>
<td>Crime Mapping</td>
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</tr>
<tr>
<td>xxxx.3/4xxx</td>
<td>Social Sciences/Minor Elective</td>
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<tr>
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### Senior Year

#### Fall Semester

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<td>Criminal Justice Data Analysis</td>
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<td>CRIM.4010</td>
<td>Substance Abuse and Crime / Victimology</td>
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<td>CRIM.4220</td>
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### Spring Semester

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<th>Cr.</th>
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<tbody>
<tr>
<td>CRIM.4890</td>
<td>Capstone Seminar in Criminology and Criminal Justice (WOC), (CTPS), (AIL)</td>
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**Total Minimum Credits = 120**

1. Required for all entering freshmen; not required for those who transfer to UMass Lowell or into the Criminal Justice major.
2. Free electives must be from departments other than Criminal Justice.

**Notes:**

- Criminal Justice majors must maintain a 2.5 Criminal Justice GPA to remain in the major and an overall GPA of 2.2.
- Criminal Justice majors need a minimum of 36 credits and cannot exceed 60 credits in Criminal Justice.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum.
You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements. Current UMass Lowell students should be using their Advisement Report in SiS (http://www.uml.edu/enrollment/sis/default.aspx). If you need assistance, please contact your adviser.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

_Last updated: 7/27/2021_

**Sample Degree Pathway for Criminal Justice - Police Option**

For students who entered fall 2022 and beyond:

**Freshman Year**

**Fall Semester**

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
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<tr>
<td>CRIM.1010</td>
<td>Systemic Issues in Criminal Justice (DCA)</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.2210</td>
<td>Criminology</td>
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<td>FAHS.1090</td>
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<td>Arts and Hum. Persp.</td>
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<th>Cr.</th>
</tr>
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<tbody>
<tr>
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<tr>
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**Spring Semester**

<table>
<thead>
<tr>
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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
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<td>CRIM.1410</td>
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<td>3</td>
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<tr>
<td>CRIM.1510</td>
<td>Introduction to Corrections</td>
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<td>MATH.2830</td>
<td>Introduction to Statistics (MATH), (QL)</td>
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<td>Science with Lab Persp. (SCL)</td>
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**Sophomore Year**

**Fall Semester**

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<th>Cr.</th>
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<tbody>
<tr>
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**Spring Semester**

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<tr>
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### Junior Year

#### Fall Semester

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<tbody>
<tr>
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<tr>
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</tr>
<tr>
<td>xxxx.3/4xxx</td>
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### Senior Year

#### Fall Semester

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</table>

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Last updated: 7/27/2021

Sample Degree Pathway for Criminal Justice - General Option

For students who entered fall 2022 and beyond.

Freshman Year

Fall Semester

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<tr>
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<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
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<tr>
<td>CRIM.1010</td>
<td>The Criminal Justice System (DCA)</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.2210</td>
<td>Criminology</td>
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<tr>
<td>FAHS.1090</td>
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<td>Social Sciences Persp. (SS)</td>
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Total 16

Spring Semester

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<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
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</thead>
<tbody>
<tr>
<td>ENGL.1020</td>
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<tr>
<td>CRIM.1410</td>
<td>Introduction to Policing</td>
<td>3</td>
</tr>
<tr>
<td>CRIM.1510</td>
<td>Introduction to Corrections</td>
<td>3</td>
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<tr>
<td>MATH.2830</td>
<td>Introduction to Statistics (Math), (QL)</td>
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</tr>
<tr>
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</table>

Total 15

Sophomore Year

Fall Semester

<table>
<thead>
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<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>CRIM.2010</td>
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<tr>
<td>CRIM.2340</td>
<td>Criminal Law</td>
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</tr>
<tr>
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Total 16

Spring Semester

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<th>Cr.</th>
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<tbody>
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<td>CRIM.xxxx</td>
<td>Criminal Justice Elective3</td>
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<tr>
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### Junior Year

#### Fall Semester

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<tbody>
<tr>
<td>CRIM.3900</td>
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<td>xxxxx.xxxx</td>
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#### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>CRIM.4890</td>
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<tr>
<td>CRIM.3/4xxx</td>
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<tr>
<td>xxxxx.3/4xxx</td>
<td>Criminal Justice/Minor Elective</td>
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<tr>
<td>xxxxx.3/4xxx</td>
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<tr>
<td>xxxxx.xxxx</td>
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### Senior Year

#### Fall Semester

<table>
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<tr>
<th>Course#</th>
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<tbody>
<tr>
<td>CRIM.3980</td>
<td>Criminal Justice Data Analysis</td>
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</table>

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*Last updated: 7/27/2021*

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### Sample Degree Pathway for Criminal Justice - Homeland Security Option

**For students who entered fall 2022 and beyond.**

**Freshman Year**

**Fall Semester**

<table>
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<tr>
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<th>Course Name</th>
<th>Cr</th>
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<tr>
<td>ENGL.1010</td>
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<td>CRIM.1010</td>
<td>The Criminal Justice System (DCA)</td>
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<td>CRIM.2210</td>
<td>Criminology</td>
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<td>FAHS.1090</td>
<td>First Year Experience Seminar</td>
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<td>Arts and Hum. Persp. (AH)</td>
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<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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Total 16

**Spring Semester**

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<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
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<tr>
<td>CRIM.1410</td>
<td>Introduction to Policing</td>
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Total 15

**Sophomore Year**

**Fall Semester**

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<tbody>
<tr>
<td>CRIM.1150</td>
<td>Introduction to Homeland Security</td>
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<tr>
<td>CRIM.2340</td>
<td>Criminal Law</td>
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</tr>
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<td>Social Sciences Persp. (SS)</td>
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Total 15

**Spring Semester**

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<tr>
<th>Course#</th>
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<tbody>
<tr>
<td>CRIM.2010</td>
<td>Systemic Issues in Criminal Justice</td>
<td>3</td>
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<tr>
<td>CRIM.2480</td>
<td>Terrorism</td>
<td>3</td>
</tr>
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<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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<td>Course Name</td>
<td>Credits</td>
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<tr>
<td>CRIM.3900</td>
<td>Criminal Justice Research Methods (IL, SRE)</td>
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<td>CRIM.3950</td>
<td>Statistics in Criminal Justice</td>
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<tr>
<td>CRIM.3970</td>
<td>Crime Mapping</td>
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<td>CRIM.3480</td>
<td>Advanced Seminar in Weapons of Mass Destruction &amp; Terrorism</td>
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<tr>
<td>CRIM.3490</td>
<td>Intelligence &amp; National Security</td>
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</tr>
<tr>
<td>CRIM.3980</td>
<td>Criminal Justice Data Analysis</td>
<td>3</td>
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for details.

_Last updated: 7/09/2021_
CRIM.1010 The Criminal Justice System (Formerly 44.101) - Credits: 3

This course presents a brief history of the Criminal Justice System and an analysis of its structure and function. This course required of all CJ majors and is a prerequisite for all other courses in criminal justice. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

CRIM.1150 Introduction to Homeland Security (Formerly 44.115) - Credits: 3

This course will encompass the study and relationship between those entities and institutions necessary for the protection of the United States. Course instructional material will examine the components of Federal, State and Local Police Agencies, as well as the role of Private Security and Emergency Responders needed to facilitate the implementation of the Homeland Security Act. Particular attention will be focused on Policy, Plans and Procedures at governmental and community levels.

CRIM.1410 Introduction to Policing (Formerly 44.141) - Credits: 3

This course provides an examination of the historical development of police work with special emphasis on the conflicting role expectations facing police officer.

CRIM.1510 Introduction to Corrections (Formerly 44.151) - Credits: 3

This course provides an overview of the American correction system including the history of corrections, probation, incarceration, community corrections, the prison experience and release.

CRIM.2010 Systemic Issues in Criminal Justice - Credits: 3

This course is designed to introduce students to the latest innovations in the applications of new technological advances in the criminal justice system. Topic areas include an examination of the new technology of crime commission, and the corresponding new technology of crime control strategies. Our focus will be on the application of both "hard" technology (e.g. equipment, hardware, devices, etc.) and "soft" technology (e.g. computer software programs, information systems, classification devices, and other problem-solving applications) in each of the following areas: crime prevention, police, courts, institutional corrections, community corrections and the private sector.

CRIM.2030 Technology and the Criminal Justice System (Formerly 44.203) - Credits: 3

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CRIM.2120 Weapons of Mass Destruction (Formerly 44.212) - Credits: 3

This course will center on Weapons of Mass Destruction (WMD) and their potential use by terrorists to obtain their goals. We will explore the origins, development and weaponization of Chemical, Biological, Nuclear and Radiological Systems and Devices. The course content is designed particularly for the First Responder to such incidents of WMD. The class will focus on the preparation and execution of plans and policies to counter this threat.

CRIM.2130 Emergency Management (Formerly 44.213) - Credits: 3

The purpose of this course is to introduce the student to the various ways in which a corporation and local municipality can plan for a disaster before it occurs. Topics covered include risk identification and assessment of multi-hazards whether natural and man-made, violence in the workplace, development of crisis and disaster incident management programs, and business/agency continuation planning.

CRIM.2210 Criminology (Formerly 44.221) - Credits: 3

The definition and nature of crime, criminal statistics, and theories of crime causation are included. Required of all CJ majors.

CRIM.2230 Crime and the Media (Formerly 44.223) - Credits: 3

This course provides an overview about how the media portrays crime and its impact on the general public, crime, and victims and offenders.

CRIM.2330 Criminal Procedure (Formerly 44.233) - Credits: 3

Examines the rules that govern the everyday operation of the
CRIM.2340 Criminal Law (Formerly 44.234) - Credits: 3

The historical origins and development of criminal law from the early common law to contemporary decisions and statutes. Constitutional and statutory factors as they pertain to criminal responsibility, capacity, crimes against persons and property, defenses to criminal charges and sentences. Sections of the Massachusetts Criminal Code and other statutes will be covered where applicable.

CRIM.2410 Physical Security (Formerly 44.241) - Credits: 3

The basic principles of physical security with emphasis on tailoring these principles to the protection of specific operations and facilities. Proper planning, appropriate design, and use of modern techniques and devices to enhance security while reducing costs are discussed.

CRIM.2430 Criminalistics I (Formerly 44.243) - Credits: 3

This laboratory course will cover basic procedures in arrest, search and seizure, and the gathering and evaluation of evidence as to admissibility, weight, and competence.

CRIM.2440 Criminalistics II (Formerly 44.244) - Credits: 3

This course is a continuation of Criminalistics I. It is intended to familiarize the student with various types of physical evidence that can be found at the more violent crime scenes. Methods of identification, preservation, collection and analysis of physical evidence relating to specific criminal activities shall be stressed. Topics shall include Bloodstain Pattern Analysis, DNA Typing, Crime Scene Reconstruction, Point of Origin Determination and evidence associated with Death Investigations, Sexual Assaults, Bombings, Arsons, Motor Vehicle Homicides, Robberies and Burglaries.

CRIM.2480 Terrorism (international and domestic) (Formerly 44.248) - Credits: 3

This course acquaints the Criminal Justice student with the concept of terrorism at both the international and domestic levels. Topics include the history of terrorism, terrorism today and terrorism in the future. Counter measures taken to respond to terrorist threats are also examined.

CRIM.2610 Juvenile Delinquency (Formerly 44.261) - Credits: 3

An examination of causative factors in the development of youthful offenders and the development and philosophy behind treatment and rehabilitative practices.

CRIM.2800 Criminal Justice Ethics (Formerly 44.280) - Credits: 3

CRIM.2910 Short Study Abroad: Selected Topics (Formerly 44.291) - Credits: 6

This is a short study abroad course, usually 3 weeks in duration. Topic and location vary.

CRIM.3120 Security Management (Formerly 44.312) - Credits: 3

Addresses the basic interdisciplinary principles of security management including planning, budgeting, organizing, staffing, directing, and controlling. This course will also cover marketing security services to management, risk management, civil and criminal liability, and labor relations. Each aspect of the course is designed to prepare security managers to face the new challenges as broader and more cost-effective protection is required with fewer resources. The course will also bring about greater awareness and understanding of the various options available in security and loss control. It will identify a number of risk areas and outline various deterrent and preventative methods.

CRIM.3230 White Collar and Elite Deviance (Formerly 44.323) - Credits: 3

This course will provide an overview of white collar crime including white collar, corporate, occupational, workplace, and organized crime.

CRIM.3260 Hate Crime (Formerly 44.326) - Credits: 3

This course examines prejudice as a motivation for criminal behavior. The criminological theory for hate crime is reviewed,
as well as historical perspectives of this crime category.

CRIM.3270 Violence in America (Formerly 44.327) - Credits: 3

This course provides students with an in-depth analysis of the courses, context, and control of a wide range of violent crimes.

CRIM.3420 Criminal Profiling (Formerly 44.342) - Credits: 3

This course provides an overview of the development and character of the many types of offenders who become criminal psychopaths. The course explores the various methods used in classifying and predicting criminal behavior derived from the field of Criminology, Psychology and Forensic Science.

CRIM.3430 Forensic Psychology (Formerly 44.343) - Credits: 3

This course examines the application of psychological theories, principles, and research to issues of concern to the criminal justice system.

CRIM.3450 The Role of Women in Terrorism and War - Credits: 3

This interdisciplinary course will examine the gendered processes of war, sub-state violence, counter-terrorism/insurgency and conflict resolution. More specifically, we will review relevant conceptual and theoretical frameworks which focus on the relationships between gender, armed conflict and conflict resolution. In addition, we will examine the strategies used by women’s and feminist movements to promote specific security related policy. The class will explore cases from Africa, the Americas, Asia, Europe, and the Middle East and North Africa.

CRIM.3460 Critical Infrastructure Protection (Formerly CRIM 346) - Credits: 3

This course provides an overview on critical infrastructure and the protection. The course will cover the concept and components of the country’s critical assets and threat environment; federal government plans and how public-private partnership protection efforts are leveraged; and strategies and methods of protecting critical infrastructure.

CRIM.3470 Police Innovations (Formerly 44.347) - Credits: 3

This course is concerned with contemporary efforts to change police agencies, particularly in the United States.

Contemporary reform revolves mainly around what we now know as “community policing” and this course will dwell at some length on these initiatives. Other innovations, some of which may complement community policing, and all of which are narrower in scope, are also considered.

CRIM.3480 Advanced Seminar on Weapons of Mass Destruction and Terrorism (Formerly 44.348) - Credits: 3

This course will examine the scientific and technological details of chemical, biological, radiological and nuclear (CBRN) weapons; the proliferation of these weapons and international CBRN prevention efforts (like the Nuclear Nonproliferation Treaty, the Chemical Weapons Convention, and the Biological Weapons Convention); and the threat of terrorist groups seeking to acquire and use CBRN weapons, and explore ways to improve our response to this complex threat.

CRIM.3490 Intelligence & National Security (Formerly 44.349) - Credits: 3

This course is designed to provide students with an understanding of how the U.S. intelligence community functions, where it fits in the policy making and law enforcement systems of U.S. democracy, and its role in the protection of national security.

CRIM.3500 Institutional Correction (Formerly 44.350) - Credits: 3

This course provides an in-depth examination of the history, function, structure, and operation of American adult and juvenile correctional institutions.

CRIM.3510 Community-Based Corrections (Formerly 44.351) - Credits: 3

A comprehensive review of community-based sanctions and community-based, early-release mechanisms. In addition to traditional probation and parole reviews, "new" intermediate sanctions such as electronic monitoring, intensive supervision, boot camps, day fines, day reporting centers, and community service sentences.

CRIM.3520 Decision Making Under Uncertainty - Credits: 3

In this course we explore the psychological process of making (or not making) high-stakes decisions in a range of situations. Most theories of decision making (in police, business, medical and ethical contexts) emphasize selecting the "best" course of action, yet the reality is that, in the real world, there is not
always a 'best' option. Most options are high-risk and most carry negative consequences. In such instances decisions involve choosing the least-worst outcome. In this course, and drawing upon the decades of psychological research in areas of decision making (in high-and-low stakes environments), and touching on cognitive, social and neurological research we look at the psychological process of making decisions in range of high-stakes environments.

CRIM.3600 Gender, Race, and Crime (Formerly 44.360) - Credits: 3
This course examines gender and racial implications of criminal laws, criminal justice practices and programs will be examined. The position of women and racial/ethnic minorities will be assessed from the different perspectives of victims, offenders, and criminal justice practitioners.

CRIM.3650 Hate Crimes (Formerly 44.365) - Credits: 3
Hate crimes illustrate bigotry plus criminal acts. This course examines prejudice as a motivation for criminal behavior. The criminological theory for hate crime is reviewed, as well as historical perspectives of this crime category. This is a rich and comprehensive exploration that begins with understanding the psychology of prejudice and ends with reviewing genocide as a mass hate crime.

CRIM.3660 Miscarriages of Justice - Credits: 3
This course will provide a critical analysis of our Criminal Justice system, focusing specifically on policies and practices that lead to errors and unjust outcomes. Students will also explore the factors that contribute to miscarriages of justice, and the impacts on victims, their families, and society. Socio-political and socio-economic factors that contribute to miscarriages of justice will be specifically addressed.

CRIM.3730 Contemporary Issues in Policing (Formerly 44.373) - Credits: 3
This course will explore a number of fundamental issues relevant to contemporary public police in America. Such issues could include, but are not limited to: the impact of police on crime and disorder; police discretion and its control; legitimacy and public support; police culture; the changing role of police in society.

CRIM.3800 Selected Topics in Criminal Justice (Formerly 44.380) - Credits: 3
An advanced course of study and examination of a variety of current issues and topics in criminal justice. Students without a sufficient background in criminal justice courses should not attempt this course. Subject matter to be announced in advance. Visit the current semester schedule on the Continuing Studies website for more details.

CRIM.3850 Crime and Mental Illness (Formerly 44.385) - Credits: 3
This course examines the realities and myths surrounding the involvement of individuals with mental illness in the criminal justice system. Material from criminal justice and psychology will be examined, with emphasis on service models that foster collaboration between mental health professionals, law enforcement, the courts, and corrections.

CRIM.3870 Criminal Mind and Behavior (Formerly 44.387) - Credits: 3
This course will explore the psychological dimensions of criminal thinking and behavior. The course will cover the psychological origins and types of crime, the multidimensional influences on criminal behavior, developmental criminal pathways, diagnoses, assessment and treatment approaches and a description of the continuum of psychopathic behavior.

CRIM.3880 Forensic Psychopathology (Formerly 44.388) - Credits: 3
This course addresses psychopathology in forensic settings, providing students with an integrative approach to understanding the multiple causes of psychological problems and disorders of adult and juvenile offenders as well as crime victims including biological, social, emotional, cognitive, and behavioral influences.

CRIM.3900 Criminal Justice Research Methods (Formerly 44.390) - Credits: 3
An introduction to research methods for the criminal justice professional including terminology, standard methodologies, and elementary statistics. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

CRIM.3950 Statistics in Criminal Justice (Formerly 44.395) - Credits: 3
This course is an extension of concepts learned in 44.390 (Introduction to Criminal Justice Research Methods). Statistics will be utilized as a mathematical language for interpreting the interrelation of social forces impacting criminality and deviance. The course will focus on how various statistics are calculated, but more importantly, the meaning of these figures for criminal justice scholars and practitioners will be discussed.
CRIM.3970 Crime Mapping (Formerly 44.397) - Credits: 3
This course examines the use of new technologies to analyze crime patterns and develop crime prevention strategies. Students study theories that explain the geographic distribution of crime and learn how to use Geographic Information Systems to study crime in ways that draw upon theory as well as how to apply GIS techniques in the law enforcement and corrections fields.

CRIM.3980 Criminal Justice Data Analysis (Formerly 44.398) - Credits: 3
The student is introduced to computer software packages (i.e. SPSS) used to analyze large quantitative data sets common in criminal justice/criminology. This course is seen as the capstone to the research methods/technology component of the major, and is intended for upper level students, especially those preparing for graduate study.

CRIM.4010 Substance Abuse and Crime (Formerly 44.401) - Credits: 3
Covers the problems posed by substance use/abuse and examines the role and impact of the legal, criminal justice, and public health systems, as well as current treatment/intervention approaches.

CRIM.4180 American Courts and Judicial Process (Formerly CRIM.418) - Credits: 3
This course will study the organization of and the processes employed by American Courts in an intensive participation format. Traditional text lessons on the U.S. Court system will be supplemented by simulations and mock trial problems. Using this two track approach, students will learn about the courts and simultaneously develop the analytical, critical reasoning and public speaking skills used in the Judicial system.

CRIM.4220 Victimology (Formerly 44.422) - Credits: 3
This course examines the patterns of victimization, the characteristics and lifestyles of crime victims, and the impact of their victimizations. The treatment of victims by the criminal justice system will be examined along with possible reforms in these approaches.

CRIM.4770 Intimate Partner Violence (Formerly 44.477) - Credits: 3
This course examines the causes and consequences of domestic violence and the latest research regarding the responses of the criminal justice system.

CRIM.4780 Child Maltreatment (Formerly 44.478) - Credits: 3
This course introduces students to empirical findings and theoretical perspectives concerned with the maltreatment of Children and youth. One of the major course goals is to balance the view of children and youth in the criminal justice system by focusing of their victimization instead of exclusively on their offending behavior.

CRIM.4890 Capstone Seminar in Criminology & Criminal Justice (Formerly 44.489) - Credits: 3
This course is designed to provide criminal justice majors with a capstone experience emphasizing integration of knowledge acquired in previous courses on the causes of criminal behavior and responses to it, particularly the institutions, policies and practices of the criminal justice system. Students engage in the development and production of a senior level research paper grounded in relevant criminology and criminal justice literature.

CRIM.4900 Criminal Justice Honors Seminar (Formerly 44.490) - Credits: 3
Specific practice in the definition, design, and execution of a research project, and an analysis of the impact of contemporary criminal justice research on policy development.

CRIM.4910 Directed Study - Criminal Justice (Formerly 44.491) - Credits: 3
CRIM.4920 Short Directed Study (Formerly 44.492) - Credits: 1
This course is designed as an independent study of a subject with Chair’s permission.

CRIM.4930 Issues in Technology and Security (Formerly 44.493) - Credits: 3
An examination of the causes and consequences of computer crime as well as the criminal justice system’s response to the problem.

CRIM.4950 Criminal Justice Field Studies (Formerly 44.495) - Credits: 6
This is an intense internship program for Criminal Justice majors which requires approval by the Department Chair.
CRIM.4960 Criminal Justice Internship (Formerly 44.496) - Credits: 3

Assigned fieldwork under the supervision and with the permission of the instructor assigned to the course. The purpose is to broaden the educational experience of pre-service students in law enforcement, probation, and correctional agencies within this area. This course is designed to provide a correlation of theoretical knowledge with practical experience in an area of particular interest to the student.

CRIM.4970 Terrorism Internship - Credits: 3

This course is a semester long internship with the Center for Terrorism &Security Studies (CTSS) where students will work on one or more of the center's research projects. After an initial period of training in data collection and coding, CTSS interns will then work under the supervision of Center faculty and staff.
College of Fine Arts, Humanities & Social Sciences

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A student’s catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

American Studies

- General Option
  - fall 2015 and beyond
  - fall 2012 - spring 2015
- Thematic Option
  - fall 2021 and beyond
  - fall 2015 - spring 2021

Art

- Animation & Interactive Media Concentration
  - fall 2017 and beyond
- Graphic Design Concentration
  - fall 2015 - spring 2020
- Studio Art Concentration
  - fall 2022 and beyond

Composition for New Media

- fall 2022 and beyond
- fall 2019 - spring 2022

Criminal Justice

- General Option
  - fall 2022 and beyond

Corrections Option

- fall 2016 and beyond
- fall 2015 - spring 2016
- fall 2012 - spring 2015

Police Option

- fall 2022 and beyond
- fall 2016 - spring 2022
- fall 2015 - spring 2016
- fall 2012 - spring 2015

Homeland Security Option

- fall 2022 and beyond
- fall 2016 - spring 2022
- fall 2015 - spring 2016
- fall 2012 - spring 2015

Violence Option

- fall 2016 and beyond
- fall 2015 - spring 2016
- fall 2012 - spring 2015

Crime and Mental Health Option
Digital Media
- fall 2021 and beyond

Economics
- fall 2015 and beyond

English
- Literature Concentration
  fall 2021 and beyond
  fall 2015 - spring 2021
- Journalism & Professional Writing Concentration
  fall 2015 and beyond
- Creative Writing Concentration
  fall 2018 and beyond
- Theatre Arts Concentration
  fall 2015 and beyond

History
- fall 2020 and beyond
- fall 2015 - spring 2020

Liberal Arts
- fall 2015 and beyond

Music Studies
- General Option
  fall 2022 and beyond
- Instrumental Option
  fall 2015 - spring 2018
- Voice Option
  fall 2022 and beyond

Music Performance
- Instrumental Option
  fall 2022 and beyond
- Voice Option
  fall 2022 and beyond

Music Business
- fall 2022 and beyond
- fall 2015 - spring 2022
- prior to fall 2015

Peace and Conflict Studies
- fall 2021 and beyond
- fall 2015 - spring 2021
Philosophy

- General Option
  - fall 2015 and beyond

- Communications & Critical Thinking Option
  - fall 2015 and beyond

- Philosophy & Religious Studies Option
  - fall 2015 and beyond

Political Science

- American Politics Concentration
  - fall 2020 and beyond

- International Relations and Comparative Politics Concentration
  - fall 2020 and beyond

- Law and Politics Concentration
  - fall 2020 and beyond

- Political Communication and Public Opinion Concentration
  - fall 2020 and beyond

- Sustainability and Environmental Politics Concentration
  - fall 2022 and beyond

Political Science (prior to fall 2020)

- fall 2015 - spring 2020
- fall 2013 - spring 2015

Psychology

- General Concentration
  - fall 2022 and beyond

- Behavior Analysis Concentration
  - fall 2022 and beyond

- Community Social Psychology Concentration
  - fall 2022 and beyond

- Clinical Psychology Concentration
  - fall 2022 and beyond

- Developmental Disabilities Concentration
  - fall 2022 and beyond

- Health Psychology Concentration
  - fall 2022 and beyond

Quantitative Economics

- fall 2022 and beyond

Sociology

- General Concentration
  - fall 2016 and beyond

- Policy & Social Problems Concentration
  - fall 2021 and beyond
Sample Degree Pathway for Sociology - Policy & Social Problems Concentration

For students who entered fall 2021 and beyond.

**Freshman Year**

**Fall Semester**

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**Spring Semester**

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Total: 16

**Sophomore Year**

**Fall Semester**

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<td>Language 3 &amp; Culture</td>
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Total: 16

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- **Beyond Fall 2016 - Spring 2021**
  - [Racial Equity and Inclusion Concentration](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) fall 2021 and beyond
  - Sound Recording Technology
    - fall 2022 and beyond
    - fall 2019 - spring 2022
    - fall 2015 - spring 2019
    - prior to fall 2015
  - World Languages and Cultures
    - French Option
      - fall 2018 and beyond fall 2015 - spring 2018
    - French/Spanish Option
      - fall 2018 and beyond fall 2015 - spring 2018
    - Italian/Spanish Option
      - fall 2018 and beyond fall 2015 - spring 2018
    - Spanish Option
      - fall 2018 and beyond fall 2015 - spring 2018
- **World Languages and Cultures**
  - French Option
    - fall 2018 and beyond fall 2015 - spring 2018
  - French/Spanish Option
    - fall 2018 and beyond fall 2015 - spring 2018
  - Italian/Spanish Option
    - fall 2018 and beyond fall 2015 - spring 2018
  - Spanish Option
    - fall 2018 and beyond fall 2015 - spring 2018
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**Spring Semester**

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<td>Contemporary Social Theory</td>
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<td>Quantitative Methods for Social Research (IL), (QL)</td>
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**Senior Year**

**Fall Semester**

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**Spring Semester**

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**Total Minimum Credits = 120**

1Required for entering Freshmen.

2Policy and Social Problems Electives:

Students take three Policy and Social Problems electives. Two of the electives must be at the 3000 level.

- SOCI.2050 ([https://www.uml.edu/catalog/courses/SOCI/2050](https://www.uml.edu/catalog/courses/SOCI/2050))
  Public Sociology
- SOCI.2130 ([https://www.uml.edu/catalog/courses/SOCI/2130](https://www.uml.edu/catalog/courses/SOCI/2130))
  Sociology of Immigration
- SOCI.2170 ([https://www.uml.edu/catalog/courses/SOCI/2170](https://www.uml.edu/catalog/courses/SOCI/2170))
  Social Movements
- SOCI.2450 ([https://www.uml.edu/catalog/courses/SOCI/2450](https://www.uml.edu/catalog/courses/SOCI/2450))

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**Junior Year**

**Fall Semester**

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<td>SOCI.3xxx (<a href="https://www.uml.edu/catalog/courses/SICI">https://www.uml.edu/catalog/courses/SICI</a>)</td>
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**Spring Semester**

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Introduction to Labor Studies

- **SOCL.3200**
  - Community Service
  - [https://www.uml.edu/catalog/courses/socl/3200](https://www.uml.edu/catalog/courses/socl/3200)

- **SOCL.3450**
  - Urban Sociology
  - [https://www.uml.edu/catalog/courses/socl/3450](https://www.uml.edu/catalog/courses/socl/3450)

- **SOCL.3620**
  - Social Welfare Policy
  - [https://www.uml.edu/catalog/courses/socl/3620](https://www.uml.edu/catalog/courses/socl/3620)

- **SOCL.4040**
  - Learning from the Field
  - [https://www.uml.edu/catalog/courses/socl/4040](https://www.uml.edu/catalog/courses/socl/4040)

- **SOCL.5150**
  - Social Policy and Inequalities
  - [https://www.uml.edu/catalog/courses/socl/5150](https://www.uml.edu/catalog/courses/socl/5150)

3 Choose one from the following:

- **SOCL.4040**
  - Learning from the Field
  - [https://www.uml.edu/catalog/courses/socl/4040](https://www.uml.edu/catalog/courses/socl/4040)

- **SOCL.4050**
  - Feminist Methodologies
  - [https://www.uml.edu/catalog/courses/socl/4050](https://www.uml.edu/catalog/courses/socl/4050)

- **SOCL.4840**
  - Internship I
  - [https://www.uml.edu/catalog/courses/socl/4840](https://www.uml.edu/catalog/courses/socl/4840)

- **SOCL.4950**
  - Thesis in Sociology
  - [https://www.uml.edu/catalog/courses/socl/4950](https://www.uml.edu/catalog/courses/socl/4950)

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_Last updated: 8/04/2021_

**Sample Degree Pathway for Sociology - Racial Equity & Inclusion Concentration**

For students who entered fall 2021 and beyond.

**Freshman Year**

**Fall Semester**

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH</td>
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## First Year Experience Seminar

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<td>WLxxxx</td>
<td>Language 1 &amp;Culture</td>
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## Spring Semester

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<tr>
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<td>Classical Social Theory (SRE)</td>
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<tr>
<td>SOCI.3xxx</td>
<td>Racial Equity and Inclusion Elective2</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
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<tr>
<td>xxxx.xxxxxx</td>
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<td>Language 4 &amp;Culture or World Ready Elective4</td>
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## Junior Year

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<td>SOCI.4020</td>
<td>Quantitative Methods for Social Research (IL), (QL)</td>
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<tr>
<td>xxxx.xxxxxx</td>
<td>STEM Persp. (STEM)</td>
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Senior Year

Fall Semester

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Spring Semester

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</table>

Total Minimum Credits = 120

1Required for entering Freshmen.

2Racial Equity and Inclusion Electives:

- SOCI.2004
- SOCI.3440
  (https://www.uml.edu/catalog/courses/SOCI/3440) Race, Gender and Film
- SOCI.3520
  (https://www.uml.edu/catalog/courses/SOCI/3520) Latino/as in the United States
- SOCI.3550
  (https://www.uml.edu/catalog/courses/SOCI/3550) Black Experience in American Life
  - SOCI.3740
    (https://www.uml.edu/catalog/courses/SOCI/3740) Race and Families

3Choose one from the following:

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  (https://www.uml.edu/catalog/courses/SOCI/4040) Learning from the Field
- SOCI.4050
  (https://www.uml.edu/catalog/courses/SOCI/4050) Feminist Methodologies
- SOCI.4840
  (https://www.uml.edu/catalog/courses/SOCI/4840) Internship I
- SOCI.4950
  (https://www.uml.edu/catalog/courses/SOCI/4950) Thesis in Sociology

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catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

for details.

*Last updated: 8/05/2021*
SOCI.1010 Introduction to Sociology (Formerly 48.101) - Credits: 3
Serves as the basic course in sociology. Emphasis is directed at the ways in which social institutions such as government, schools, the economy, social class, and the family develop and influence our lives. It is concerned not only with presenting various ways to understand our relationship to society but also with ways to change it. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

SOCI.1020 Social Anthropology (Formerly 48.102) - Credits: 3
Using the comparative approach to society, this course examines several distinct cultures as a means of understanding both the universal constants and the variations in human societies.

SOCI.1110 A Novel Approach to Sociology (Formerly 48.111) - Credits: 3
Examines major sociological themes through analysis of literature, primarily major works of fiction.

SOCI.1120 Sociology Goes to the Movies (Formerly 48.112) - Credits: 3
This course is designed to give students the opportunity to survey primary sociological texts and view films, offer commentary on and analysis of social behavior.

SOCI.1150 Social Problems (Formerly 48.115) - Credits: 3
This entry level course uses the core concept of social problems to introduce basic social science reasoning-how social scientist define research questions, develop systematic methods to study them, gather evidence, search for pattern, in link findings to existent knowledge,. Cases provide opportunities to discuss how private problems develop into public issue, illustrating sociology as a discipline that evolves in response to social conflicts and inequalities. The course also meets General Education requirements for Ethics and Diversity.

SOCI.2004 Introduction to Multiracial Studies - Credits: 3
What does is mean to be biracial or multiracial? How is being bi/multiracial shaped by other identities? We will explore these important questions. You will also learn about the experiences, identities, and unique struggles of bi/multiracials. You will develop the analytical skills to challenge rigid racial binary. Bi/multiracial Americans are a growing population in the United States, and therefore, you are statistically more likely to befriend, date, work with and/or parent a bi/multiracial American than any other generation in American history. Consequently, this course was developed to enhance your racial consciousness by acknowledging the complexities of racial inequality in a population that is often assumed to be evidence of racial harmony in America.

SOCI.2010 Foundations of Social Analysis (Formerly 48.201) - Credits: 3
This intermediate-level class deepens students’ analytical skills beyond intro level preparing for more abstract work in Theory and Methods courses. It also prepares students for more complex integration of theory, methods and issue content in 300 level courses. This course will attend to developing students’ ability to recognize, and write social science research papers.

SOCI.2050 Public Sociology (Formerly 48.205) - Credits: 3
Public sociology includes sociological initiatives targeting non-university audiences and serving the public good. This course will 1) introduce and critique the various conceptualizations of public sociology linking them to broad schools of sociological theory; 2) explore alternative field models and methods, preparing students for field projects in future semesters; and 3) expose students to sociological practitioners and practices compatible with the mission of the university and department. From a liberal arts perspective, the course stresses critical thinking and communication skills.

SOCI.2100 Sociology of Food (Formerly 48.210) - Credits: 3
This course is about Sociology of food exploring the connection between food, society and culture. Our food choices are influenced by age, gender, ethnicity, class and religion. History of food and methods of food production contribute to understanding of social relations among individuals and social changes in society. This course will examine 1. role of food in society, culture and change, 2. changes in food production from simple to complex societies and 3. problems associated with new systems of food production locally and globally.

SOCI.2110 Sociology of American Education (Formerly 48.303/SOCI.3030) - Credits: 3
Course introduces students to ongoing debates in the field of Sociology regarding the American educational system, its
structures and functions and how it relates to issues of inequality by race, class and gender. Students are expected to explore, examine and evaluate the current issues relating to the system of education in the United States.

SOCI.2120 Cultures of the World (Formerly 48.212) - Credits: 3

Focuses on a different country or region each time it is given. Students examine the traditional culture, recent history, economic development, class structure, and international relations of the area covered.

SOCI.2130 Sociology of Immigration (Formerly 48.307/SOCI.3070) - Credits: 3

The United States is frequently described as a country with a proud history of immigration. As a result, citizens and residents of the U.S. often identify their home as a nation of people who make up a melting pot country. While useful and insightful, the melting pot metaphor requires comparison with additional explanations of immigration and immigrant experiences. In order to provide deeper comprehension of the topic matter, this course offers sociological examination of immigration processes, laws, and debates. Three areas compose the main portion of class content: historical accounts and theories, legislation, and the social, economical, and political experiences of immigrants.

SOCI.2140 Sociology of Sports (Formerly 48.340/SOCI.3400) - Credits: 3

Examines the history of modern sports at the amateur and professional levels and international competition. The impact of race, sex, economics, and politics on the institution of sports will also be examined.

SOCI.2150 Peacemaking Alternatives (Formerly 48.215) - Credits: 3

Examines various positive alternatives to war and violence, including disarmament, nonviolence, conflict resolution, and the United Nations. Students do volunteer work with an activist agency or interview an activist. The course stresses the historical and contemporary role of peace movements and allied social-change movements such as feminism, civil rights and environmentalism.

SOCI.2160 Sociology of War and Peace (Formerly 48.216) - Credits: 3

The purpose of this course is to examine critically the social forces that contribute to war, war’s social consequences, and the possibilities for creating a more peaceful world.

SOCI.2170 Social Movements (Formerly 48.382/SOCI.3820) - Credits: 3

Considers organized action undertaken to alter the social position of a group. Organization, techniques of action, motivation of participants, and group ideologies are studied. Materials from historical, social, psychological, and sociological sources are used.

SOCI.2200 Self-Assessment and Career Development (Formerly 48.220) - Credits: 3

Studies the meaning of work in our society. Class participants will assess their own life experiences and develop plans to integrate interests, values, and abilities into meaningful and realistic life/work options.

SOCI.2250 Sociology of Disability (Formerly 48.225) - Credits: 3

This course is organized around several key questions that are used to study the concepts of disability and ability from a variety of sociological and interdisciplinary perspectives. Specifically, the course explores representations of disability in popular culture and medical discourses to discuss disability and ability as social constructs. By looking at various literary and cultural representations, this course investigates constructions of the disabled and abled body, how this becomes politicized, and the implications of these constructions.

SOCI.2310 Sociology of Families (Formerly 48.231) - Credits: 3

This course uses a sociological approach to understand family forms, practices, and controversies in contemporary society, with particular emphasis on families in the United States. We will look closely at how family experiences and opportunities have changed over time, and also how they vary by gender, age, class, race/ethnicity and sexual orientation. What functions do families perform in modern society? How are they changing? How do these changes affect our lives?

SOCI.2340 Race and Ethnicity (Formerly 48.234) - Credits: 3

This course locates and studies the sociological dynamics of race and ethnic relations in the United States as it pertains to all groups. The course material presents theories and models that explain periods of conflict and cooperation between diverse sets of people. While providing some historical background, the course focuses primarily on recent and contemporary situations.
SOCI.2350 Digital Inequalities - Credits: 3

Digital sociology is broadly interested in how (1) social actors use technology in everyday life and (2) technology shapes social processes, especially social problems. This course is a sociological exploration of the development and evolution of racial and gender inequalities online, as well as the implications of racism and sexism online on groups and society.

SOCI.2360 Climate Crisis and Society (Formerly 48.236) - Credits: 3

Focusing on case studies of recent and pending environmental disasters, this course will trace how political, social, economic and cultural arrangements and choices contribute to environmental catastrophes and their resolution. In order to identify possibilities for agency, students will play several environmental games in which they will assume roles in the global economy, governmental and civil society to identify possibilities for agency. As a final project, students will describe a recent disaster identifying both structures that create environmental stresses and the options that might exist for structural changes. The project is intended to develop both critical thinking and communication skills.

SOCI.2400 Sociology of Gender (Formerly 48.240) - Credits: 3

This course is an interdisciplinary introduction to the field of gender studies. A variety of topics are presented, such as gender stratification, work and family, sexual identities, media representations of women and men, women's movement, and violence against women. Feminist theories and methods are also introduced.

SOCI.2450 Introduction to Labor Studies (Formerly 48.245) - Credits: 3

This foundational course has two overarching learning objectives: (1) to give students basic empirical knowledge and analytical tools to understand the context of work in the United States at the dawn of the twenty-first century and (2) to give students an understanding of how labour unions work, what has been their impact historically, and what their role is in contemporary society. The course will be explicitly interdisciplinary, drawing on readings from history, sociology, economics, political science, and psychology to offer and introduction to understanding work and labor through and analytic lens. In addition, the course will include a service-learning component in collaboration with the UML Labor Education Program.

SOCI.2550 Sociology of Deviance (Formerly 48.255) - Credits: 3

Analysis of how social institutions define and respond to various forms of social deviance, from individual mental illness to gang violence to illegal acts by governments and corporations. Attention will be paid to the construction and management of deviant identities, the role played by social status, and the social importance of institutions of social control.

SOCI.2560 Political Sociology (Formerly 48.256) - Credits: 3

Focuses on the development and use of power in modern society. Emphasis is placed on the relationship of American political institutions to economic institutions, to social class, and to supporting ideologies.

SOCI.2700 Self and Society (Formerly 48.270) - Credits: 3

An examination of the relationship between individuals and the social world around them. The course examines the underlying structures that pattern human interaction. Topics include the social construction of the self, the construction of social reality, and the sociology of emotions, among others.

SOCI.2710 Sociology of Work (Formerly 48.371 and SOCI.3710) - Credits: 3

In the United States, work is a fundamental part of people's identities, consumes huge amounts of our time and effort, is a vital part of our economic and social development, and is linked inextricably to gender, racial-ethnic, and class inequalities. This course will take a sociological perspective, challenging students to take a step back and look analytically at work, something with which most of us are intimately familiar.

SOCI.2760 Sociology of the Gun (Formerly 48.276) - Credits: 3

This course examines the social impact of guns on the American psyche, from deer hunters and intergenerational family bonds to street gangs and broken families, from collectors and recreational users to hospital trauma. Self-defense issues are discussed within the context of the Second Amendment. The conflict between pro-gun and anti-gun special interest groups and the evolution of an American gun culture will be studied.

SOCI.2800 Drugs and Society (Formerly 48.280) - Credits: 3

This course is designed to introduce students to the cultural and poplitical qualities of drugs in society. The course provides
a historical and cross-cultural overview of the use of organic and simple processed substances, as well as a history of drug policy in the United States.

**SOCI.3010 Sociology of Human Rights (Formerly 48.301) - Credits: 3**

Examines the politically divergent definitions of rights and freedoms. Attention will be paid to the activities of international human rights organizations to the human rights policies of the major powers. Various current human rights issues will be examined. Case histories may include the Soviet Union, Northern Ireland, South Africa, Afro-Americans, Armenians and Palestinians.

**SOCI.3020 Seminar on Homelessness: Lowell and Mumbai - Credits: 3**

This course will focus on understanding housing insecurity by looking closely at what it means to be homeless in two very different cities, located across the world from each other: Lowell, USA and Mumbai, India. In doing so, we will use this comparison to highlight the root causes of homelessness within a global context, including how certain social situations, policies and innovations may exacerbate and/or improve this situation. Simultaneously, students will gain a first-hand understanding of homelessness in Lowell through performing 3-4 hours of service per week at a local shelter and/or drop-in center.

**SOCI.3040 Science, Technology and Society (Formerly SOCI.2220) - Credits: 3**

The complex relationships between science, technology, and society are commonly obscured by a popular belief in the value-neutrality and objectivity of science and technology. Being able to analyze that belief as a myth is necessary in order to engage in critical analysis of the ways in which science, technology and society are mutually constituted. Social inequalities are both built into and perpetuated by science, technology, and engineering. Likewise, science, technology, and engineering shape and are shaped by various societal power relations. This course will provide the analytical tools necessary to understand science, technology, and engineering as fundamentally social enterprises and to understand how they shape society.

**SOCI.3050 Sociology of Family Law (Formerly 48.305) - Credits: 3**

Examines some social issues in family law, the changes therein, and the social climate and consequences accompanying these. By using the sociological method of inquiry to examine family law cases, the relationship between law and society as instruments of order and change are exemplified.

**SOCI.3060 Race, Gender, and the Future of Work - Credits: 3**

This course will use an intersectional lens to examine the role of race, gender, class, ability, and other dimensions of inequality in structuring work in the United States and around the world. How do different groups of people end up in different jobs? What is the wage gap and what does it mean for you? Why is who in the family changes diapers and cooks dinner connected to work? What are the implications of the rise of automation, remote work, and the gig economy for the future of work? These are some of the questions we will address, using sociological literature and contemporary news sources and making connections to our own experiences as past, present and future workers.

**SOCI.3100 Ethnicity in Massachusetts (Formerly 48.310) - Credits: 3**

Massachusetts is well known for its rich immigrant history and culture. This course examines the social history of and conditions faced by immigrants upon arrival to Massachusetts, the ways they are affected as they settle in communities and their social and cultural impact locally and state-wide. Selected ethnic groups/communities are examined to understand the common processes and experiences as well as differences among them.

**SOCI.3110 Sociological Perspective on Communication & Social Change (Formerly 48.311) - Credits: 3**

Most social interactions and interventions involve communication. Thus, communication patterns present critical issues for sociological inquiry. This course introduces communication as a central yet often ignored element of social life. It surveys existing communication theories, then focuses on models used by marginalized populations in efforts to democratize communication systems. Finally, it introduces tools for communication strategizing. As a final product students will conduct a frame analysis of a current social topic. From a general liberal arts perspective, the course will stress critical thinking and writing skills.

**SOCI.3160 Youth and Society (Formerly 48.316) - Credits: 3**

Youth (or adolescence) constitutes a historically and socially constructed stage of the life course between childhood and adulthood. Since the early twentieth century, society’s view of this life period has been ambivalent, at once glorifying the age of youth while also fretting over the problems that youth face.
This course takes a sociological view of the study of youth/adolescence with particular attention to: (1) how this stage of the life course intersects with race, gender, immigration status and sexuality; (2) how society has responded to youth over time through a range of youth-serving organizations and media representations; and (3) how youth have responded as agents in their own public representations and development.

SOCI.3170 Sociology of Genocide (Formerly 48.317) - Credits: 3

The deliberate destruction of an ethnic group is a historical event and a social process. This course addresses such questions as: Why do genocides occur? Why do people become genocide perpetrators? How do genocides affect survivors and their offspring? How can genocide be prevented? Focus is on Native American, Armenian and Jewish experiences and recent cases of ethnic cleansing.

SOCI.3200 Community Service (Formerly 48.320) - Credits: 3

Course uses fieldwork approach to understand social problems and to discipline study and career pursuit in the area of public service.

SOCI.3210 Classical Social Theory (Formerly 48.321) - Credits: 3

This course offers a critical examination of major classical sociological theories. It emphasizes the relationship between the individual and society and the competing pressures for social order and social conflict.

SOCI.3220 Contemporary Social Theory (Formerly 48.322) - Credits: 3

This course offers a critical examination of major contemporary sociological theories, including critical theory, neo-Marxism, critical race theory, feminist theory, and postmodernism.

SOCI.3250 Global Conflicts (Formerly 48.325) - Credits: 3

SOCI.3300 Fast Food, Hot Planet: Sociological Approaches (Formerly 48.330) - Credits: 3

With an eye on climate change sustainability, this course maps the social and historical dimensions of crisis and inequalities of food production and distribution. In addition to exploring food security’s relation to sustainable food production, students will strengthen critical thinking, writing, and library research skills.

SOCI.3350 Sociology of Intimacies and Sexualities - Credits: 3

In this course, students will investigate the relationship between society and sexualities, including: social categorizations of sex, gender, and sexuality; social and cultural representations of intimacy and sexuality; and social and institutional control of sexualities and sexual behavior and practice. Students will read theoretical and methodological works from the field of sexualities studies, including sociological, feminist, post-colonial, and queer theorists. By the end of the course, students will be able to articulate a sociological perspective on intimacy and sexualities.

SOCI.3410 Wealth, Status and Power (Formerly 48.341) - Credits: 3

Focuses on the phenomenon of social class distinctions with particular emphasis on social class in America. The approach is both historical and sociological.

SOCI.3440 Race, Gender and Film - Credits: 3

In this course, we will critically and sociologically analyze racial and gender patterns in American films. We will analyze how each film is shot with regard to racial messages using film studies terminology (for example, cinematography). We will also highlight which films are recognized with prestigious awards, and what this suggests about American society. In addition, we will discuss the role of power in the film industry and how directors, producers and screenwriters shape the public imagination of the American society and the world through widely disseminated media portrayals. We will also critically evaluate seemingly race-neutral, animation films, such as children’s films, where characters appear in animal form.

SOCI.3450 Urban Sociology (Formerly 48.345) - Credits: 3

Deals with issues related to the quality of life in American cities. Students taking this course may engage in research projects on the city of Lowell and the role of the University of Massachusetts Lowell within that city.

SOCI.3510 The Sociology of Health and Health Care (Formerly 48.351) - Credits: 3

With the passage of the Affordable Care Act, the U.S. Health Care system is undergoing a radical change as profound as any in U.S. history including those for minority and woman’s rights. A large segment of the population has struggled to obtain even basic health care coverage. The changes taking place are analyzed in a historical and comparative context by examining health care in other countries. Special attention is
given to understanding the professions in medicine and the role medical professions have had in shaping medical care. At the micro level, the course examines evolving health care provider/patient relationships to better understand the level of control patients can exert over their health care decisions.

**SOCI.3520 Latinos/as in the United States - Credits: 3**

By 2060, Latinos are forecast to comprise over 28 percent of the US population. While the presentation of Latinos/as in public discourse often frames them as recently arrived immigrants, Spanish-speaking peoples in the US have a long and rich history. This course focuses on a sociological lens on the historical and contemporary experiences of a community whose emergence requires deep analysis. Emphasis is placed on immigration policy, demographic shifts, labor market discrimination and bilingual education.

**SOCI.3550 Black Experience in American Life (Formerly 48.355) - Credits: 3**

**SOCI.3570 The Sociology of Religion (Formerly 48.357) - Credits: 3**

An investigation of religious institutions and experiences. Emphasis is placed on the influence of religion on social change.

**SOCI.3600 Sociology of Non-Violence (Formerly 48.360) - Credits: 3**

An analysis of non-violent efforts to achieve social change through demonstrations, civil disobedience, etc. Movements led by Mahatma Gandhi, Martin Luther King, Jr., and others are examined.

**SOCI.3610 Sociology of Law (Formerly 48.361) - Credits: 3**

The course examines the role of social forces in defining the law. Topics include the legal profession, white-collar crime, and the importance of race, class and gender in the criminal justice system.

**SOCI.3620 Social Welfare Policy (Formerly 48.362) - Credits: 3**

The course examines the development of social welfare policy in the United States as well as alternative strategies for social welfare provision. Particular attention is paid to the role of race/ethnicity, class, and gender in the formation of social welfare policy.

**SOCI.3700 Intersections of Disability and Gender - Credits: 3**

This course is organized around several questions that will be used to help engage students in the study of the concepts of disability and gender from a variety of sociological and interdisciplinary perspectives. The course will explore feminist representations of disability and gender in popular culture discourses to discuss disability as well as gender as social constructs. By analyzing books, movies, television, cartoons, and the internet, we will look at how conceptualizations of disability and gender intersect and are represented in these "texts" and the possible influences on perceptions and definitions of disability.

**SOCI.3740 Race and Families - Credits: 3**

This course will explore the "traditional" definition of family throughout American history as well as how now more than ever, many families challenge the conventional definition. We will discuss how different political, economic and social factors (i.e. enslavement, immigration policies, etc.) have shaped the experiences, structure and dynamics of how families function in the United States. We will analyze families of diverse racial backgrounds as well as other families that have been constructed as outside of the "norm," such as LGBT families, military families and adoptive and foster families. We will also outline specific societal changes (e.g. assisted reproductive technology) that have contributed to how families form, bond and experience family life.

**SOCI.3800 Sociology of Mass Media (Formerly 48.380) - Credits: 3**

Examines ownership and control patterns of electronic and print media and their impact on media content and censorship.

**SOCI.4020 Quantitative Methods for Social Research (Formerly 48.402) - Credits: 3**

An introduction to methods of social research, with emphasis on quantitative research methods. Presents basic statistical techniques used in social research as well as the computer software used for analyzing social science data. For majors only.

**SOCI.4030 Qualitative Methods for Social Research (Formerly 48.403) - Credits: 3**

Qualitative research methods. Discusses various strategies employed by qualitative researchers with special emphasis on field research. For majors only. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Critical Thinking &Problem Solving (CTPS).
SO CI.4040 Learning from the Field (Formerly 48.404) - Credits: 3
Provides students with the opportunity to directly observe and participate in the operation of a social service organization.

SO CI.4050 Feminist Methodologies (Formerly 48.405) - Credits: 3
Despite the recent growth of feminist methodologies, there is no one way of doing feminist methodologies. The growing body of literature in this area addresses the distinctive challenges and strengths of doing this research. Gender Studies scholars especially seek to question the framing of a study, managing of emotions, and ethical dilemmas. We will explore feminist strategies for creating, implementing, and analyzing a project that is grounded in the everyday lives of people while situating them in a social, political, and economic context. We will explore the interdisciplinary intersections where these challenges push at the boundaries of the disciplines of your major field of study. We will also investigate how to use a variety of qualitative approaches while doing a feminist project and the ways in which feminism can enlighten understandings of "traditional" qualitative methods.

SO CI.4210 Seminar on the Family (Formerly 48.421) - Credits: 3
Study of the family structures and gender roles in various human societies. Prerequisites: 48.101 plus either 48.231 or 48.241.

SO CI.4690 Seminar on Global Society (Formerly 48.469) - Credits: 3
Considers the spread of industrial society globally. Emphasizes economic, political and cultural changes in various parts of the world and in the USA.

SO CI.4720 Seminar on Ethnic Communities (Formerly 48.472) - Credits: 3
This course examines a variety of issues, problems and prospects immigrants experience as they attempt to "make it in America". Immigrant America is increasingly ethnically diverse and this course focuses on the factors underlying migration and the ethnic communities migrants settle into with the aim to understand the cultural and contextual basis of their lives, their success and challenges.

SO CI.4840 Internship I (Formerly 48.484) - Credits: 3

SO CI.4845 Civil Society and Social Change in Valencia, Spain - Credits: 3-6
Students will study civic community in the third largest city in Spain to understand the unique linguistic and socio-political history of the region. The region provides rich opportunity for sociological analysis of socio-linguistic diversity within a modern national and global context. Readings, papers and field tips will emphasize the cultural construction of community and society. In addition, students who choose the six-credit option will spend 120 hours working in an individually defined internship placement in Valencia during six weeks after the end of the Spring semester. In addition students will be assigned hands-on activities and readings that will facilitate learning in the internship placement settings.

SO CI.4910 Directed Studies in Sociology (Formerly 48.491) - Credits: 3
The student, through regular and frequent consultation with an instructor, develops a course of directed reading in sociology and defines a problem for individual research. Prerequisite: permission of instructor.

SO CI.4920 Directed Studies: Sociology (Formerly 48.492) - Credits: 1
A one-credit, short course available only to qualified seniors. Prerequisite: Permission of Department Chairperson.

SO CI.4950 Thesis in Sociology (Formerly 48.495) - Credits: 3
A program of study which affords the advanced student with an additional opportunity to pursue a previously explored problem in greater depth or to initiate a new study. The purpose is to sharpen and refine techniques for scholarly research and presentation in the student's major discipline. Prerequisites: demonstrated proficiency in an area selected for directed study and permission of instructor.

SO CI.4960 Practicum Experience (Formerly 48.496) - Credits: 3
A program of on-campus and/or off-campus experience for sociology majors and minors only. Specific requirements vary depending upon department policies and the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural, or artistic area and for applying techniques of problem solving and/or skills that are appropriate to the student's major discipline. May be repeated to a maximum of six credits. Students are graded satisfactory and unsatisfactory. The practicum experiences may
not be substituted for a required course in the major.
Prerequisite: permission of Chairperson.
College of Fine Arts, Humanities & Social Sciences

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A student's catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

American Studies
- General Option
  - fall 2015 and beyond
  - fall 2012 - spring 2015
- Thematic Option
  - fall 2021 and beyond
  - fall 2015 - spring 2021
- Arts
  - Animation & Interactive Media Concentration
    - fall 2017 and beyond
  - Graphic Design Concentration
    - fall 2015 - spring 2020
  - Studio Art Concentration
    - fall 2022 and beyond
Composition for New Media
- fall 2022 and beyond
- fall 2019 - spring 2022

Criminal Justice
- General Option
  - fall 2022 and beyond
  - fall 2016 - spring 2022
- Corrections Option
  - fall 2016 and beyond
- Police Option
  - fall 2022 and beyond
- Homeland Security Option
  - fall 2022 and beyond
- Violence Option
  - fall 2016 and beyond
- Crime and Mental Health Option
Digital Media

- fall 2021 and beyond

Economics

- fall 2015 and beyond

English

- Literature Concentration
  - fall 2021 and beyond
  - fall 2015 - spring 2021

- Journalism & Professional Writing Concentration
  - fall 2015 and beyond

- Creative Writing Concentration
  - fall 2018 and beyond

- Theatre Arts Concentration
  - fall 2015 and beyond

Graphic Design

- fall 2021 and beyond
- fall 2020 - spring 2021

History

- fall 2020 and beyond
- fall 2015 - spring 2020

Liberal Arts

- fall 2015 and beyond

Music Studies

- General Option fall 2022 and beyond
- Instrumental Option fall 2015 - spring 2018
- Voice Option fall 2015 - spring 2018

Music Performance

- Instrumental Option fall 2022 and beyond
- Voice Option fall 2022 and beyond

Music Business

- fall 2022 and beyond
- fall 2015 - spring 2022
- prior to fall 2015

Peace and Conflict Studies

- fall 2021 and beyond
- fall 2015 - spring 2021
Academic Catalog 2021 - 2022 / Sound Recording Technology - General Information

Philosophy
- General Option
  fall 2015 and beyond
  fall 2011 - spring 2015
- Communications & Critical Thinking Option
  fall 2015 and beyond
- Philosophy & Religious Studies Option
  fall 2015 and beyond

Political Science
- American Politics Concentration
- International Relations and Comparative Politics
  Concentration
- Law and Politics Concentration
- Political Communication and Public Opinion
  Concentration
- Sustainability and Environmental Politics Concentration

Political Science (prior to fall 2020)
- fall 2015 - spring 2020
- fall 2013 - spring 2015

Psychology
- General Concentration
  fall 2022 and beyond
  fall 2017 - spring 2017
- Behavior Analysis Concentration
  fall 2022 and beyond
  fall 2018 - spring 2018
- Community Social Psychology Concentration
  fall 2022 and beyond
- Clinical Psychology Concentration
  fall 2022 and beyond
- Developmental Disabilities Concentration
  fall 2022 and beyond
- Health Psychology Concentration
  fall 2022 and beyond

Quantitative Economics
- fall 2022 and beyond

Sociology
- General Concentration
  fall 2016 and beyond
- Policy & Social Problems Concentration
beyondfall 2016 - spring 2021
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

- Racial Equity and Inclusion Concentration fall 2021 and beyond

Sound Recording Technology
- fall 2022 and beyond
- fall 2019 - spring 2022
- fall 2015 - spring 2019
- prior to fall 2015

World Languages and Cultures
- French Option
  fall 2018 and beyond fall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- French/Spanish Option fall 2018 and beyond fall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Italian/Spanish Option
  fall 2018 and beyond fall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Spanish Option
  fall 2018 and beyond fall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Sample Degree Pathway for Sound Recording Technology

For students who entered prior to fall 2015.
Freshman Year

Fall Semester

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<tr>
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Spring Semester

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<tr>
<td>MUTH.1080</td>
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<td>MUHI.1040</td>
<td>Musical Practices 1</td>
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Sophomore Year

Fall Semester

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Spring Semester

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Total 1 7
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### Junior Year

#### Fall Semester

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<td>Music History 2 (Gen. Ed. - AH)</td>
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<td>Introductory Physics</td>
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### Senior Year

#### Fall Semester

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<td>MUSR.3900</td>
<td>Acoustics &amp;Psychoacoustics</td>
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<td>MUSR.4700</td>
<td>Recording Studio Repair &amp; Maint.</td>
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Spring Semester

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Total Minimum Credits = 127-129

1MUSR.4940
SRT Senior Project may be substituted for MUSR.4930 with permission of SRT Coordinator.

Please see advisor or Music Office for more specific requirements pertaining to Freshman Chorus, Recital Attendance, Applied Music, Ensembles and Internships.

Refer to the General Education website for General Education requirements.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

Last updated: 10/26/2017

Sample Degree Pathway for Sound Recording Technology

For students who entered fall 2015 to spring 2019.

Freshman Year

Fall Semester

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<td>MUTH.1050</td>
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<td>MUHL.1040</td>
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<td>ENGL.1010</td>
<td>College Writing (CW)</td>
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Spring Semester

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## Sophomore Year

### Fall Semester

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### Spring Semester

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## Junior Year

### Fall Semester

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<th>Course#</th>
<th>Course Name</th>
<th>C r.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
</tr>
<tr>
<td>MUAP.xxxx</td>
<td>Applied Music 5</td>
<td>2</td>
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<tr>
<td>MUEN.xxxx</td>
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<tr>
<td>MUPF.2330</td>
<td>Conducting 1</td>
<td>2</td>
</tr>
<tr>
<td>MUSR.3600</td>
<td>Critical Listening</td>
<td>3</td>
</tr>
<tr>
<td>MUSR.3900</td>
<td>Acoustics &amp; Psychoacoustics (IL)</td>
<td>3</td>
</tr>
<tr>
<td>MUSR.4100</td>
<td>Recording Production (w/lab) (CTPS)</td>
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### Spring Semester

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### Senior Year

#### Fall Semester

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<tr>
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<td>MUSR.3500</td>
<td>Video Production</td>
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<tr>
<td>MUSR.4110</td>
<td>Audio Theory (w/lab)</td>
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<tr>
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#### Spring Semester

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<tbody>
<tr>
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</table>

**Total Minimum Credits = 127-129**

1MUSR.4940 SRT Senior Project may be substituted for MUSR.4930 with permission of SRT Coordinator.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty adviser to determine how you will meet the Core Curriculum requirements.

Please see advisor or Music Office for more specific requirements pertaining to Freshman Chorus, Recital Attendance, Applied Music, Ensembles and Internships.

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_Last updated: 4/26/2019._
### Sample Degree Pathway for Sound Recording Technology

For students who entered fall 2019 to spring 2022.

#### Freshman Year

**Fall Semester**

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing /FYSH (CW)</td>
<td>3</td>
</tr>
<tr>
<td>MATH.1310</td>
<td>Calculus I (MATH)</td>
<td>4</td>
</tr>
<tr>
<td>MUTH.1050</td>
<td>Freshman Chorus</td>
<td>0</td>
</tr>
<tr>
<td>MUTH.1080</td>
<td>Musicianship and Analysis 1</td>
<td>4</td>
</tr>
<tr>
<td>MUSR.1100</td>
<td>Intro to Music Technology</td>
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</tr>
<tr>
<td>MUSR.1150</td>
<td>SRT Colloquium</td>
<td>0</td>
</tr>
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<td>MUAP.xxxx</td>
<td>Applied Music 1</td>
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**Spring Semester**

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<tbody>
<tr>
<td>MATH.1320</td>
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<td>MUTH.1050</td>
<td>Freshman Chorus</td>
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<td>Musicianship and Analysis 2</td>
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<tr>
<td>MUTH.1200</td>
<td>M&amp;AKeyboard Lab</td>
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**Total** 18

#### Sophomore Year

**Fall Semester**

<table>
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<tr>
<th>Course#</th>
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<td>MUSR.2100</td>
<td>Audio in Practice and Theory</td>
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<tr>
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**Spring Semester**

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<tr>
<td>PHYS.1010</td>
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### Junior Year

#### Fall Semester

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<tr>
<td>ECON.2010</td>
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<td>3</td>
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<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
</tr>
<tr>
<td>MUSR.3200</td>
<td>Mixing and Mastering Audio</td>
<td>2</td>
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<tr>
<td>MUSR.3600</td>
<td>Critical Listening</td>
<td>3</td>
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<tr>
<td>MUSR.3900</td>
<td>Acoustics and Psychoacoustics (IL)</td>
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<td>MUAP.xxxx</td>
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#### Spring Semester

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<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
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<td>Fundamentals of Sound Rec. (SCL)</td>
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<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
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### Senior Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MUAP.1000</td>
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<td>MUPF.2330</td>
<td>Conducting 1</td>
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<td>MUEN.xxxx</td>
<td>Ensembles</td>
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<tr>
<td>MUSR.xxxx</td>
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<tr>
<td>xxxx.xxxx</td>
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#### Spring Semester

<table>
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<th>Course Name</th>
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<tbody>
<tr>
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</tr>
<tr>
<td>MUSR.xxxx</td>
<td>SRT Elective</td>
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</table>
Total Minimum Credits = 128

1MUSR.4940 (https://www.uml.edu/catalog/courses/MUSR/4940) SRT
Senior Project may be substituted for MUSR.4930 (https://www.uml.edu/catalog/courses/MUSR/4930) with permission of SRT Coordinator.

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- Department Specific Policies (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

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*Last updated: 11/14/2019.*

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### Technology

For students who entered fall 2022 and beyond.

### Freshman Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENGL.1010</td>
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<td>MATH.1310</td>
<td>Calculus I (MATH)</td>
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<td>MUAP.1000</td>
<td>Recital Attendance</td>
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<td>MUTH.1080</td>
<td>Musicianship and Analysis 1</td>
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<td>MUHL.1040</td>
<td>Musical Practices 1</td>
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<td>MUSR.1100</td>
<td>Intro to Music Technology</td>
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<tr>
<td>MUSR.1150</td>
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<td>MUAP.xxxx</td>
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#### Spring Semester

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<tbody>
<tr>
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<td>MUTH.1090</td>
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<tr>
<td>MUTH.1200</td>
<td>M&amp;A Keyboard Lab</td>
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<tr>
<td>MUHL.1050</td>
<td>Musical Practices 2 (DCA)</td>
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#### Sample Degree Pathway for Sound Recording
### Sophomore Year

#### Fall Semester

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<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
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<tr>
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<td>Recital Attendance</td>
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<td>MUSR.2100</td>
<td>Audio in Practice and Theory</td>
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<tr>
<td>MUHL.2610</td>
<td>Music History 1 (AH)</td>
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#### Spring Semester

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<th>Course Name</th>
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<tbody>
<tr>
<td>PHYS.1010</td>
<td>Introductory Physics (SCL)</td>
<td>3</td>
</tr>
<tr>
<td>PHYS.1010L</td>
<td>Intro to Experimental Physics (Lab)</td>
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</tr>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
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### Junior Year

#### Fall Semester

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<th>Course Name</th>
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<tbody>
<tr>
<td>ECON.2010</td>
<td>Principles of Microeconomics (SS), (QL)</td>
<td>3</td>
</tr>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
</tr>
<tr>
<td>MUSR.3200</td>
<td>Mixing and Mastering Audio</td>
<td>2</td>
</tr>
<tr>
<td>MUSR.3600</td>
<td>Critical Listening</td>
<td>3</td>
</tr>
<tr>
<td>MUSR.3900</td>
<td>Acoustics and Psychoacoustics (IL)</td>
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#### Spring Semester

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<tr>
<td>MUSR.4130</td>
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### Senior Year

#### Fall Semester

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<tbody>
<tr>
<td>MUAP.1000</td>
<td>Recital Attendance</td>
<td>0</td>
</tr>
<tr>
<td>MUPF.2330</td>
<td>Conducting 1</td>
<td>2</td>
</tr>
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<td>MUEN.xxxx</td>
<td>Ensembles</td>
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</tr>
<tr>
<td>MUSR.xxxx</td>
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<tr>
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<td>xxxx.xxxx</td>
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**Total**: 17

#### Spring Semester

<table>
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<tr>
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</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp.</td>
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**Total**: 12

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**Total Minimum Credits = 128**

1. MUSR.4940
   - SRT Senior Project may be substituted for MUSR.4930 with permission of SRT Coordinator.

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_Last updated: 3/18/2022._
MUSR.1100 Introduction to Music Technology - Credits: 2

This is a one semester course exploring the inventive ways today's musicians incorporate technology for creative, promotional, and education purposes in their careers. This course provides a practical and hands-on approach to notation software, MIDI sequencing and electronic instruments, audio and video applications, the computer as a performance instrument, and other web-based professional resources.

MUSR.1150 SRT Colloquium - Credits: 0

A weekly colloquium series for all Sound Recording Technology majors, providing opportunities for the presentation of student work, masterclasses, and guest lectures, as well as a place to address program-wide topics and issues. Note: Only first-year SRT students enroll in this course. Attendance and participation is required as part of all SRT courses for upperclassmen.

MUSR.1600 Audio Practicum - Credits: 1

Basic training in core practices in the recording studio in preparation for subsequent SRT courses. This will include proper handling of equipment, check-out and check-in procedures, scheduling procedures, lab rules, session etiquette, and PA/Live sound setup and teardown. In addition to the one hour weekly class meeting, each student will work a weekly shift in the SRT office as part of their contact time. This will give them first hand experience in the day-to-day management and practices of out studio facilities.

MUSR.2100 Audio in Theory and Practice - Credits: 2

The theory and usage of audio-recording/reproduction components are explored at a basic level and supplemented by hands-on experience. The aesthetics of recording media and their influence on society are discussed in relation to the artistic and commercial functions of the media.

MUSR.2600 Music Production - Credits: 3

Intermediate audio production. Planning and executing recording sessions which involve a variety of musical ensembles under diverse recording conditions; live-performance/concert recordings; multi-track recording, overdub, and remix procedures; and research in recording techniques. Laboratory required.

MUSR.3010 Music, Technology and Society (Formerly 78.301) - Credits: 3

Examines how recording technology has changed music and the relationships of music and society. The course studies and evaluates the application of technology to making music, to music listening, to styles of music, and to music’s roles in society, other art forms, and media. The evolving importance of technology in music over the past century is charted through the study of musical examples and through viewing how human values are reflected in this century's timely music. Studies will be based on assigned readings, lectures and discussions, examination of current and historically significant music recordings, motion pictures and media pieces for this artistry, their use of available technology, and their impact on human values and society.

MUSR.3050 Survey: Music Technology (Formerly 78.305) - Credits: 3

The use of technology in music listening, performance, analysis, composition, recording and music study will be presented. The dimensions and applications of technology will be discussed as related to aesthetics, the musician’s experiences, musical style, and the musical experience. Basic introduction to the technologies of audio recording. Course includes required reading, listening, session participation. Music Majors Only.

MUSR.3100 Introduction To Recording (Formerly 78.310) - Credits: 3

The theory and usage of audio-recording/reproduction components are explored at a basic level and supplemented by hands-on experience. The aesthetics of recording media and their influence on society are discussed in relation to the artistic and commercial functions of the media. Individual research on a subject of interest to the student is required.

MUSR.3200 Mixing and Mastering Audio - Credits: 2

This course builds on the material presented in Music Production, following the recording process through post-production tasks including mixing and mastering. Students will explore the application of informed musical judgment to the mixing process, learn about creative and technical uses of signal processing, and gain a basic understanding of the tasks involved in mastering.

MUSR.3500 Video Production for SRT (Formerly 78.350) - Credits: 3

An introductory course in the fundamentals of video technology and production; encompassing signal transmission, tape formats, transduction, optical characteristics of lenses and cameras, production equipment and procedures, and post-production equipment and techniques; hands-on experience via video and audio for video projects. Permission of Coordinator and Chair.

MUSR.3600 Critical and Analytical Listening
(Formerly 78.360) - Credits: 3
The recognition and identification of timbral modifications and spatial characteristics. Aural analysis of historically significant and current music recordings for recording techniques, musical balance, performance intensity, sound quality and imaging. Development of critical listening skills and sound evaluation techniques.

MUSR.3900 Acoustics & Psychoacoustics (Formerly 78.390) - Credits: 3
The physical attributes of sound and acoustic measurement; displacement, time, velocity, acceleration, force, energy, resonance, wave shapes and spectral energy distribution are examined for most instruments; acoustic properties of the ear and enclosed environments; acoustic measurements and instruments. The interrelationships and differences of physical acoustics and psychoacoustics are stressed.

MUSR.4010 Music of The Beatles (Formerly 78.401) - Credits: 3
This course will explore how technology shaped, enhanced and defined the music of The Beatles. In doing so their music will also be studied for its musical materials, stylistic content, the sound qualities of recordings, cultural impacts, and extra-musical aspects, as well as the music and cultural ideas that influenced the music of The Beatles. Selected solo recordings and compositions of the artists will also be examined to trace the growth of ideas and materials with their roots in The Beatles’ music.

MUSR.4100 Recording Production (Formerly 78.410) - Credits: 3
Intermediate audio production. Planning and executing recording sessions which involve a variety of musical ensembles under diverse recording conditions; live-performance/concert recordings; multi-track recording, overdub, and remix procedures; application of informed musical judgment to the mixing process; and research in recording techniques. Laboratory required.

MUSR.4130 Advanced Audio theory - Credits: 2
Advanced audio theory. An in-depth examination of the principles and operating specifications of the major components of the modern recording studio: mastering and multi-track recorders, mixing consoles, microphones, monitoring systems, and signal processing equipment. Recording projects and technical research. Laboratory required.

MUSR.4200 Sound Synthesis 1 (Formerly 78.420) - Credits: 3
Sound synthesis equipment and techniques are studied and supplemented with sound synthesis studio laboratory work. The course will cover practices and principles of analog and digital sound synthesis and their historic origins, related audio equipment and applications, theories of sound samplers and sequencers, and an introduction to MIDI applications in sound synthesis and recording production.

MUSR.4210 Sound Synthesis 2 (Formerly 78.421/521) - Credits: 3
Advanced sound synthesis techniques are studied and supplemented with sound synthesis studio laboratory work. The course will cover MIDI implementation in analog and digital sound synthesis, the historic origins of computer music and electro-acoustic music, live electronic music performance, audio equipment and applications of MIDI-based and functional devices and processors, advanced music production and sound synthesis via MIDI. Permission of Coordinator and Chair.

MUSR.4300 Computer Applications in Music (Formerly 78.430) - Credits: 3
Applications of computers to audio production is emphasized in studies of computer generated and controlled sound sources and devices, algorithmic composition, computer music, digital signal processing, advanced MIDI applications and programming, and computer synchronization of audio and video. Laboratory work required. SRT majors and minors. Permission of Coordinator and Chair.

MUSR.4400 Multitrack Production (Formerly 78.440) - Credits: 3
24-track recording. Session planning and preparation, tracking process; microphone techniques and applications; incorporating processing; planning the mix and sound stage; MIDI applications, rough mixdown. Recording project required.
MUSR.4410 Advanced Multitrack Production (Formerly 78.441) - Credits: 3
Advanced production techniques; tape machine calibration; automation and final mixdown; digital multitracking; SMPTE applications; premastering and mastering. Recording project required.

MUSR.4500 The Recording Industry (Formerly 78.450) - Credits: 3
A detailed survey of the many career options of the audio-recording industry; position duties and responsibilities. Guest lecturers from diverse careers in the industry share their experiences, disciplines, and backgrounds. Permission of Coordinator and Chair.

MUSR.4550 Careers in Audio - Credits: 2
A detailed survey of the numerous career paths in audio-related industries. Skills required to find and obtain internships and job opportunities are explored. Guest lecturers from diverse careers in the industry share their experiences, disciplines, and backgrounds.

MUSR.4600 Audio for Visual and Interactive Media (Formerly 78.460) - Credits: 3
This course is designed to introduce students to the theory and practice of audio for visual media including production and post-production sound. Students will study the aesthetics and philosophies of sound design for visual media through the study of important films and television shows and through applied projects which include the planning and execution of production sound, dialog editing and ADR, the creation and design of sound effects, performance of Foley, sound effects editing, music editing, current and historic synchronization technologies, and re-recording.

MUSR.4700 Recording Studio Repair and Maintenance (Formerly 78.470) - Credits: 3
Hands-on experience in repair and maintenance techniques. Common minor repairs and routine maintenance of recording equipment; test equipment and tools; power supplies, op-amps, and low-noise amplifiers; distortion; analog and digital hardware; and interface considerations. Permission of Coordinator and Chair.

MUSR.4930 Internship in SRT (Formerly 78.493) - Credits: 6
Practical experience in audio-recording under the supervision of a professional firm. At least twenty hours per week for fifteen weeks is spent working at an entry-level position for a firm involved in audio.

MUSR.4940 Senior Project in Sound Recording Technology (Formerly 78.494) - Credits: 6
Advanced projects developed in consultation with faculty advisor. Typical projects include production of a complete record album, investigation of experimental recording techniques, and original research in recording technology. To be completed in place of MUSR.4930 by students not choosing an internship. Permission of Coordinator and Chair.

MUSR.4950 Directed Study in Sound Recording Technology (Formerly 78.495) - Credits: 3
Individual work under the supervision of a member of the SRT faculty on a topic or area of production approved by the instructor and the Coordinator of SRT. Permission of Coordinator and Chair.
THEA.2010 Introduction to Theatre (Formerly THEA 201) - Credits: 3

This course explores the arts and practices of theatre from classical to contemporary times. Students are introduced to the basic concepts and forms of theatre as well as to theories of its origins and purposes. Replaces 42.219 and 59.219; credit may not be earned for both 42/59.219 and THEA 201.

THEA.2020 Living Theatre: The Audience Experience - Credits: 3

In this course students will experience the fundamentals of live theatre. Students will attend 5-8 productions of varying styles; including but limited to period productions, musicals and new works. Through readings, conversations with professional artists and live performances, students will explore the latest trends of the local area theatre community. Students will critically analyze theatrical productions from the point of view of audience. The purpose of our analysis as audience - to be able to read scripts and critically respond to productions from an informed perspective.

THEA.2210 Stagecraft (Formerly THEA 221) - Credits: 3

Survey of the materials, skills, and techniques of technical theatre (including scenic construction, scene painting, lighting, and sound production) through reading, lecture, and hands-on experience. Replaces 42.252; credits may not be earned for both 42/59.252 and THEA 221.

THEA.2300 Foundations of Theatrical Design (Formerly THEA 230) - Credits: 3

Basic principles and techniques in scenic, lighting and costume design for theatre. Replaces 42.260 and 59.386; credits may not be earned for both 42.260 and THEA 230 or for 59.386 and THEA 230.

THEA.2610 Acting 1 (Formerly THEA 261) - Credits: 3

Theory and practice of acting including exercises in the elements and methods of acting and the preparation of a public performance. Replaces 42.261 and 59.261; credits may not be earned for both 42/59.261 and THEA 261.

THEA.3110 Play Production (Formerly THEA 311) - Credits: 3

Introduction to the design and technical aspects of theatre through hands-on experience working on campus productions. Focus on basic principles of set, lighting, props, costume, makeup, and sound production. May be repeated for credit.

THEA.3400 Directing Workshop (Formerly THEA 340) - Credits: 3

Study of the process of directing plays of different styles. Students will direct scenes with other members of the workshop and their work will be analyzed by the instructor and fellow students. Replaces 42.343 and 59/343; credits may not be earned for both 42/59.343 and THEA 340.

THEA.3620 Acting 2 (Formerly THEA 262) - Credits: 3

A continuation of THEA 261 emphasizing techniques of scene study and characterization. Pre-requisite THEA 261 or the equivalent. Replaces 42/59.262; credits may not be earned for both 42/59.262 and THEA 262.

THEA.3640 Performing Shakespeare - Credits: 3

An introductory workshop exploring Shakespeare's plays from the standpoint of the actor. We will study techniques for understanding and activating Shakespeare's words through our bodies, voices, and imaginations. Students will gain a basic, hands-on knowledge of Elizabethan theatre practices, as well as skills in analyzing and performing Shakespeare's language, characters, and genres through action exercises, text analysis, monologues, and scene study.

THEA.3650 Voice and Movement (Formerly THEA 265) - Credits: 3

To discover the possibilities of you unique voice and physicality, to gain techniques to free up tension, release habitual blocks and inhibitions, and to explore creative expression through the voice and body, ultimately applying all of these elements to performance. This course uses techniques designed for voice, movement, and physical acting including Linklater, Alexander, Viewpoints, Grotowski, Yakim and others.

THEA.4010 Topics in Theatre (Formerly THEA 401) - Credits: 3

Advanced study of a selected area of theatrical production, history, texts, or theory. Repeatable for credit when topics differ. Replaces 42.414 and 59.414; repeated credit may only be earned when topics differ.

THEA.4900 Performance Practicum (Formerly THEA 490) - Credits: 1-3

THEA.4920 Technical Theatre Practicum (Formerly
THEA 492) - Credits: 1

One-credit practicum in technical theatre (scenic construction, lighting, sound, costuming), consisting of work on a campus production under the supervision of Theatre Arts faculty.

THEA.4930 Practicum in Theatre (Formerly THEA 493) - Credits: 1-3

Part-time, full-semester internship at a professional theatre. Program director's permission required. Replaces 42.495 and 59.495; may be repeated for credit with permission.

THEA.4940 Directed Study in Theatre (Formerly THEA 494) - Credits: 3

Supervised independent project in theatre. Instructor's permission required. Replaces 42.494 and 59.494; may be repeated for credit with permission.

THEA.4950 Senior Seminar in Theatre (Formerly THEA 495) - Credits: 1

Capstone-experience seminar focusing on advanced projects (in performance, dramaturgy, or design/tech) in the service of portfolio building and preparation for graduate study and/or work in the professional world of theatre. To be taken during the student's final year in the program. Instructors Consent required.
LABR.2400 Introduction to Labor Studies (Formerly WLS 240) - Credits: 3

This foundational course has two overarching learning objectives: (1) to give students basic empirical knowledge and analytical tools to understand the context of work in the United States at the dawn of the twenty-first century and (2) to give students an understanding of how labour unions work, what has been their impact historically, and what their role is in contemporary society. The course will be explicitly interdisciplinary, drawing on readings from history, sociology, economics, political science, and psychology to offer an introduction to understanding work and labor through an analytic lens. In addition, the course will include a service-learning component in collaboration with the UML Labor Education Program.

LABR.4020 Directed Studies in Work, Labor and Society (Formerly WLS 402) - Credits: 1-3

This course, taken for 1 or 3 credits, may serve as a capstone experience for advanced students in the Work, Labor and Society minor, helping them to explore a work-related topic of interest while working closely with a faculty member. Projects that students complete for the Directed Studies will vary in length, scope, and topic, depending on how many credits are taken and which faculty member agrees to work with the student. What all projects will have in common is (1) a topic clearly relevant to work, labor, and society (2) an emphasis on achieving deep learning through advanced study, and (3) the integration of two or more distinct disciplines, integrating these disciplinary insights in order to solve a complex problem or analyze a complicated issue.

LABR.4100 Internship in Work, Labor and Society (Formerly WLS 410) - Credits: 3

This internship option allows students to take full advantage of the substantial links to the community that the UML Labor Extension program has built over many years of work in this region. The internship provides opportunities for students to learn through thoughtful engagement in community service, applying knowledge of work/labor issues gained in the classroom to the world outside the classroom. Students will be expected to spend a minimum of 100 hours during the semester at the internship site, and to have a designated supervisor on site as well as a faculty supervisor overseeing their work and ensuring it is a meaningful learning experience.
French Minor

The French minor in the Department of World Languages and Cultures encourages students to work toward proficiency in the French language, and to learn about the culture, history, literature, cinema, and linguistic variation of the vast French-speaking world. The French minor focuses on practical, culture-based proficiency in the use of French and consists of a minimum of 18 credits (max. 24) of required and approved elective courses with the WLFR prefix. At least two courses must be at the 3000 level or above.

Required Courses

- WLFR.1010 (https://www.uml.edu/catalog/courses/WLFR/1010) French 1 and Culture
- WLFR.1020 (https://www.uml.edu/catalog/courses/WLFR/1020) French 2 and Culture
- WLFR.2110 (https://www.uml.edu/catalog/courses/WLFR/2110) French 3 and Culture
- WLFR.2120 (https://www.uml.edu/catalog/courses/WLFR/2120) French 4 and Culture
- WLFR.3/4xxx (https://www.uml.edu/catalog/courses/WLFR) French Elective at 3000/4000 level
- WLFR.3/4xxx (https://www.uml.edu/catalog/courses/WLFR) French Elective at 3000/4000 level

Note: Students who placed out of any of the elementary and intermediate language courses (French 1-4) will need to take more elective courses (labeled WLFR.3/4xxx (https://www.uml.edu/catalog/courses/WLFR) and taught in French) in order to complete the necessary number of credits required for the minor. Please note that World Ready courses for the French track are not part of this minor (even if labeled WLFR). See course description in university catalog for details.

For more information, contact the Department of World Languages and Cultures (https://www.uml.edu/FAHSS/Languages-Cultures/Contact.aspx).

Spanish Minor

The Spanish minor in the Department of World Languages and Cultures encourages students to work toward proficiency in the Spanish language, and to learn about the culture, history, literature, cinema, and linguistic variation of the vast Spanish-speaking world. The Spanish minor focuses on practical, culture-based proficiency in the use of Spanish and consists of a minimum of 18 credits (max. 24) of required and approved elective courses with the WLSP prefix. At least two courses must be at the 3000 level or above.

Required Courses

- WLSP.1010 (https://www.uml.edu/catalog/courses/WLSP/1010) Spanish 1 and Culture
- WLSP.1020 (https://www.uml.edu/catalog/courses/WLSP/1020) Spanish 2 and Culture
- WLSP.2110 (https://www.uml.edu/catalog/courses/WLSP/2110) Spanish 3 and Culture
- WLSP.2120 (https://www.uml.edu/catalog/courses/WLSP/2120) Spanish 4 and Culture
- WLSP.3/4xxx (https://www.uml.edu/catalog/courses/WLSP) Spanish Elective at 3000/4000 level
- WLSP.3/4xxx (https://www.uml.edu/catalog/courses/WLSP) Spanish Elective at 3000/4000 level

Note: Students who placed out of any of the elementary and intermediate language courses (Spanish 1-4) will need to take more elective courses (labeled WLSP.3/4xxx (https://www.uml.edu/catalog/courses/WLSP) and taught in Spanish) in order to complete the necessary number of credits required for the minor. Please note that World Ready courses for the Spanish track are not part of this minor (even if labeled WLSP). See course description in university catalog for details.

For more information, contact the Department of World Languages and Cultures (https://www.uml.edu/FAHSS/Languages-Cultures/Contact.aspx).
Sample Degree Pathway for World Languages and Cultures - French Option

For students who entered fall 2018 and beyond.

Freshman Year

**Fall Semester**

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Sophomore Year

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Junior Year

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### Senior Year

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### Spring Semester

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Total Minimum Credits = 121

1Required for entering Freshmen.

2World Languages and Cultures students meet the Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL) outside the department. MATH.1110 is recommended. See the QL course listing for a complete list of options.

3World Languages and Cultures students meet the Core Curriculum Essential Learning Outcome for Social Responsibility and Ethics (SRE) outside the department. Students must take at least one course that satisfies this outcome; see the SRE course listing for a complete list of options.

4Students in the French option must take at least one French Upper Level course that satisfies the Core Curriculum Essential Learning outcome for Critical Thinking and Problem Solving (CTPS) and one French Upper Level course that satisfies the Core ELO for Written and Oral Communication (WOC).

The French option consists of a minimum of 37 credits in the major, with at least 25 credits at the 3000 level or above. Students may not exceed a total of 54 credits in the major. Please note: the degree pathway shows additional upper level French courses that may be taken by students who enter the program at a higher level of proficiency in French.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should be using their Advisement Report in SiS. If you need assistance, please contact your advisor.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy.
Sample Degree Pathway for World Languages and Cultures - French/Spanish Option

For students who entered fall 2018 and beyond.

Freshman Year

**Fall Semester**

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Sophomore Year

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<td>WLS.2110 (<a href="https://www.uml.edu/catalog/courses/WLSP/2110">https://www.uml.edu/catalog/courses/WLSP/2110</a>)</td>
<td>Spanish 4 and Culture (AIL), (DCA)</td>
<td>3</td>
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<td>WLSRF.2110 (<a href="https://www.uml.edu/catalog/courses/WLSP/1010">https://www.uml.edu/catalog/courses/WLSP/1010</a>)</td>
<td>French 3 and Culture</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Science w/Lab Persp. (SCL)</td>
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**Spring Semester**

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>WLSRF.2110 (<a href="https://www.uml.edu/catalog/courses/WLSP/1010">https://www.uml.edu/catalog/courses/WLSP/1010</a>)</td>
<td>French 4 and Culture (AIL), (DCA)</td>
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<tr>
<td>WLSRF.2110 (<a href="https://www.uml.edu/catalog/courses/WLSP/1110">https://www.uml.edu/catalog/courses/WLSP/1110</a>)</td>
<td>Spanish Upper Level</td>
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<td>STEM Persp. (STEM)</td>
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### Spring Semester

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<tr>
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<td>WLSP.3500 (<a href="https://www.uml.edu/catalog/courses/WLSP/3500">https://www.uml.edu/catalog/courses/WLSP/3500</a>)</td>
<td>Intro. to Literary Analysis (CTPS), (WOC)</td>
<td>3</td>
</tr>
<tr>
<td>WLFR.3xxx (<a href="https://www.uml.edu/catalog/courses/WLFR">https://www.uml.edu/catalog/courses/WLFR</a>)</td>
<td>French Upper Level</td>
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</table>

### Total Minimum Credits = 121

1. Required for entering Freshmen.

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The French/Spanish option consists of a minimum of 37 credits, with 18 credits in each language; a minimum of 6 credits in each language must be at the 3000 level or above. Students may not exceed a total of 54 credits in the major. Please note: the degree pathway shows additional upper level French and Spanish courses that may be taken by students who enter the program at a higher level of proficiency in French or Spanish.

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Sample Degree Pathway for World Languages and Cultures - Italian/Spanish Option

For students who entered fall 2018 and beyond.

### Freshman Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
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</tr>
<tr>
<td>WLSP.1010</td>
<td>Spanish 1 &amp;Culture</td>
<td>3</td>
</tr>
<tr>
<td>FAHS.1090</td>
<td>First Year Seminar1</td>
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<tr>
<td>MATH.xxxx</td>
<td>Math Persp. (MATH) - MATH.1110 (QL) recommended2</td>
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#### Spring Semester

<table>
<thead>
<tr>
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<th>Course Name</th>
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<tbody>
<tr>
<td>WLIT.1020</td>
<td>Italian 2 and Culture</td>
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<tr>
<td>WLSP.2110</td>
<td>Spanish 3 and Culture</td>
<td>3</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>STEM Persp. (STEM)</td>
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<td>Free Elective</td>
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### Sophomore Year

#### Fall Semester

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<td>WLIT.2110</td>
<td>Italian 3 and Culture</td>
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<td>WLSP.2120</td>
<td>Spanish 4 and Culture (AIL), (DCA)</td>
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<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Science w/Lab Persp. (SCL)</td>
<td>3/4</td>
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#### Spring Semester

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<tr>
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<tbody>
<tr>
<td>ENGL.1020</td>
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<td>WLSP.1020</td>
<td>Spanish 2 &amp;Culture</td>
<td>3</td>
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<tr>
<td>WLIT.1010</td>
<td>Italian 1 and Culture</td>
<td>3</td>
</tr>
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<td>Arts and Hum. Persp. (AH)</td>
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### Junior Year

#### Fall Semester

<table>
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<tbody>
<tr>
<td>WLIT.2120</td>
<td>Italian 4 and Culture (AIL), (DCA)</td>
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<tr>
<td>WLSP.3xxx</td>
<td>Spanish Upper Level</td>
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</tr>
<tr>
<td>WLIT.3xxx</td>
<td>Italian Upper Level</td>
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<tr>
<td>Course#</td>
<td>Course Name</td>
<td>C r.</td>
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<tr>
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<tr>
<td>WLSP.3500</td>
<td>Intro. to Literary Analysis (CTPS), (WOC)</td>
<td>3</td>
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<tr>
<td>WLIT.3xxx</td>
<td>Italian Upper Level</td>
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<tr>
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<tr>
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<tr>
<td>Total</td>
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<td>15/ 16</td>
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</tbody>
</table>

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catalog policy
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
for details.

Last updated: 8/16/2018

Sample Degree Pathway for World Languages and Cultures - Spanish Option

For students who entered fall 2018 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>ENGL.1010 (<a href="https://www.uml.edu/catalog/courses/ENGL/1010">https://www.uml.edu/catalog/courses/ENGL/1010</a>) / HONR.1100 (<a href="https://www.uml.edu/catalog/courses/HONR/1100">https://www.uml.edu/catalog/courses/HONR/1100</a>)</td>
<td>College Writing I / FYSH (CW)</td>
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<tr>
<td>WLP.1010 (<a href="https://www.uml.edu/catalog/courses/WLP/1010">https://www.uml.edu/catalog/courses/WLP/1010</a>)</td>
<td>Spanish 1 &amp;Culture</td>
<td>3</td>
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<tr>
<td>FAHS.1090 (<a href="https://www.uml.edu/catalog/courses/FAHS/1090">https://www.uml.edu/catalog/courses/FAHS/1090</a>)</td>
<td>First Year Seminar1</td>
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<tr>
<td>MATH.1xxx (<a href="https://www.uml.edu/catalog/courses/MATH">https://www.uml.edu/catalog/courses/MATH</a>)</td>
<td>Math Persp. (MATH) - MATH.1110 (<a href="https://www.uml.edu/catalog/courses/MATH/1110">https://www.uml.edu/catalog/courses/MATH/1110</a>) (QL) recommended</td>
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<td>Arts and Hum. Persp. (AH)</td>
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Spring Semester

<table>
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<tr>
<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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<td>Free Elective</td>
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Sophomore Year

Fall Semester

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<td>WLP.2110 (<a href="https://www.uml.edu/catalog/courses/WLP/2110">https://www.uml.edu/catalog/courses/WLP/2110</a>)</td>
<td>Spanish 3 and Culture</td>
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<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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<td>xxxx.xxxx</td>
<td>Science w/Lab Persp. (SCL)</td>
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Spring Semester

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<tr>
<td>WLP.2120 (<a href="https://www.uml.edu/catalog/courses/WLP/2120">https://www.uml.edu/catalog/courses/WLP/2120</a>)</td>
<td>Spanish 4 and Culture (AIL), (DCA)</td>
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<tr>
<td>WLP.3xxx (<a href="https://www.uml.edu/catalog/courses/WLP">https://www.uml.edu/catalog/courses/WLP</a>)</td>
<td>Spanish Upper Level</td>
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<tr>
<td>WLP.3xxx (<a href="https://www.uml.edu/catalog/courses/WLP">https://www.uml.edu/catalog/courses/WLP</a>)</td>
<td>Spanish Upper Level</td>
<td>3</td>
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<td>Science w/Lab Persp. (SCL)</td>
<td>3/4</td>
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Junior Year

Fall Semester

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<tr>
<td>WLP.3xxx (<a href="https://www.uml.edu/catalog/courses/WLP">https://www.uml.edu/catalog/courses/WLP</a>)</td>
<td>Spanish Upper Level</td>
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<tr>
<td>WLP.3xxx (<a href="https://www.uml.edu/catalog/courses/WLP">https://www.uml.edu/catalog/courses/WLP</a>)</td>
<td>Spanish Upper Level</td>
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<tr>
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<td>STEM Persp.</td>
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### Spring Semester

<table>
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<tbody>
<tr>
<td>WLSP.3500 (<a href="https://www.uml.edu/catalog/courses/WLSP/3500">https://www.uml.edu/catalog/courses/WLSP/3500</a>)</td>
<td>Intro. to Literary Analysis (CTPS), (WOC)</td>
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<tr>
<td>WLSP.3xxx (<a href="https://www.uml.edu/catalog/courses/WLSP">https://www.uml.edu/catalog/courses/WLSP</a>)</td>
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### Senior Year

#### Fall Semester

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<td>WLSP.3/4xxx (<a href="https://www.uml.edu/catalog/courses/WLSP">https://www.uml.edu/catalog/courses/WLSP</a>)</td>
<td>Spanish Upper Level</td>
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<td>WLSP.3/4xxx (<a href="https://www.uml.edu/catalog/courses/WLSP">https://www.uml.edu/catalog/courses/WLSP</a>)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
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<tr>
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#### Spring Semester

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<tr>
<td>WLSP.3/4xxx (<a href="https://www.uml.edu/catalog/courses/WLSP">https://www.uml.edu/catalog/courses/WLSP</a>)</td>
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<tr>
<td>WLSP.3/4xxx (<a href="https://www.uml.edu/catalog/courses/WLSP">https://www.uml.edu/catalog/courses/WLSP</a>)</td>
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<tr>
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<td>Free Elective</td>
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for details.

Last updated: 8/16/2018
Zuckerberg College of Health Sciences

Degree Pathways are a semester-by-semester sequence of courses recommended for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A student's catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

Applied Biomedical Sciences

- **Clinical Science Option** fall 2020 and beyond fall 2019 - spring 2020 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- **Medical Laboratory Science Option** fall 2020 and beyond fall 2019 - spring 2020 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Clinical Laboratory Sciences


Exercise Physiology

- **fall 2016 - spring 2018** (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Exercise Science (3-year)

- **Clinical Option** fall 2022 and beyond

Exercise Science (4-year)

Nutritional Science

- **Dietetics Option** fall 2022 and beyond fall 2020 - spring 2022 fall 2019 - spring 2020 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Nursing


Pharmaceutical Sciences (4-year)
• Pharmaceutical Marketing and Management Option fall 2020 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Pharmaceutical Sciences (3-year)
• Pharmaceutical Marketing and Management Option fall 2022 and beyond

Public Health
• Health Sciences Concentration spring 2021 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2016 to fall 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2016
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  prior to fall 2015
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Community Health/Health Promotion Concentration
  spring 2021 and beyond
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2016 - fall 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
  fall 2015 - spring 2016
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
Policies

The policies below apply to students in the Zuckerberg College of Health Sciences. Please also see the university catalog for general policies (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) that apply to all students.

- Academic Advising (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Academic Requirements (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Academic Standards
- Declaration of Program and Change of Program (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Requirements for Continued Matriculation (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Special School Requirements (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Transfer Policies (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Zuckerberg College of Health Sciences Academic Standards

Department of Biomedical and Nutritional Sciences

1. Applied Biomedical Sciences - Clinical Science Option Cumulative, semester, and science GPA requirement of 2.500 Science GPA Includes: A&PI/II, Phy. Chem I/II, Micro, Organic Structures & Reactions, and Clinical Lab Theory (with all labs included) Grade of at least C in professional courses No withdrawals from professional courses

3. Nutritional Science - Dietetics Option Cumulative, semester, and science GPA requirement of 2.500 Science GPA Includes: A&PI/II, Phy. Chem I/II (with labs), and Human Nutrition Minimum grade of B- for professional courses Scores of 80% or better on assignments that directly relate to a competency outlined by the accrediting body of the program.

5. Nutritional Sciences - Nutrition and Wellness Option Cumulative, semester, and science GPA requirement of 2.500 Science GPA Includes: A&PI/II, Phy. Chem I/II (with labs), and Human Nutrition

6. Pharmaceutical Sciences - Pharmaceutical Marketing and Management Option Cumulative and semester GPA requirement of 2.500

Department of Physical Therapy and Kinesiology

1. Exercise Science - Clinical Option Must maintain a minimum 2.500 cumulative/overall GPA Must maintain a minimum 2.500 science GPA Sciences GPA includes: A&PI/II, Phy. Chem I/II, Physics I/II, and Biology I/II (with labs) Must maintain a minimum 2.500 major GPA (all EXER courses) Must successfully complete all professional courses (EXER) with a grade of C (2.000) or higher No withdrawals from professional courses (all EXER courses)

2. Exercise Science - Exercise and Fitness Management Option Must maintain a minimum 2.500 cumulative/overall GPA Must maintain a minimum 2.500 science GPA Sciences GPA includes: A&PI/II, Phy. Chem I/II, and Bio. for Scientists (with labs) Must maintain a
minimum 2.500 major GPA (all EXER courses)
No withdrawals from professional courses (all EXER courses)

3. Exercise Science - Students accepted into the Direct Entry to Physical Therapy Program Cumulative/overall and prerequisite science GPA requirement of 3.4 (calculated at the end of junior and senior year only) Pre-requisite Science GPA includes: A&PI/II, Phy. Chem I/II, and Physics I/II (with labs), Kinesiology, Exercise Physiology
Must successfully complete all professional courses (EXER) with a grade of C (2.000) or higher
No withdrawals from professional courses (all EXER courses)

Department of Public Health

1. Public Health - Health Sciences Concentration Cumulative and semester GPA requirement of 2.7
Science GPA requirement of 2.5
Sciences GPA includes: A&PI/II, Phy. Chem I/II, and Micro (with labs) and Biochemistry
Minimum grade of C for professional major courses (all PUBH and HSCI.2220)
HSCI.3080
HSCI.3400

2. Public Health - Community Health/Health Promotion Concentration Cumulative and semester GPA requirement of 2.5
Minimum grade of C for professional major courses (all PUBH and HSCI.2220)
HSCI.3080
HSCI.3400

Solomont School of Nursing

- Cumulative and semester GPA requirement of 2.7
- Cumulative Science GPA requirement of 2.7
Degree Pathways

Degree Pathways are a semester-by-semester sequence of courses recommended for successful completion of a degree, diploma, credential or certificate from the university.

Applied Biomedical Sciences

- Clinical Science Option fall 2020 and beyondfall 2019 - spring 2020
- Medical Laboratory Science Option fall 2020 and beyondfall 2019 - spring 2020

Clinical Laboratory Sciences

- Clinical Science Option fall 2017 - spring 2019
- Medical Laboratory Science Option fall 2018 - spring 2019

Nutritional Science

- General Option fall 2020 and beyondfall 2019 - spring 2020

Pharmaceutical Sciences (4-year)

- Pharmaceutical Marketing and Management Option fall 2020 and beyondfall 2018 - spring 2020

Pharmaceutical Sciences (3-year)

- Pharmaceutical Marketing and Management Option fall 2022 and beyond

Learning Outcomes

Learning Outcomes for the majors in Biomedical & Nutritional Sciences:

- Applied Biomedical Sciences
- Nutritional Science
- Pharmaceutical Sciences

For more information, contact the Department of Biomedical & Nutritional Sciences.
Suggested Degree Pathway for Applied Biomedical Sciences - Clinical Science Option

For students who entered fall 2020 and beyond.

**Freshman Year**

**Fall Semester**

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<tr>
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<th>Course Name</th>
<th>Cr.</th>
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<tr>
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<td>Anatomy &amp; Physiology Lab I (SCL)</td>
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<tr>
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<td>IPE First Year Seminar2</td>
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<td>College Writing I / FYSH (CW)</td>
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<td>Arts and Hum. Persp. (AH)1</td>
<td>3</td>
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<tr>
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<td>Social Sciences Persp. (SS)1</td>
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**Spring Semester**

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**Sophomore Year**

**Fall Semester**

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**Spring Semester**

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## Junior Year

### Fall Semester

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<td>[Human Nutrition]</td>
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### Spring Semester

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## Senior Year

### Fall Semester

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### Spring Semester

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### Total Minimum Credits = 120

1. Must choose one among (AH), (SS), or Free Electives that satisfies the (DCA) ELO.
2. Can be replaced with HSCI.1060 ([https://www.uml.edu/catalog/courses/HSCI/1060](https://www.uml.edu/catalog/courses/HSCI/1060)) or HSCI.1050 ([https://www.uml.edu/catalog/courses/HSCI/1050](https://www.uml.edu/catalog/courses/HSCI/1050)).
5 Can be replaced with CHEM.1130L (https://www.uml.edu/catalog/courses/CHEM/1130L) or CHEM.1230L (https://www.uml.edu/catalog/courses/CHEM/1230L).

6 Can be replaced with PHYS.1410 (https://www.uml.edu/catalog/courses/PHYS/1410) or PHYS.1610 (https://www.uml.edu/catalog/courses/PHYS/1610).

7 Can be replaced with PHYS.1410L (https://www.uml.edu/catalog/courses/PHYS/1410L) or PHYS.1610L (https://www.uml.edu/catalog/courses/PHYS/1610L).


9 Can be replaced with CHEM.1140L (https://www.uml.edu/catalog/courses/CHEM/1140L) or CHEM.1240L (https://www.uml.edu/catalog/courses/CHEM/1240L).

10 Can be replaced with CHEM.2210 (https://www.uml.edu/catalog/courses/CHEM/2210).


12 Can be replaced with HSCI.5510 (https://www.uml.edu/catalog/courses/HSCI/5510).

13 BNS Electives (at least 3 credits must be from courses with an *):

- BMSC.4830 (https://www.uml.edu/catalog/courses/BMSC/4830) Applied Biomedical Research I*
- BMSC.4840 (https://www.uml.edu/catalog/courses/BMSC/4840) Applied Biomedical Research II*
- BMSC.4900 (https://www.uml.edu/catalog/courses/BMSC/4900) Advanced Biomedical Lab Techniques*
- MLSC.3110 (https://www.uml.edu/catalog/courses/MLSC/3110) MLSC.5120 (https://www.uml.edu/catalog/courses/MLSC/5120) Medical Bacteriology
- MLSC.3210 (https://www.uml.edu/catalog/courses/MLSC/3210) Clinical Hematology
- MLSC.4520 (https://www.uml.edu/catalog/courses/MLSC/4520) Clinical Chemistry II
- MLSC.6100 (https://www.uml.edu/catalog/courses/MLSC/6100) / MLSC.6101 (https://www.uml.edu/catalog/courses/MLSC/6101) Clinical Toxicology w/Lab*
- MLSC.6000 (https://www.uml.edu/catalog/courses/MLSC/6000) / MLSC.6001 (https://www.uml.edu/catalog/courses/MLSC/6001) Biomarker Discovery and Applications w/Lab*
- NUTR.3710 (https://www.uml.edu/catalog/courses/NUTR/3710) Nutrition and Metabolism
- NUTR.4630 (https://www.uml.edu/catalog/courses/NUTR/4630) Vitamins and Minerals
Methods in Nutritional Assessment*

- **NUTR.4720**
  (https://www.uml.edu/catalog/courses/NUTR/4720)
  Nutrigenetics

- **PHRM.3100**
  (https://www.uml.edu/catalog/courses/PHRM/3100)
  Introduction to Drug Design

- **PHRM.4100**
  (https://www.uml.edu/catalog/courses/PHRM/4100)
  Basic Pharmaceutics

- **PHRM.6501**
  (https://www.uml.edu/catalog/courses/PHRM/6501) /
  **PHRM.6120**
  (https://www.uml.edu/catalog/courses/PHRM/6120)
  Drug Discovery w/Principles of Pharmaceutical Sciences Lab*

- **PHRM.6400**
  (https://www.uml.edu/catalog/courses/PHRM/6400) /
  **PHRM.6420**
  (https://www.uml.edu/catalog/courses/PHRM/6420)
  Pharmaceutical Analysis w/Lab*

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the CoreCurriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should be using their Advisement Report in SiS (https://www.uml.edu/Enrollment/SiS/default.aspx). If you need assistance, please contact your adviser.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last Updated: 6/12/2020

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**Suggested Degree Pathway for Applied Biomedical Sciences - Medical Laboratory Science Option**

For students who entered fall 2020 and beyond.

**Freshman Year**

**Fall Semester**

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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>HSCI.1010</td>
<td>Human Anatomy &amp; Physiology I (SCL)</td>
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<td>Human Anatomy &amp; Physiology I Lab (SCL)</td>
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<td>HSCI.1051</td>
<td>IPE First Year Seminar</td>
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**Spring Semester**

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### Sophomore Year

#### Fall Semester

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<td>PHYS.1030</td>
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#### Spring Semester

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### Junior Year

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<td>Human Biochemistry</td>
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<tr>
<td>MLSC.3210</td>
<td>Clinical Hematology</td>
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<td>MLSC.3230</td>
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#### Spring Semester

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<tr>
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<td>MLSC.4200</td>
<td>Clinical Hematology Practicum</td>
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### Senior Year

#### Fall Semester

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<tr>
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<td>Clinical Urinalysis Practicum</td>
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<td>MLSC.4520</td>
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<td>Medical Mycology and Parasitology</td>
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<td>MLSC.4130</td>
<td>Medical Mycology and Parasitology Lab</td>
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<td>MLSC.4180</td>
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<td>MLSC.4500</td>
<td>Clinical Chemistry Practicum</td>
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<td>MLSC.4520</td>
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**Total Minimum Credits = 120**

1 Can be satisfied with one of the following:

- MATH.1200 [Precalculus Mathematics I](https://www.uml.edu/catalog/courses/MATH/1200)
- MATH.1210 [Management Precalculus](https://www.uml.edu/catalog/courses/MATH/1210)
- MATH.1220 [Management Calculus](https://www.uml.edu/catalog/courses/MATH/1220)
- MATH.1310 [Calculus I](https://www.uml.edu/catalog/courses/MATH/1310)
- MATH.1380 [Calculus for the Life Sciences](https://www.uml.edu/catalog/courses/MATH/1380)

2 Can be substituted with CHEM.1110 [General Chemistry I](https://www.uml.edu/catalog/courses/CHEM/1110) or CHEM.1210 [Chemistry I](https://www.uml.edu/catalog/courses/CHEM/1210) or CHEM.1330 [Honors Chemistry I](https://www.uml.edu/catalog/courses/CHEM/1330).

3 Can be substituted with CHEM.1130L [General Chemistry Laboratory I](https://www.uml.edu/catalog/courses/CHEM/1130L) or CHEM.1230L [Chemistry Laboratory I](https://www.uml.edu/catalog/courses/CHEM/1230L).

4 Can be substituted with PHYS.1010 [Introductory Physics](https://www.uml.edu/catalog/courses/PHYS/1010) or PHYS.1410 [Physics I](https://www.uml.edu/catalog/courses/PHYS/1410).

5 Can be substituted with PHYS.1010L [Introductory Experimental Physics](https://www.uml.edu/catalog/courses/PHYS/1010L) or PHYS.1410L [Physics I Lab](https://www.uml.edu/catalog/courses/PHYS/1410L).

6 Can be substituted with CHEM.1120.
General Chemistry II or CHEM.1220
Chemistry II or CHEM.1360
Honors Chemistry II.

7Can be substituted with CHEM.1140L General Chemistry Laboratory II or CHEM.1240L Chemistry Laboratory II.

8Only for students from the Zuckerberg College of Health Sciences. Can be substituted with CHEM.2210 Organic Chemistry I.

9Only for students from the Zuckerberg College of Health Sciences. Can be substituted with CHEM.2270L Organic Chemistry Laboratory IA or CHEM.2290L Organic Chemistry Laboratory IB.

10Core Curriculum (Core Curr.) courses may be taken in any sequence.

11Must choose one among (AH), (SS), or Free Electives that satisfies the (DCA) ELO.

12Can be replaced with HSCL.1060 or HSCL.1050

Notes:
- All students must come for pre-registration advising every semester.
- All students must have transportation for off-campus practicum during junior and senior year.
- All students must have current CPR certification and immunization documentation report on file with department prior to the beginning of their junior year.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the CoreCurriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should be using their Advisement Report in SiS. If you need assistance, please contact your adviser.

Restriction on off-campus study:
Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

Last Updated: 8/10/2021

Suggested Degree Pathway for Pharmaceutical Sciences - Pharmaceutical Marketing and Management Option

For students who entered fall 2020 and beyond.

**Freshman Year**

**Fall Semester**

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
</tr>
<tr>
<td>HONR.1100</td>
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<tr>
<td>HSCL.1010</td>
<td>Human Anatomy and Physiology I (SCL)</td>
<td>3</td>
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<tr>
<td>HSCL.1030</td>
<td>Human Anatomy and Physiology I Lab</td>
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<td>HSCL.1051</td>
<td>IPE First-Year Seminar</td>
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<td>PSYC.1010</td>
<td>Introduction to Psychological Science (SS)</td>
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### Spring Semester

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<tbody>
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<td>Introduction to Public Health</td>
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### Sophomore Year

#### Fall Semester

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<td>Basic Clinical Microbiology and Pathology Lab</td>
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<td>HSCI.2510</td>
<td>Physiological Chemistry I</td>
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<td>HSCI.2530</td>
<td>Physiological Chemistry I Lab</td>
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<td>MATH.2830</td>
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### Junior Year

#### Fall Semester

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<tbody>
<tr>
<td>BMSC.3630</td>
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<td>ENTR.3000</td>
<td>Principles of Innovation and Entrepreneurship (DCA), (WOC)</td>
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<td>HSCI.3190</td>
<td>Pathophysiology</td>
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<td>Human Biochemistry</td>
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<td>MKTG.2010</td>
<td>Marketing Principles</td>
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#### Spring Semester

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### Sophomore Year

#### Fall Semester

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<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>BMSC.3630</td>
<td>Analytical Instrumentation Lab</td>
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<td>ENTR.3000</td>
<td>Principles of Innovation and Entrepreneurship (DCA), (WOC)</td>
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#### Spring Semester

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<tr>
<th>Course#</th>
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<tr>
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Senior Year

Fall Semester

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<tr>
<td>PHRM.4100</td>
<td>Basic Pharmaceutics</td>
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<td>POMS.4040</td>
<td>Managerial Quality Control</td>
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<td>PUBH.2070</td>
<td>The U.S. Healthcare System</td>
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<td>Intro to Epidemiology (IL), (QL)</td>
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Spring Semester

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<td>Applied Biomedical Genetics (AIL)</td>
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Total Minimum Credits = 122

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

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Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last Updated: 10/20/2021

Suggested Degree Pathway for Nutritional Science - General Option

For students who entered fall 2020 and beyond.

Freshman Year

Fall Semester

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<tbody>
<tr>
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<td>Human Anatomy &amp;Physiology I (SCL)</td>
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<td>HSCL.1030</td>
<td>Human Anatomy &amp;Phys. I Lab (SCL)</td>
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<td>HSCL.1051</td>
<td>IPE First Year Seminar</td>
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<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
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Spring Semester

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<th>Course Name</th>
<th>Cr.</th>
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### Sophomore Year

#### Fall Semester

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<th>Course Name</th>
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<tbody>
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<td>Basic Clinical Microbiology Lab</td>
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<td>Physiological Chem I</td>
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<td>NUTR.1100</td>
<td>Nutrition and Wellness</td>
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#### Spring Semester

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<tr>
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<td>MATH.2830</td>
<td>Intro. to Statistics (STEM)</td>
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<td>BMSC.2420</td>
<td>Organic Structures and Reactions I</td>
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### Junior Year

#### Fall Semester

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<tbody>
<tr>
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<td>HSCI.3400</td>
<td>IPE Research Methods</td>
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<td>NUTR.3720</td>
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#### Spring Semester

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<tbody>
<tr>
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<td>Food Science with Lab</td>
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<tr>
<td>NUTR.3360</td>
<td>Lifecycle Nutrition</td>
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<tr>
<td>NUTR.3710</td>
<td>Nutrition &amp;Metabolism</td>
<td>3</td>
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<tr>
<td>PUBH.3050</td>
<td>Intro. to Epidemiology (IL)</td>
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### Senior Year

#### Fall Semester

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Chemistry II with Lab OR CHEM.1220
(https://www.uml.edu/catalog/courses/CHEM/1220) / CHEM.1240L
(https://www.uml.edu/catalog/courses/CHEM/1240L) Chemistry II with Lab

Note: All students must come for pre-registration advising every semester.

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Last Updated: 10/20/2020

Suggested Degree Pathway for Nutritional Science - Dietetics Option

For students who entered fall 2020 to spring 2022.

Freshman Year

Fall Semester

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Spring Semester

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Total Minimum Credits = 120

1 Meets Core Curriculum Social Sciences Perspective (SS) requirement.


4 Can be replaced with CHEM.1120 (https://www.uml.edu/catalog/courses/CHEM/1120) / CHEM.1140L (https://www.uml.edu/catalog/courses/CHEM/1140L) General

GRADUATE – ALL COLLEGES

GRADUATE – ALL COLLEGES

UNDERGRADUATE / COLLEGE OF HEALTH SCIENCES

Academic Catalog 2021 - 2022 / Biomedical & Nutritional Sciences - General Information
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<td>Human Anatomy &amp; Physiology II (SCL)</td>
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### Sophomore Year

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<td>Life Cycle Nutrition</td>
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<td>MGMT.3100</td>
<td>Human Resources Management</td>
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### Senior Year

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<td>NUTR.4720</td>
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### Total Minimum Credits = 120

1. Meets Core Curriculum Social Sciences Perspective (SS) requirement.
2. Can be replaced with CHEM.1110 (Chemistry I with Lab) OR CHEM.1130L (Chemistry I with Lab).
3. Can be replaced with CHEM.1120 (Chemistry II with Lab) OR CHEM.1220 (Chemistry II with Lab).
4. Organic Chemistry is required for the MPH Coordinated Program in Dietetics. Organic lecture and lab may also be required for other graduate programs.

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_Last Updated: 12/03/2021_

**Suggested Degree Pathway for Nutritional Science - Nutrition and Wellness Option**

_for students who entered fall 2020 and beyond._

### Freshman Year

#### Fall Semester

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<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
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<td>PSYC.1010</td>
<td>Introduction to Psychological Science (SS)</td>
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#### Spring Semester

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<tr>
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### Sophomore Year

#### Fall Semester

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<tr>
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#### Spring Semester

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### Junior Year

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<td>Marketing Principles</td>
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### Senior Year

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#### Spring Semester

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**Total Minimum Credits = 120**

1. Meets Core Curriculum Social Sciences Perspective (SS) requirement.

2. Can be replaced with CHEM.1110 / CHEM.1130L / CHEMISTRY I with Lab OR CHEM.1210 / CHEM.1230L.
Can be replaced with CHEM.1120 OR CHEM.1220

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Last Updated: 10/20/2020

Suggested Degree Pathway for Nutritional Science - Dietetics Option

For students who entered fall 2022 and beyond.

Freshman Year

Fall Semester

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Spring Semester

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Total: 16

Sophomore Year
## Fall Semester

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<td>HSCI.2130</td>
<td>Basic Clinical Microbiology Lab</td>
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## Spring Semester

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<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
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<tr>
<td>BMSC.2420</td>
<td>Organic Structures and Reactions I</td>
<td>3</td>
</tr>
<tr>
<td>HSCI.2520</td>
<td>Physiological Chemistry II</td>
<td>3</td>
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<tr>
<td>HSCI.2540</td>
<td>Physiological Chemistry II Lab</td>
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<td>MATH.2830</td>
<td>Intro to Statistics (STEM)</td>
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<td>NUTR.2060</td>
<td>Human Nutrition</td>
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<td>xxxx.xxxx</td>
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## Junior Year

### Fall Semester

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<tr>
<td>HSCI.3500</td>
<td>Human Biochemistry</td>
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<tr>
<td>MGMT.3010</td>
<td>Organizational</td>
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### Spring Semester

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<tbody>
<tr>
<td>NUTR.3310</td>
<td>Practice of the Nutrition Professional</td>
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<td>NUTR.3450</td>
<td>Community Nutrition (DCA), (SRE)</td>
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<tr>
<td>NUTR.3720</td>
<td>Body Diversity and Health</td>
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## Senior Year

### Fall Semester

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<tbody>
<tr>
<td>HSCI.3400</td>
<td>IPE Research Methods</td>
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<tr>
<td>NUTR.4630</td>
<td>Vitamins and Minerals</td>
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<td>NUTR.4810</td>
<td>Medical Nutrition Therapy I</td>
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### Spring Semester

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<tbody>
<tr>
<td>NUTR.3010</td>
<td>Food Science with Lab</td>
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<tr>
<td>NUTR.3360</td>
<td>Life Cycle Nutrition</td>
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<tr>
<td>NUTR.3710</td>
<td>Nutrition and Metabolism</td>
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<tr>
<td>MGMT.3100</td>
<td>Human Resources Management</td>
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</table>
Managing Teams and Projects 3
Nutrigenetics 3
Medical Nutrition Therapy II 3
Introduction to Epidemiology (IL) 3
Free Elective 3

**Total Minimum Credits = 120**

1. Meets Core Curriculum Social Sciences Perspective (SS) requirement.

2. Can be replaced with CHEM.1110 with Lab OR CHEM.1210 with Lab.

3. Can be replaced with CHEM.1120 with Lab.

4. Organic Chemistry is required for the MPH Coordinated Program in Dietetics; Organic lecture and lab may also be required for other graduate programs.

Note: All students must come for pre-registration advising every semester.

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**Restriction on off-campus study:**

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**Last Updated: 3/02/2021**

**Suggested Degree Pathway for Pharmaceutical Sciences, Pharmaceutical Marketing and Management Option - 3 Year Degree**

For students who entered fall 2022 and beyond.

**First Year**

**Fall Semester**

<table>
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<tr>
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<th>Course Name</th>
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<tr>
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<td>College Writing I / FYSH (CW)</td>
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<tr>
<td>HSCI.1010</td>
<td>Human Anatomy and Physiology I (SCL)</td>
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<tr>
<td>HSCI.1030</td>
<td>Human Anatomy and Physiology I Lab</td>
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<td>HSCI.1051</td>
<td>IPE First-Year Seminar or ZCHS Transfer Seminar</td>
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<td>PSYC.1010</td>
<td>Introduction to Psychological Science (SS)</td>
<td>3</td>
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<td>SOCL.1010</td>
<td>Introduction to Sociology (SS)</td>
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**Total** 14

**Spring Semester**

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<td>Human Anatomy and Physiology II (SCL)</td>
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<tr>
<td>HSCI.1040</td>
<td>Human Anatomy and</td>
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### Second Year

#### Summer Semester

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<tbody>
<tr>
<td>HSCI.2510</td>
<td>Phy. Chem. I / Chemistry I</td>
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<tr>
<td>CHEM.1210</td>
<td>Ph. Chem. I / Chemistry I</td>
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<td>HSCI.2530</td>
<td>Phy. Chem. I Lab / Chemistry I Lab</td>
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<td>CHEM.1230L</td>
<td>Ph. Chem. II / Chemistry II Lab</td>
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<td>HSCI.2520</td>
<td>Phy. Chem. II / Chemistry II</td>
<td>3</td>
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<tr>
<td>CHEM.1220L</td>
<td>Phy. Chem. III / Chemistry III</td>
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<td>HSCI.2540</td>
<td>Phy. Chem. III Lab / Chemistry III Lab</td>
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<td>CHEM.1240L</td>
<td>Phy. Chem. III Lab / Chemistry III Lab</td>
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#### Fall Semester

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<tr>
<td>ECON.2010</td>
<td>Economics I (SS)</td>
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<tr>
<td>HSCI.2110</td>
<td>Basic Clinical Microbiology and Pathology</td>
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<tr>
<td>HSCI.2130</td>
<td>Basic Clinical Microbiology and Pathology Lab</td>
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<tr>
<td>HSCI.2190</td>
<td>Pathophysiology</td>
<td>3</td>
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<tr>
<td>MATH.2830</td>
<td>Introduction to Statistics (STEM)</td>
<td>3</td>
</tr>
<tr>
<td>PHIL.2030</td>
<td>Introduction to Ethics (AH), (SRE)</td>
<td>3</td>
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<tr>
<td><strong>Total</strong></td>
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#### Spring Semester

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<tbody>
<tr>
<td>HSCI.2220</td>
<td>Health and Disease across the Lifespan</td>
<td>3</td>
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<tr>
<td>HSCI.3400</td>
<td>IPE Research Methods</td>
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</tr>
<tr>
<td>NUTR.2060</td>
<td>Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>POMS.2010</td>
<td>Introduction to Business Analytics</td>
<td>3</td>
</tr>
<tr>
<td>PUBH.3100</td>
<td>Infectious Disease (CTPS)</td>
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### Third Year

#### Fall Semester

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<tbody>
<tr>
<td>BMSC.3630</td>
<td>Analytical Instrumentation Lab</td>
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<tr>
<td>ENTR.3000</td>
<td>Principles of Innovation and Entrepreneurship (DCA), (WOC)</td>
<td>3</td>
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<tr>
<td>PHRM.4100</td>
<td>Basic Pharmaceutics</td>
<td>3</td>
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<tr>
<td>PUBH.2070</td>
<td>The US Healthcare System</td>
<td>3</td>
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<tr>
<td>PUBH.3050</td>
<td>Introduction to Epidemiology</td>
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### Spring Semester

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<tr>
<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>BMSC.4350</td>
<td>Applied Biomedical Genetics (AIL)</td>
<td>3</td>
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<tr>
<td>MGMT.4150</td>
<td>Managing teams and Projects</td>
<td>3</td>
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<tr>
<td>PHRM.3200</td>
<td>Molecular Pharmacology</td>
<td>3</td>
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<tr>
<td>POMS.4040</td>
<td>Managerial Quality Control</td>
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### Summer Semester

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<td>Arts and Hum. Persp. (AH)</td>
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**Total Minimum Credits = 122**

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**Restriction on off-campus study:**

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**Last Updated: 4/14/2022**

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**Suggested Degree Pathway for Exercise Science - Exercise and Fitness Management Option**

**For students who entered fall 2020 and beyond.**

### Freshman Year

#### Fall Semester

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<th>Course Name</th>
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<tbody>
<tr>
<td>HSCI.1010</td>
<td>Human Anatomy &amp; Physiology I (SCL)</td>
<td>3</td>
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<tr>
<td>HSCI.1030</td>
<td>Human Anatomy &amp; Physiology I Lab (SCL)</td>
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<tr>
<td>HSCI.1051</td>
<td>Interprofessional Education First Year Seminar</td>
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<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
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<tr>
<td>PSYC.1010</td>
<td>Introduction to Psychological Science (SS)</td>
<td>3</td>
</tr>
<tr>
<td>PUBH.1021</td>
<td>Introduction to Public Health</td>
<td>3</td>
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#### Spring Semester

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<th>Course Name</th>
<th>Credits</th>
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<tr>
<td>HSCI.1020</td>
<td>Human Anatomy &amp; Physiology II (SCL)</td>
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<td>Human Anatomy &amp; Physiology II Lab (SCL)</td>
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<td>SOC1.1010</td>
<td>Intro to Sociology (SS)</td>
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<tr>
<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
<td>3</td>
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<tr>
<td>MATH.2830</td>
<td>Introduction to Statistics (MATH)</td>
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<tr>
<td>PSYC.2600</td>
<td>Child and Adolescent Development (SS)</td>
<td>3</td>
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### Sophomore Year

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<tr>
<td>PUBH.2050</td>
<td>Social Determinants of Health</td>
<td>3</td>
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<tr>
<td>HSCI.2510</td>
<td>Physiological Chemistry I</td>
<td>3</td>
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<tr>
<td>HSCI.2530</td>
<td>Physiological Chemistry I Lab</td>
<td>1</td>
</tr>
<tr>
<td>HSCI.3400</td>
<td>IPE Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>NUTR.2060</td>
<td>Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
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#### Spring Semester

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<th>Course Name</th>
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<tbody>
<tr>
<td>HSCI.2520</td>
<td>Physiological Chemistry II</td>
<td>3</td>
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<tr>
<td>HSCI.2540</td>
<td>Physiological Chemistry II Lab</td>
<td>1</td>
</tr>
<tr>
<td>EXER.2020</td>
<td>Intro to Exercise Science</td>
<td>3</td>
</tr>
<tr>
<td>POMS.2010</td>
<td>Introduction to Business Analytics</td>
<td>3</td>
</tr>
<tr>
<td>BIOL.1220</td>
<td>Biology for Scientists (STEM)</td>
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<td>BIOL.1240L</td>
<td>Biology for Scientists Lab</td>
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### Junior Year

#### Fall Semester

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<tbody>
<tr>
<td>ENTR.3000</td>
<td>Principles of Innovation and Entrepreneurship</td>
<td>3</td>
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#### Spring Semester

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<tr>
<td>EXER.4300</td>
<td>Exercise is Medicine</td>
<td>3</td>
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<td>PUBH.4030</td>
<td>Mind, Body, and Health</td>
<td>3</td>
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**Total Minimum Credits = 123**

1EXER.4200 can be substituted with EXER.4210.

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_Last Updated: 10/20/2021_
BMSC.1010 Biomedical Sciences Freshman Seminar -  
Credits: 1  
This course is intended to provide the student with an introduction to the professions available within the field of biomedical sciences. Topics include history of the profession, state and federal laboratory regulations, professional organizations, ethics and professionalism, and an overview of each laboratory discipline. The role of the biomedical scientist in the clinical setting will be explored further through laboratory and industry tours.

BMSC.3100 Introduction to Laboratory Research -  
Credits: 3  
This course prepares students in the Biomedical Sciences major for biomedical research. Students will learn basic and clinical research design and experimental aspects, applying critical thinking skills and engaging in outcome evaluation of research studies and quantitative data analysis and interpretation. Students will develop an understanding of the key differences between basic, clinical, and translational research and their implications and relation to diagnostic, treatment, and health management. The course will introduce students to literature review, identifying basic and key gaps and formulating key questions for scientific experimental pursuit. The course also reviews basic statistics research methods and the importance of significant statistical sampling.

BMSC.3220 Clinical Molecular and Cell Biology I -  
Credits: 3  
The course is designed to provide a foundation in Molecular Biology and will cover structure, function, and regulation of proteins and nucleic acids. Other topics will include transcription, translation, DNA replication, DNA repair, genomics, and proteomics. A significant portion of the course will be dedicated to molecular biology techniques used to study proteins and nucleic acids. Emphasis will be placed on the application of molecular biology in biomedical research and healthcare.

BMSC.3240 Clinical Molecular and Cell Biology Laboratory I - Credits: 2  
This laboratory course introduces basic molecular techniques and methodologies with hands-on experience. Starting with practices on information access from the NCBI databases, the students will learn techniques for proteins and nucleic acids extraction, quantification and separation, primer designs and PCR applications, gene cloning and expression, and principles of column chromatography for protein purification.

BMSC.3420 Organic Structures and Reactions II -  
Credits: 3  
This course presents fundamental principles of Organic Chemistry and chemical reactions not covered in Organic Structures and Reactions I, with continued emphasis on concepts most relevant to the health professions. More detailed structure-stability-reactivity relationships, stereochemical principles, and reaction mechanisms are presented, including many relevant examples of the applications of Organic Chemistry in drug design and synthesis, as well as its central role on metabolism and pharmacology. The course reviews and reinforces the use of spectral techniques for the qualitative analysis of organic compounds and elucidation of chemical structures, with emphasis on infrared spectroscopy, mass spectrometry, and nuclear magnetic resonance spectroscopy.

BMSC.3440 Organic Structures and Reactions Laboratory II - Credits: 1  
This course is designed to expose and train students interested in pursuing careers in health-related professions to more advanced laboratory techniques used in Organic Chemistry, building on the principles learned in organic structures and Reactions Laboratory I, including extraction, recrystallization, and chromatography. The synthesis, purification, and characterization of various classes of organic compounds will be carried out, including a multi-step synthesis. Laboratory experiments will be performed to exemplify and expand upon the principles covered in the Organic Structures and Reactions II lecture course.

BMSC.3700 Biomedical Sciences Junior Seminar -  
Credits: 2  
This course introduces students to contemporary biomedical research projects within the field of biomedical sciences. Students will attend research seminars organized by the Biomedical Sciences faculty and evaluate each presentation. Students will also develop interviewing skills and techniques for future employment and graduate school opportunities.

BMSC.4110 OMICS: Essentials and Applications -  
Credits: 3  
This course is designed to introduce the current OMICS technologies and their practical applications in human health and living environments. It provides the essential knowledge to explore OMICS technologies on person medicine. OMICS are emerging technologies for understanding the diversity and distribution of living organisms and the behavior of cells, tissues, organs, and the whole organism at the molecular level using methods such as genomics, proteomics, systems biology, bioinformatics, as well as the computational tools needed to analyze and make sense of the data. Each of these OMICS topics will be covered by lectures for general overview and
discussions on practical applications.

BMSC.4120 Clinical Molecular and Cell Biology II - Credits: 3

The course is designed to provide a foundation in cell biology and will primarily focus on essential structural components and organelles and their biological functions, as well as molecular signaling mechanisms underlying major cellular processes and intercellular communications. The course will also cover integration of cells into tissues, system cells, cell death, and cancer. Cell biology techniques will be studied and the application of cell biology in biomedical research and healthcare will be emphasized.

BMSC.4140 Clinical Molecular and Cell Biology Laboratory II - Credits: 2

This laboratory course introduces basic cell biology techniques and methodologies with hands-on experience. The course will focus on practices of tissue culture, fluorescent labeling, membrane surface and intracellular protein visualization, microscopy, flow cytometry, posttranslational protein modification assays, ion channel functional assessment, cell signaling research methods, signaling pathway analysis and modeling disease conditions in cell lines.

BMSC.4900 Advanced Biomedical Laboratory Techniques - Credits: 3

This advanced laboratory course is designed for students to reinforce and apply many of the concepts and hands-on laboratory techniques learned in all of the previous courses taken by Biomedical Sciences majors. Students will engage in a semester-long laboratory project or projects involving extensive hands-on experience, whose primary objective is to empower students with the necessary knowledge and experience to make them employable in their field of choice within the Biomedical Sciences upon graduation for the University.

MLSC.2410 Clinical Laboratory Theory (Formerly 36.241) - Credits: 3

This course is designed to introduce the theoretical principles and applications of diagnostic techniques and the procedures of the clinical laboratory including phlebotomy. It will define and describe both qualitative and quantitative, manual and automated laboratory techniques, particularly in hematology.

MLSC.2430 Clinical Laboratory Theory Lab (Formerly 36.243) - Credits: 1

A laboratory course designed to expose prospective clinical scientists to many of the essentials skills, methods, and procedures basic to professional performance in the clinical laboratory; to explain and demonstrate to students and have them perform these methods; to develop an understanding of these techniques and to provide a technical background, an approach to testing that the student can build upon and use in future courses.

MLSC.3110 Medical Bacteriology I (Formerly 36.311/512) - Credits: 3

A study of the cultural, biochemical, genetic, serological and pathogenic characteristics of disease producing microorganisms. Emphasis will be placed on the pathophysiology of the infectious diseases and their relationship to isolation and identification of the pathogenic microorganisms.

MLSC.3130 Medical Bacteriology Laboratory I (Formerly 36.313) - Credits: 2

This course is designed to introduce the student to pathogenic microorganisms, media and techniques used in the identification of these organisms. Emphasis will be based upon the isolation, identification and differentiation of pathogenic microorganisms common to man. In addition, quality control and antimicrobial susceptibility testing will be covered.

MLSC.3200 Clinical Hematology Practicum (Formerly 36.420 and MLSC.4200) - Credits: 2

Supervised clinical training in an affiliated clinical laboratory. Designed to reinforce knowledge and skills gained in lecture and laboratory and at the same time introduce the student to the daily activities of a clinical hematology laboratory. Emphasis will be placed on quality control, methodology, and clinical interpretation and correlation.

MLSC.3210 Clinical Hematology (Formerly 36.321) - Credits: 3

A study of the human hematopoietic system and its relationship to other organ systems. Discussions will include morphological and biochemical relationships of erythropoiesis and leukopoiesis in health and disease states. A study of the mechanics of blood coagulation as it relates to health and disease states will also be included.

MLSC.3230 Clinical Hematology Laboratory (Formerly 36.323) - Credits: 2

This course is designed to emphasize current hematological and coagulation procedures used in today’s clinical laboratory. The implications of these tests to diagnose, monitor and evaluate the various hematological disorders are also discussed.
MLSC.3340 Advanced Topics in Hemostasis
(Formerly 36.434 and MLSC.4340) - Credits: 1
This course will constitute an in-depth study of the hemostatic mechanism. Current research and case studies on the roles of vessel endothelium, platelet function, clotting procoagulants and fibrinolysis will be presented. Students will diagnose pathologic hemostatic states, such as hemorrhage or thrombophilia, due to deficiencies and impairments of these roles, including the impact of natural and acquired anticoagulants/inhibitors and anticoagulant therapy.

MLSC.3530 Clinical Chemistry Laboratory I
(Formerly 36.353) - Credits: 2
This course is designed to introduce the clinical techniques of biochemical measurement in body fluids. These techniques range from general to specific assays and from the classical to the up-to-date state of the art methodologies. Biochemical measurements of the following in the normal state and alterations due to pathophysiology are discussed: amino acids, proteins, carbohydrates and lipids. Quality control of assay procedures is emphasized.

MLSC.3610 Clinical Laboratory Instrumentation
(Formerly 36.361) - Credits: 3
This course is designed to provide an in-depth knowledge of clinical chemistry laboratory instrumentation. Emphasis is placed on theoretical concepts, instrument components and design, calibration and troubleshooting of modern instrumentation, and analytical methodologies in the clinical laboratory. Additionally, qualitative and quantitative applications of instrumental techniques are covered. Computer applications are included where appropriate. The following spectroscopic instruments are studied: ultraviolet, visible and infra red absorption, fluorescence, turbidimetry and nephelometry, reflectance, flame emission and atomic absorption spectroscopy. Electrochemical methods of analysis are reviewed, including potentiometric techniques, voltammetry and coulometry. Chromatographic instrumentation and methods are discussed, such as column and thin layer chromatography, high pressure liquid chromatography, gas chromatography, and ion exchange chromatography.

MLSC.3730 Clinical Laboratory Sciences Seminar
(Formerly 36.373) - Credits: 1
This course is designed to familiarize the student with different interview skills and approaches to resume writing, the process of implementing a laboratory information system, good education practices and team building skills. Students will evaluate current research designs and work in a team to create a presentation to express their opinions as educated consumers.

MLSC.3810 Molecular Diagnostics Laboratory - Credits: 2
The Molecular Diagnostics course is designed to instruct students in the principles and laboratory techniques used in Molecular Diagnostics in the clinical laboratory setting. An overview of nucleic acid structure, gene expression, and genetic diseases will be provided. Students will be given both lecture and laboratory instruction in basic molecular testing methodologies.

MLSC.4100 Clinical Microbiology Practicum
(Formerly 36.410) - Credits: 2
Supervised clinical training in an affiliated clinical laboratory, designed to reinforce knowledge and skills gained in lecture and laboratory and at the same time introduce the student to the daily activities of the clinical microbiology laboratory. Emphasis will be placed on quality control, methodology and clinical interpretation.

MLSC.4110 Medical Mycology & Parasitology
(Formerly 36.411) - Credits: 3
Intensive study of classification, morphology, physiology, genetics and ecology of medically important fungi and parasites. Emphasis on epidemiology, pathogenicity and diagnosis.

MLSC.4130 Medical Mycology & Parasitology Laboratory
(Formerly 36.413) - Credits: 2
The laboratory is designed to emphasize principles and procedures used in the isolation, cultivation, and identification of medically important fungi and parasites.

MLSC.4150 Clinical Virology/Serology Lab
(Formerly 36.415) - Credits: 2
This course is designed to survey pathogenic viruses emphasizing diagnosis of disease. Evaluation of new technology and diagnostic tests with reference to diagnosis and prognosis of disease are examined. In addition, this course is designed to instruct students in the principles and techniques used in the clinical immunology/serology setting. Students will become proficient in laboratory techniques such as immunodiffusion, ELISA, hemagglutination, and neutralization techniques used for immunodiagnosis.

MLSC.4160 Molecular Diagnostics Lab
(Formerly 36.416) - Credits: 1
This course is designed to instruct students in the principles
and techniques used in Molecular Diagnostics in the clinical laboratory setting. Students will be given both lecture and laboratory instruction in basic molecular testing methodologies. At the completion of this course, the student will have a basic understanding of molecular diagnostic principles and will be proficient in molecular diagnostic laboratory techniques including DNA extraction, PCR using SINEs and STRs, restriction enzyme digestion, ELISA, bacterial transformation, DNA sequencing and microarrays.

MLSC.4180 Medical Laboratory Science Senior Seminar - Credits: 2

This course is designed to familiarize the student with educational methodologies, teambuilding skills, and the principles and practices of research study design. Students will evaluate current research designs, and work in a team to create a presentation to express their opinions as educated laboratory consumers. In addition, this course will provide a review of the theoretical and practical knowledge required to successfully pass the ASCP Board of Certification Exam in Medical Laboratory Science. Case studies and different types of questions integrating all areas of the clinical laboratory will be utilized to review the important topics in each discipline.

MLSC.4300 Clinical Immunohematology Practicum (Formerly 36.430) - Credits: 2

Supervised clinical training in an affiliated clinical laboratory is designed to reinforce knowledge and skills gained in lecture and laboratory and, at the same time, introduce the student to the daily activities of the clinical immunohematology laboratory. Emphasis will be placed on quality control, methodology and clinical interpretation and correlation.

MLSC.4310 Clinical Immunohematology (Formerly 36.431) - Credits: 3

Lecture and case study discussions look at the major red cell antigen/antibody systems that are of importance in understanding transfusion therapies, blood antigen and antibody testing, compatibility testing, and pathological diseases. Emphasis is on differentiation and clinical significance of each system. Donor selection regulations, component preparation, adverse transfusion reactions, and hemotherapy will also be discussed.

MLSC.4330 Clinical Immunohematology Laboratory (Formerly 36.433) - Credits: 2

Practical laboratory experience in blood banking, illustrating the concepts stressed in the lecture including ABO and Rh typing, identification of other red cell antigens, antibody screening and identification, direct antiglobulin testing, crossmatching, and other techniques performed in the Clinical Immunohematology laboratory.

MLSC.4500 Clinical Chemistry Practicum (Formerly 36.450) - Credits: 2

Supervised clinical training in an affiliated hospital clinical laboratory. Designed to reinforce knowledge and skills gained in lecture and laboratory and at the same time introduce the student to the daily activities of the clinical laboratory. Emphasis will be placed on quality control, methodology and clinical interpretation and correlation.

MLSC.4510 Urinalysis Practicum (Formerly 36.451) - Credits: 0

A one-week clinical rotation in an affiliated laboratory designed to give the student experience in microscopic examination and evaluation of urine sediments. Emphasis is on correlating physical and chemical characteristics with sediment evaluation and diagnoses as well as on quality control, methodology, and clinical interpretation and correlation. Additional routine tests of a physical and chemical nature will be performed and demonstrated.

MLSC.4520 Clinical Chemistry II (Formerly 36.452) - Credits: 3

This course will provide students with knowledge and theory of techniques associated with determinants of acid-base balance, blood gases, electrolytes, osmolality, hemoglobin, toxicology, therapeutic drug monitoring and endocrinology. Students learn to interpret and evaluate the performance of these laboratory methods and develop the ability to recognize levels of these biochemical components in both normal and pathophysiological states. Laboratory techniques range from general to specific assays and from the classical to state-of-the-art methodologies. In addition, students will be able to assess the quality and validity of laboratory generated values, determine when values are invalid and suggest ideas to troubleshoot methodologies. Students will also be able to produce and analyze statistical data for use in correlation, comparison and evaluation of laboratory techniques. Prerequisite: 35.351

MLSC.4530 Laboratory Management and Ethics (Formerly 36.453) - Credits: 2

This course will acquaint the student with the many managerial, educational, technical, and administrative theories and practices, as well as moral and ethical issues that may confront the health care professional functioning within a clinical or research laboratory setting. In addition, it will present the varied career opportunities that are available for
graduates.

**MLSC.4540 Clinical Chemistry Laboratory II**
(Formerly 36.454) - Credits: 2

This course, a continuation of MLSC.3530, is designed to instruct the student in the analytical procedures and methods currently used in the clinical laboratory. Manual and automated methods utilized in the assessment of such topics as acid-base balance, porphyrins, toxicology and vitamins will be introduced. In addition, methods associated with the routine examinations of urine and other body fluids will be introduced. Quality control, laboratory safety and professional performance are emphasized.

**MLSC.4610 Clinical Virology** - Credits: 1

This course is designed to introduce the student to the field of Clinical Virology. Viral structures, physiology, and pathogenesis will be discussed. Emphasis will be placed on viral diseases and the laboratory techniques used to identify them.

**MLSC.4740 Senior Seminar** (Formerly 36.474) - Credits: 1

This course is designed to familiarize the student with different types of questions used in the national certification exams and to give the student the opportunity to practice taking mock certification examinations.

**NUTR.1100 Nutrition and Wellness** (Formerly 35.210 and NUTR.2100)) - Credits: 3

This course is an introductory course to the science of nutrition as it applies to everyday life and health. Focus will include the six major nutrients: carbohydrates, lipids (fats), protein, vitamins, minerals, and water and their importance in the human body. Digestion, absorption, and metabolism in the human body will be introduced. The course will also examine energy balance and weight management as they relate to nutrition and fitness. The impact of culture, demographics and ethnicity on nutritional intake will be discussed. Students will explore the relationship between nutrition and health through laboratory experiences. Students should not be taking NUTR.1100 if they already took NUTR.2060.

**NUTR.2050 Introduction to Nutritional Science** (Formerly 35.205) - Credits: 3

This course introduces students to the major in Nutritional Science. Objectives of the major are covered along with beginning nutritional and food science principles, history of the profession, career options, and legal aspects of practice as a nutrition educator. An integrated survey of nutrition science as it relates to human physiological chemistry, food chemistry and biochemistry will also be discussed. This course will include guest speakers from within the department and outside the university. This course will be restricted to nutritional science majors.

**NUTR.2060 Human Nutrition** (Formerly 35.206) - Credits: 3

This course provides an overview of nutrition and the components of a nutritious diet during the various stages of the life cycle. It emphasizes the impact of nutrition on the major contemporary health problems in the United States. Nutrition issues, trends and research, and their effect on society and the legislative process will be explored.

**NUTR.2700 Introduction to Food Safety** - Credits: 3

This course focuses on food safety from a 'farm to fork' perspective. The class will cover a comprehensive overview of the food safety system addressing the biological, chemical and physical agents with emphasis on domestic food-borne outbreaks, public health significance, disease control, and the microbial spoilage of foods. The history and fundamental principles of food safety will be addressed including the risk and hazard analysis of different foods and the important advances in food system that are necessary for controlling hazards in the modern food industry.

**NUTR.3010 Food Science with Lab** - Credits: 3

This course explores the basic principles of food science such as: food preparation, food ingredients and food preservation, regulatory agencies and food regulations, and concepts that relate to food safety, recipe alteration and menu design. The laboratory component demonstrates and illustrates the chemical and physical properties of foods including the effects of processing, ingredients, and storage on food quality and nutrient retention.

**NUTR.3310 Practice of Nutrition Professional**
(Formerly NUTR.4310) - Credits: 3

This course provides students with the knowledge and application of the skills of the dietetics professional and the governance of nutrition and dietetics practice. Student will learn the importance of quality management of food and nutrition services and the management theories and business principles required to deliver programs and services. Students will also learn the fundamentals of public policy. This course will have an emphasis on preparing the student for supervised practice necessary for a career as a Registered Dietitian Nutritionist.

**NUTR.3360 Life Cycle Nutrition** (Formerly 36.336) -
Credits: 3

Biology of the life cycle including development, growth, maturation, and aging and its impact on nutritional requirements of humans from the zygote to the elderly is considered. How to meet these nutritional requirements is discussed relative to the feeding issues and context of each major life stage. Course emphasizes the critical analyses of beneficial and adverse outcomes of various nutrient intakes and dietary patterns of the nutritional status and well-being through integration of nutrition and other health sciences in understanding nutritional needs during the life cycle. Analysis of cultural, environmental, psychosocial, physical, and economic factors affecting nutritional status through the life span will also be discussed. Methods of nutritional assessment for each stage of the life cycle will be examined.

NUTR.3450 Community Nutrition (Formerly 36.345) - Credits: 3

This course explores the role of the nutrition professional in community needs assessment, intervention development and evaluation, and in forming domestic nutrition policy. Nutrition problems in contemporary communities and of selected target groups in the United States and in developing countries are examined. Programs and strategies to meet nutrition needs outside the acute care setting, such as nutrition education and food assistance are explored. Local, state, and national nutrition policy and initiatives in nutrition will also be examined. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

NUTR.3710 Nutrition and Metabolism (Formerly 36.371) - Credits: 3

This class is advancement into the biochemical and physiologic process through which the nourishment of the human organism is accomplished and how the interactions among nutrients, other aspects of the environment, and the body result in perturbations affecting human health. The process of human nourishment proceeds within the context of an organism with an intricate structure, unique composition, and specific capacities for adaptive change. Basic information from many disciplines relating to body function and structure will be summarized. This will serve as setting the stage for detailed discussions, which describe the nutritional biochemistry and metabolism of the body for the normal state, and for states where nutrient availability is altered of disease is imposed. Prerequisites: 35.206

NUTR.3720 Body Diversity and Health (Formerly 36.372) - Credits: 3

This class will advance the understanding of prevention and treatment of chronic diseases where body size is a significant risk factor. A comprehensive overview of the physiological and social determinants of energy balance will be provided. Methods to complete nutrition assessments and deliver culturally sensitive and unbiased interventions will be reviewed. Evidence-based individual and population level strategies that promote healthy habits, a positive body image, and eliminates health disparities will be compared and contrasted to scientifically unsupported approaches.

NUTR.4060 Biochemistry of Lipids (Formerly 36.406) - Credits: 3

This advanced course in the nutritional biochemistry and physiology of lipids will detail the role of lipids in the normal and pathological processes at both the cellular and whole organism level. Topics will range from general discussions of the digestion, absorption, and transport of lipids to the role of eicosanoids and lipid-soluble antioxidants during normal and diseased states, such as atherosclerosis, diabetes, and hypertension. Subject matter will also include a discussion of the various interventions for the prevention and treatment of certain of these disease states. There will also be discussion of the current issues in lipid nutrition.

NUTR.4630 Vitamins and Minerals (Formerly 36.463) - Credits: 3

Detailed analysis of the digestion, absorption, transport, and intermediary metabolism of vitamins and minerals as essential nutrients. The chemical and biochemical characteristics of vitamins and minerals are examined to account for the physiological functions.

NUTR.4650 Lab Methods in Nutrition Assessment (Formerly 36.465/565) - Credits: 3

This course provides the student the opportunity to assess nutritional status using several modern analytical methods. The course uses spectrophotometry, HPLC and automated procedures to assess the status of vitamins, lipids, iron, glucose, and insulin. The student will learn the mathematical calculations needed for the methods. This course enables the student to appreciate how nutrient analysis is designed and implemented in the analytical laboratory.

NUTR.4720 Nutrigenetics (Formerly 36.472) - Credits: 3

Regulation of eukaryotic gene expression by specific nutrients, hormones, and metabolites will be discussed including transcriptional, post-transcriptional, and translational mechanisms with emphasis on disease development or prevention. Application of material will include determining
how human dietary requirements are affected by gene variants and inherited biochemical characteristics. This course will enable students to link their knowledge of nutrition with the growing discipline of the effects of diet on the human genome and specific hereditary diseases.

NUTR.4810 Medical Nutrition Therapy I (Formerly 36.481) - Credits: 3

This course is intended to provide students with current knowledge and application in dietary prevention, treatment, and long-term management of obesity, diabetes, cardiovascular diseases, and upper gastrointestinal diseases. Topics include nutrition counseling and communication skills, professional ethics, medical terminology, clinical laboratory values, dietary menu planning and analysis in specific situations, evaluating nutritional status, case studies for these diseases. This course will stress the steps in the nutrition care process, determine appropriate methods for screening patients for nutritional risk, and help the student assess the nutritional status of patients.

NUTR.4820 Medical Nutrition Therapy II (Formerly 36.482) - Credits: 3

This course is a continuation of Medical Nutrition Therapy I that will provide students with current knowledge and application in dietary prevention, treatment, and long-term management of patients with trauma, burns, HIV, cancer, liver, lower gastrointestinal diseases, celiac disease, and renal diseases. Topics include nutrition counseling and communication skills, professional ethics, medical terminology, clinical laboratory values, dietary menu planning and analysis in specific situations, evaluating nutritional status, case studies for these diseases, and will examine enteral and parental nutrition support for critically ill patients. Students will also develop a basic knowledge related to the principles of fluid and electrolytes balance as well as acid-base balance as they relate to the nutritional care of patients/clients.

NUTR.4830 Senior Research in Nutrition I - Credits: 1

Senior Research in Nutrition I will introduce concepts and application of research through critical exploration of the research process, research methodology, and ethics. Students will begin to critically review literature relevant to their field or interests and practice written scientific communication skills related to research.

NUTR.4940 Directed Research in Nutrition (Formerly 36.494) - Credits: 3

Students with their faculty advisor structure a research project in the area of nutrition. A paper embodying the results of the project will be prepared.
HSCI.1010 Human Anatomy and Physiology I  
(Formerly 35.101) - Credits: 3
This course provides a basic knowledge of the structure and function of the human body. An overview of the general organization of the body introduces the course. Following a discussion of basic human chemistry, the anatomy and physiology of cells, tissues, organs, and organ systems are studied with special emphasis placed on homeostasis and interaction among the various systems. The topics treated are body plan, chemistry, cytology, histology, the integumentary system, the skeletal system, the muscular system, and the nervous system. Clinical applications will be presented.

HSCI.1011 Medical Terminology for Health Professionals - Credits: 1
This course is designed to introduce entry-level students of any discipline to the fascinating language of Medical Terminology. Medical terminology is a system of words that are used to describe the human body, including its anatomy, physiology, disease processes, and treatments. In the course, students will explore the roots, prefixes, and suffixes that form the basis of language across careers in health sciences. The content of this course it is relevant to students interested in pre-health disciplines (premed, pre-dental, pre-veterinary), as well as careers as physicians assistants, nurses, public health professionals, Emergency Medical Technicians, or health scientists.

HSCI.1020 Human Anatomy and Physiology II  
(Formerly 35.102) - Credits: 3
A continuation of the basic knowledge of human structure and function. The topics treated are cardiovascular system, lymphatic system, respiratory system, endocrine system, digestive system, metabolism, urinary system, and reproductive system.

HSCI.1030 Human Anatomy and Physiology Laboratory I  
(Formerly 35.103) - Credits: 1
Laboratory exercises are designed to reinforce didactic material by providing hands-on experience with the subject matter. Students actively participate in simple chemical analysis, microscopic observations, and studies of anatomical models and preserved specimens. Students perform simple physiological tests on themselves and work in small groups to discuss conclusions.

HSCI.1040 Human Anatomy and Physiology Laboratory II  
(Formerly 35.104) - Credits: 1
Laboratory exercises are designed to reinforce didactic material by providing hands-on experience with the subject matter. Students actively participate in simple chemical analysis, microscopic observations, and studies of anatomical models and preserved specimens. Students perform simple physiological tests on themselves and work in small groups to analyze results and discuss conclusions.

HSCI.1041 Topics in Health  
(Formerly 30.104) - Credits: 3
This introductory course is designed to provide students with the opportunity to explore a variety of topics and issues in health through reading and discussing recently published articles. Using classroom discussions as the major format for this course, students will be encouraged to think critically about current topics and issues in health to strengthen their analytical skills. This course will also assist students in developing oral presentation and communication skills that are necessary in the health field.

HSCI.1050 Health Pathways Freshman Seminar - Credits: 1
This seminar course introduces Health Pathway students to UMass Lowell and the Zuckerberg College of Health Sciences. Students will engage in learning activities that promote success in the program by familiarizing themselves with academic policies, resources, and positive time management, communication and study skills. Students will also explore careers in all majors in the college and other health-related fields through Interprofessional learning while being introduced to the concepts of diversity, professionalism and ethical conduct.

HSCI.1051 Interprofessional Education First Year Seminar - Credits: 1
This seminar introduces First Year health science majors to UML and the Zuckerberg College of Health Sciences. Students will engage in learning activities that promote success in the program by creating a positive transition to college and sense of community, building and establishing confidence, familiarization with academic policies, resources, and time management, goal setting, study and test-taking skills. This course will also provide a foundation for beginning health science students to gain an understanding of the importance of interprofessional collaboration across a wide spectrum of health professions. Through experiential activities, key themes focused on interprofessional communication, collaboration, teamwork, and professionalism will be incorporated throughout the course.

HSCI.1060 ZCHS Transfer Student Seminar - Credits: 1
This Transfer Student Seminar introduces new students to the Zuckerberg College of Health Sciences to the University, College, and the major the have declared. Transfer students bring unique experiences, and those experiences will be utilized to assist students in their successful transition into the UMass Lowell academic community. The seminar will focus on expectations for students in a research university setting, as well as the policies, resources, and advanced skills in time management, communication, and exam preparation that are essential for student success.

**HSCI.1200 Life Skills (Formerly 30.120) - Credits: 3**

This course is designed to assist new students adjust to, and succeed in college and beyond. Course subject matter has been created in conjunction with the National Collegiate Athletic Association (NCAA). This course has been specifically designed to meet the needs of the student-athletes who are current members of our campus community. Successful completion of this course will give the participants the skills necessary to be successful students, athletes and citizens academically, socially, personally and professionally.

**HSCI.2040 Introduction to Exercise Physiology (Formerly 30.204) - Credits: 3**

This course serves as an introductory course to the field of Exercise Physiology. It is designed as a program foundation to the profession and to professional behavior. Students will be exposed to what happens in both the fitness centers and in the cardiac or pulmonary rehabilitative facilities. The course will serve as a precursor to the remaining upper division major courses.

**HSCI.2060 Pandemics: How Do They Occur? - Credits: 3**

This course focuses on the global challenge posed by infectious diseases. In the past 30 years, many previously unknown infectious diseases have emerged, while others have reemerged at an unprecedented rate. Despite tremendous strides in science, technology, and medical advances, and primary prevention strategies, infectious disease continue to plague humanity. This course will feature the global challenges posed by select pathogens. To do this, we will explore pandemics through a few different lenses. We will review the sources of and risk factors that lead to pandemics, and methods to prevent and control infectious disease outbreaks from becoming pandemics. Infectious diseases discussed in this course include: Cholera, Ebola, HIV, Influenza, SARS, MERS, COVID-19, among others.

**HSCI.2100 Clinical Calculations (Formerly 30.210) - Credits: 1**

This elective course is designed for students beginning the nursing program. It reviews the mathematics necessary to compute drug calculations using dimensional analysis. This course covers the metric system of weights and measures. The focus of the course is on the computation of drug dosages for oral and parenteral medications with emphasis on the application of skills necessary to calculate intravenous infusions and medications.

**HSCI.2110 Basic Clinical Microbiology & Pathology (Formerly 35.211) - Credits: 3**

Studies the fundamentals of microbiology with major emphasis on structure, function, growth, metabolism, and classification of clinically important microorganisms. The human body's response to invading microbes and an introduction to the ecological aspects of microorganisms in the environment with particular stress on their significance, activities (beneficial and detrimental) and control measures will also be studied.

**HSCI.2130 Basic Clinical Microbiology & Pathology Laboratory (Formerly 35.213) - Credits: 1**

Laboratory investigations of basic properties and characteristics of microorganisms are conducted. Students will perform commonly used techniques for collecting, handling, and studying clinically important microorganisms.

**HSCI.2140 Careers in Health (Formerly 30.214) - Credits: 1**

This introductory survey course is designed to give those students interested in health careers the opportunity to explore a variety of career path options in the health field. The goal of this course is to help students recognize their interests, knowledge, skills, and aspirations so that they can begin to make educated career decisions. The knowledge students will gain throughout this course will help them discern their own career path in the health care industry.

**HSCI.2220 Health and Disease Across the Lifespan (Formerly 30.222) - Credits: 3**

This course will introduce the basic principles that promote health of individuals throughout the lifespan. Physiological, socioeconomic, economic, and behavioral factors that impact health, disease, and quality of life across the lifespan will be examined. Health assessment tools will be reviewed. The course emphasizes the role of nutrition and physical activity for health promotion and disease prevention across different life stages and the impact of aging on health and disease. Major causes of morbidity and mortality in the United States will be discussed.
The chemistry of acids, bases and buffers will be explored. Laboratory experiments are conducted to complement the material covered in 35.251. The chemistry of the basic biochemical molecules will be explored, including proteins, enzymes, carbohydrates, lipids, and nucleic acids. Selected aspects of metabolism and the assay of clinically significant materials will be studied.

HSCI.3050 Exercise Physiology Lecture (Formerly 30.305) - Credits: 4

This course is designed to enable students to understand the acute and chronic physiologic effects of exercise on the human body. Topics will include bioenergetics, cardiopulmonary and cardiovascular physiology, neuromuscular physiology, special populations, and exercise prescription for apparently healthy athletic and clinical populations. Special topics in exercise physiology and environmental physiology will also be covered.

HSCI.3060 Introduction to Gerontology (Formerly 30.306) - Credits: 3

This course examines human aging from a multidisciplinary and developmental perspective. The course will focus on the adult years of the life span. The social-psychological factors involved in adjustments to the aging process, to retirement, to family, to leisure, to aloneness, to death and bereavement will be discussed together with such special concerns of the elderly as widowhood, finances, religion, sexuality and health problems. Rehabilitative strategies such as remotivation and reality orientation are included.

HSCI.3080 Global Health (Formerly 30.308) - Credits: 3

The focus of this course is on examining health issues from a global perspective including issues related to maternal and child health, aging, infectious diseases, sanitation, and health inequality. Nutritional and environmental health issues in diverse societies are analyzed. Social determinants of health and access to health care in developing and developed countries are emphasized. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HSCI.3090 Universal Design in the Promotion of Health (Formerly 30.309) - Credits: 3

This is a three-credit interdisciplinary undergraduate blended course (face-to-face and online). The course is designed to examine the principles of universal design and investigate challenges of equity, access and inclusion in healthy communities. Undergraduate students from a variety of
disciplines will examine universal design and Assistive Technology (AT) that enhances the participation of individuals with a physical, emotional, sensory or intellectual and cognitive disability in education, community development, health care, recreation and public policy. The course reviews design concepts and the use of Assistive Technology as it relates to education, communication, vocation, recreation, and mobility for individuals with disabilities. Laws focusing on assistive technology in the home, school, community, and the workplace will be examined. The course explores both 'low tech' and 'high tech' types of assistive technologies that are available to support people with disability, based on the ICF model of disability. Interaction with users of assistive technology is accomplished through an experiential learning project. Students will engage in a team project that completes a thorough examination of a particular access or functional challenge and the use of universal design and AT to increase participation and minimize the effects of the person’s impairments.

HSCI.3190 Pathophysiology (Formerly 30/33.319) - Credits: 3
This course provides an overview of the dynamic aspects of disease processes as they present in major body systems.

HSCI.3200 Legal Issues in Nursing (Formerly 30.320) - Credits: 3
This course provides an overview of legal issues nurses encounter in clinical practice. Case studies will be used to identify common risks to safety and quality of care. To examine the legal process when lawsuits are filed and to identify preventive strategies which improve quality of care and therefore, decrease legal risks for nurses.

HSCI.3220 Independent Study Health Promotion (Formerly 30.322) - Credits: 1
This course focuses on a health promotion project. Must have faculty approval for the course. Can be for 1, 2, or 3 credits.

HSCI.3400 IPE Research Methods - Credits: 3
This course introduces critical evaluation of the current literature, the research process, and research study design and methodology and ethics. The importance of research across interdisciplinary health fields will be explored. Students will practice critical thinking and oral and written communication skills related to health research.

HSCI.3500 Human Biochemistry (Formerly 36.350) - Credits: 3
This course is an in-depth study of biochemical substances and their reactions in the body, with major emphasis placed on metabolism at the cellular level and examined in the tissues of the various organs where these reactions occur. Correlation of biochemical processes underlying pathologic conditions will be made whenever practical.

HSCI.4020 Global Health Experience (Formerly 30.402) - Credits: 3
The Global Health Experience provides an experiential learning experience in health within a country outside of the United States. Students will study the health issues of a given country while examining the socio-cultural, economic and environmental determinants of health within that society. The strengths and weaknesses of the existing health care system will be analyzed. Students will explore the culture, environment, and health care system under the direction of School of Health and Environment faculty.

HSCI.4100 Interprofessional Approaches in Community Health - Credits: 3
This is an advanced course in interprofessional education and collaborative practice that provides a critical foundation for current work in community health, including clinical and public health fields. It allows students to increase their understanding of how each profession contributes to the team by exploring current health issues. It provides opportunities to practice effective communication and team collaboration in decision making related to health and wellness. It is designed to provide hands on experience for students to deliberately and intelligently work together in clinical and community health settings and simulations. Key concepts include importance of best practices in professionalism, roles and responsibilities, teamwork, communication, and ethics in all health-related careers.

HSCI.4200 Digital Health - Credits: 3
This course will explore the field of digital health and the application of digital technology to improving health outcomes in patients. Students will learn about the types of digital health interventions (biosensors, mobile apps, telemedicine, text messaging, etc). They will also discuss how these technologies are currently being used to deliver personalized medicine and enhance patient care (i.e. cardiovascular monitoring, smoking cessation, healthier eating diabetes, etc). Upon completion of the course, students will be able to identify emerging areas of digital health interventions and assess how these new technologies might impact health.

HSCI.4910 Directed Study (Formerly 30.491) - Credits: 1-9
Directed Study
HSCI.4992 Interdisciplinary Multi-Topic - Credits: 3

This inter-professional experiential learning experience is designed to provide hands on experience for health science undergraduate students to deliberatively and intelligently work together in a health care setting. Key concepts include the importance of best practices for professionalism, roles and responsibilities, teamwork, communication, ethics, and collaborative practice in health care.

PUBH.2031 Intro to Pub Hlth Informatics and info Systems - Credits: 3

This course is an introduction to public health informatics and information systems. Topics include the evolution of public health information systems, public health data sources, core concepts and terminology in health informatics, and ethics. The office of the National Coordinator for Health Information Technology standards for public health information technology will be introduced. Students will identify data sources and learn basic data visualization skills to describe a public health problem.

PUBH.2090 Technical Writing in Public Health - Credits: 1

The intent of this course is to prepare students for conveying Public Health technical communications, i.e., the presentation of specialized information in an accessible way to a variety of audiences. Specifically, the course will focus on the process of writing (including the planning, drafting, and revising stages) and looking carefully at the work that goes into the final polished product. As collaboration is often a key part of the professional realm, students will spend much of the semester working with their classmates, which will include participating in brainstorming sessions, providing constructive criticism, and preparing their assignments.
PHRM.1010 Introduction to the Pharmaceutical Industry - Credits: 3

The purpose of this introductory course is to provide an overview of the pharmaceutical industry. The student will become acquainted with the discovery and development processes required to bring a new therapeutic agent to the market. This course discusses current theoretical, practical, regulatory, and professional issues in the pharmaceutical industry.

PHRM.3100 Introduction to Drug Design - Credits: 3

This course will provide an overview of how novel pharmacologically active molecules are discovered and designed to treat human disease. Topics will include drug discovery, molecular design and redesign, synthetic strategies of drug molecules, structure-activity relationships (SAR), drug interactions with their targets, pharmacokinetics (PK) and pharmacodynamics (PD), and ethical considerations.

PHRM.3200 Molecular Pharmacology - Credits: 3

This course is designed to give students an understanding of the molecular basis of drug action. Upon completion of this course, students will be able to describe receptor-ligand interactions, signal transduction pathways, the different classes of target biomolecules for drugs and how genetic variability influences drug action.

PHRM.4100 Basic Pharmaceutics - Credits: 3

This course is designed to give students an understanding of the basic physical chemistry needed to determine drug dosing and knowledge of how drugs are delivered through the body. Upon completion of this course, students will be able to describe how drugs are formulated, manufactured and how to ensure sterile manufacturing and delivery of these drugs.

PHRM.4600 Pharmacokinetics and Drug Metabolism - Credits: 3

This course focuses of the study of the biochemical and physiological effects of drugs and the mechanisms of their actions. The quantitative aspects of drug absorption, distribution, metabolism, and excretion will be explored. The philosophy of pharmacokinetic modeling and its application in practice will be introduced. An overview of the structure, function and regulation of major drug metabolic enzymes and transporters will also be emphasized.
Degree Pathways

Degree Pathways are a semester-by-semester sequence of courses recommended for successful completion of a degree, diploma, credential or certificate from the university.

**Exercise Science (3-year)**

- Clinical Option fall 2022 and beyond

**Exercise Science (4-year)**

- Clinical Option fall 2021 and beyond fall 2020 - spring 2021 (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

**Exercise Physiology**


**Suggested Degree Pathway for Exercise Science - Clinical Option**

**For students who entered fall 2021 and beyond.**

**Freshman Year**

**Fall Semester**

<table>
<thead>
<tr>
<th>Course#</th>
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<tr>
<td>BIOL.1110</td>
<td>Principles of Biology I</td>
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<tr>
<td>BIOL.1170L</td>
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<tr>
<td>HSCL.1010</td>
<td>Human Anatomy</td>
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**Spring Semester**

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<tbody>
<tr>
<td>BIOL.1120</td>
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<td>BIOL.1180L</td>
<td>Principles of Biology II Laboratory</td>
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<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
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<td>EXER.2020</td>
<td>Introduction to Exercise Science</td>
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<tr>
<td>HSCL.1020</td>
<td>Human Anatomy and Physiology I (SCL)</td>
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<tr>
<td>HSCL.1040</td>
<td>Human Anatomy and Physiology Laboratory II (SCL)</td>
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<td>MATH.2830</td>
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**Total**

17

**Sophomore Year**

**Fall Semester**

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<tr>
<td>HSCI.3500</td>
<td>Human Biochemistry</td>
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<tr>
<td>EXER.3050</td>
<td>Exercise Physiology</td>
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<td>EXER.3070</td>
<td>Exercise Physiology Laboratory</td>
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<tr>
<td>EXER.3130</td>
<td>Kinesiology</td>
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<td>EXER.3170</td>
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Spring Semester

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<tbody>
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<td>PSYC.2720</td>
<td>Abnormal Psychology</td>
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<tr>
<td>PUBH.1021</td>
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Junior Year

Fall Semester

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<tr>
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<tr>
<td>EXER.3050</td>
<td>Exercise Physiology</td>
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<tr>
<td>EXER.3070</td>
<td>Exercise Physiology Laboratory</td>
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<tr>
<td>EXER.3130</td>
<td>Kinesiology</td>
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</tr>
<tr>
<td>EXER.3170</td>
<td>Kinesiology Lab</td>
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Spring Semester

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<td>EXER.4060</td>
<td>Foundations of Strength and Conditioning</td>
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<tr>
<td>EXER.4080</td>
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<td>EXER.4220</td>
<td>Exercise Prescription and Laboratory</td>
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<td>EXER.4280</td>
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Senior Year

Fall Semester

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<tr>
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<td>Clinical Practicum I and II</td>
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<tr>
<td>EXER.4240</td>
<td>Motor Control and Learning</td>
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<tr>
<td>EXER.4250</td>
<td>Clinical Exercise Physiology</td>
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<tr>
<td>HSCI.3060</td>
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### Spring Semester

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### OR

#### Senior Year

### Fall Semester

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<tr>
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### Spring Semester

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<tr>
<td>EXER.4120</td>
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<tr>
<td>EXER.4250</td>
<td><a href="https://www.uml.edu/catalog/courses/EXER/4250">Clinical Exercise Physiology</a></td>
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<tr>
<td>HSCI.3060</td>
<td><a href="https://www.uml.edu/catalog/courses/HSCI/3060">Introduction to Gerontology / Adult Development and Aging</a></td>
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<td>xxx.xxxx</td>
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Total Minimum Credits = 122.

1Science Electives with Lab:

- [HSCI.2510](https://www.uml.edu/catalog/courses/HSCI/2510)
  Physiological Chemistry I and [HSCI.2530](https://www.uml.edu/catalog/courses/HSCI/2530)
  Physiological Chemistry Laboratory I
- [CHEM.1110](https://www.uml.edu/catalog/courses/CHEM/1110)
  General Chemistry I and [CHEM.1130L](https://www.uml.edu/catalog/courses/CHEM/1130L)
  General Chemistry Laboratory I
- [CHEM.1210](https://www.uml.edu/catalog/courses/CHEM/1210)
  Chemistry I and [CHEM.1230L](https://www.uml.edu/catalog/courses/CHEM/1230L)
  Chemistry I laboratory
- [HSCI.2520](https://www.uml.edu/catalog/courses/HSCI/2520)
  Physiological Chemistry II and [HSCI.2540](https://www.uml.edu/catalog/courses/HSCI/2540)
  Physiological Chemistry Laboratory II
- [CHEM.1120](https://www.uml.edu/catalog/courses/CHEM/1120)
  General Chemistry II and [CHEM.1140L](https://www.uml.edu/catalog/courses/CHEM/1140L)
  General Chemistry Laboratory II
- [CHEM.1220](https://www.uml.edu/catalog/courses/CHEM/1220)
  Chemistry II and [CHEM.1240L](https://www.uml.edu/catalog/courses/CHEM/1240L)
  Chemistry II Laboratory

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the [CoreCurriculum](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine
how you will meet the Core Curriculum requirements.

Current UMass Lowell students should be using their Advisement Report in SiS (https://www.uml.edu/Enrollment/SiS/default.aspx). If you need assistance, please contact your adviser.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf)

prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

_Last Updated: 8/06/2021_
Exercise Science Admissions Requirements

Freshman Admission Requirements to the Exercise Science Program (Clinical Option or Exercise & Fitness Management Option)

- High school GPA of 3.25 or better.
- Completion of college prep courses including: English, biology and chemistry.
- Recommended: high school pre-calculus or calculus, and physics.
- Combined SAT scores totaling at least 1080 (mathematics and verbal).
- Evidence of good health through a physical exam, which attests to the student’s ability to actively and safely participate in all phases of laboratory work.

Transfer Admission Requirements to the Exercise Science Program

UMass Lowell (UML) students and students from other colleges or universities are invited to apply to the Exercise Science BS program. Requirements include:

- A cumulative GPA of 2.7
- A science GPA of 2.7 in at least one, two-semester required science sequence of either: Anatomy and Physiology I and II, Physiological Chemistry or Chemistry I and II, Physics I and II, or Biology I and II.

Students must have successfully completed at least one of the two-semester prerequisite science sequences identified above, and be on track to complete all prerequisite science course sequences by the completion of their fourth semester at UML. This means that students must complete all prerequisite science courses prior to beginning professional courses (EXER.xxxx [https://www.uml.edu/catalog/courses/EXER]) in the Junior year of the curriculum (see degree pathway).

We strongly recommend that transfer students complete college level pre-calculus or calculus prior to transfer.

ES to Doctorate (DPT)

Students who meet the qualifications as incoming freshmen are notified in their letter of acceptance to the university from Admissions. Students must be enrolled in the Clinical Option to be eligible. Students will also obtain real-world experience by completing a required 35 hours of physical therapy observation prior to your senior year. The UMass Lowell DPT program does not offer deferred acceptance. All accepted students must begin matriculation the immediately subsequent summer term.

The program requirements are:

- Completion of the B.S. in Exercise Science program with an overall GPA of 3.40 or higher
- Completion of the DPT pre-requisite science courses outlined below with an earned GPA of 3.40 or higher:
  - Anatomy & Physiology I & II, with labs
  - Chemistry I & II, with labs
  - Physics I & II, with labs
  - Exercise Physiology lecture
  - Kinesiology lecture

Your class GPA will be calculated after the end of your junior year of studies and again after your senior year is completed. GPA calculation will occur once more at the end of your senior year prior to matriculation into the program.

For more information, contact the Undergraduate Admissions [https://www.uml.edu/admissions/contact/default.aspx].
EXER.1010 Strategies for Academic Success in Exercise Science (Formerly 38.101) - Credits: 1
This seminar course introduces Exercise Physiology (EP) students to UMass Lowell, the Zuckerberg College of Health Sciences, and the Exercise Physiology program. Students will engage in learning activities that promote success in the program by familiarizing themselves with academic policies, resources, and positive time management, communication and study skills. Students will also explore careers in Exercise Physiology and other health-related fields through interprofessional learning while being introduced to the concepts of diversity, professionalism and ethical conduct. All exercise physiology undergraduate course (EXER) are restricted to EP majors.

EXER.2020 Introduction to Exercise Science (Formerly 38.202) - Credits: 3
This course will provide a broad overview of the various fields and career options within Exercise Science. Course content will include a history of the profession, potential career and graduate studies options, the legal and ethical aspects of practice, and an introduction to basic fitness terminology and principles using ACSM guidelines. Students will have the opportunity to network with guest speakers for all different careers and explore various environments in which Exercise Physiologists work.

EXER.2170 Research Methods in Exercise Science - Credits: 3
This course involves an in-depth study of current research methods and topics with specific applications to the field of Exercise Physiology. The content includes the sources of data acquisition, research design, testing procedures, and treatment of data. Each student must participate in a senior research project utilizing information gained from the lecture portion of the class. All 1st 2nd and 3rd year course work in the exercise physiology major. All exercise physiology undergraduate courses (number 38) are restricted to EP majors only. Meets one Curriculum Essential Learning Outcome for Information Literacy (IL) and Quantitative Literacy (QL).

EXER.3010 Junior Seminar (Formerly 38.301) - Credits: 1
The Junior Seminar, offered spring semester to Exercise Physiology majors, will orient students to information required for their Practicum experience during their Senior Year.

EXER.3050 Exercise Physiology (Formerly 38.305) - Credits: 4
This course will examine the short and long term effects of exercise of the oxygen transport systems, including understanding the concepts of physiological and metabolic functioning of the human body during aerobic physical activity, exercise, sports performance and training. Students taking this course and its lab co-requisite are advised that the capability to exercise moderately and maximally will be necessary.

EXER.3070 Exercise Physiology Laboratory (Formerly 38.307) - Credits: 1
This course offers students the opportunity to apply, test and evaluate physiological concepts and skills discussed in the lecture as it related to the aerobic systems and training.

EXER.3150 Kinesiology (Formerly 38.315) - Credits: 3
This course combines the study of mechanics, kinematics, kinetics, anatomy and neuromuscular physiology to teach the examination and evaluation of human movement. The major focus of the course is in qualitative evaluation of movement. Topics also include quantitative evaluation, body mechanics, posture and gait evaluation with a focus on identification of abnormal movement patterns.

EXER.3170 Kinesiology Laboratory (Formerly 38.317) - Credits: 1
This course should be taken concurrently with EXER.3150. This course is designed to practically apply topics discussed in kinesiology lecture. Students are given the opportunity to engage in various activities that will allow them to observe and analyze the numerous factors involved in human motion and the impact of those factors on human performance. Students are given the opportunity and encouraged to explore areas of personal interest within the goals and objective of the course.

EXER.3350 Sport and Exercise Biomechanics - Credits: 4
This course will examine the mechanical laws and principles applied to the human body including forms of motion, linear and angular kinematics/kinetics. The concepts studied will include qualitative and quantitative analysis of sport techniques and general movement patterns. There will be in-class lab activities to prepare the student to use a scientific approach for analyzing exercise and sports activities.

EXER.3560 Pharmacology (Formerly 38.356) - Credits: 3
An introduction to the biochemistry and physiological actions of various pharmaceuticals. Fundamental concepts will include
drug receptors, drug receptor interactions, pharmacokinetics, enzyme induction, drug metabolism, drug safety and effectiveness and idiosyncratic reactions. Several major disease states, and the common agents used for treatment will be presented including: autonomic (central nervous system stimulants, cholinergic, adrenergic, and muscarinic agents); Neuropharmacology (Alzheimer’s and Parkinson’s diseases, major depressive disorder, anxiety and insomnia); Cardiovascular conditions (hypertension, hypercholesterolemia), Endocrinology (adrenal steroids anti-hyperglycemic agents); Analgesia (opioid and non-opioid), Antibacterial agents, and Respiratory conditions.

EXER.4060 Foundations of Strength and Conditioning (Formerly 38.406) - Credits: 4

This course is the second of a two-part series in exercise physiology designed to study the physiological effects of exercise on the human body. It will call upon the knowledge gained in Anatomy and Physiology, Biochemistry, Kinesiology, and Exercise Physiology. The course covers a variety of topics including: physiological adaptations to resistance training, resistance training concepts and methods to include periodization and principles of test selection and administration, concepts of flexibility, dynamic warm-ups, plyometrics, speed, agility and speed-endurance development, basic concepts of rehabilitation and reconditioning, exercise prescription and programming for healthy populations, and the effect of performance-enhancing drugs on performance. This course will cover (cont’d).

EXER.4080 Foundations of Strength and Conditioning Laboratory (Formerly 38.408) - Credits: 1

This course must be taken concurrently with EXER.4060, Foundations of Strength and Conditioning. The laboratory experiences allow students to observe the concepts discussed in the lecture co-requisite course; develop the psychomotor skills necessary for practical applications; work collaboratively in groups; and develop skills in scientific method including written communication. The course is organized to develop students’ critical thinking as an active participant in class. Students are expected to develop practical skills in the laboratory consistent with current standards of practice, learn to administer exercise tolerance tests, interpret and present exercise test data, and develop simple assessment and treatment programs for all clients. (cont’d)

EXER.4120 Clinical Practicum I and II (Formerly 38.412) - Credits: 4

This course is an off-campus experience in either a cardiac/pulmonary rehab clinical facility or in a fitness setting. Students experience practical applications of the concepts and theories learned in the classroom settings. Strength and conditioning, research or industry related setting, or other setting appropriate to the particular student’s interests.

EXER.4170 Research Methods in Exercise Physiology (Formerly 38.417) - Credits: 3

This course involves an in-depth study of current research methods and topics with specific applications to the field of Exercise Physiology. The content includes the sources of data acquisition, research design, testing procedures, and treatment of data. Each student must participate in a senior research project utilizing information gained from the lecture portion of the class. All 1st 2nd and 3rd year course work in the exercise physiology major. All exercise physiology undergraduate courses (number 38) are restricted to EP majors only. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Quantitative Literacy (QL).

EXER.4180 Senior Seminar (Formerly 38.418) - Credits: 3

This course is specifically designed to enhance the practicum experience in the senior year.

EXER.4200 Advanced Study in Exercise Science (Formerly 38.420) - Credits: 3

This course is a capstone course in Exercise Science. Students summate and synthesize classroom and clinical experiences in Exercise Science in the preparation of a final project.

EXER.4210 Directed Study Health Promotion (Formerly 38.421) - Credits: 3

This course is designed for independent study opportunities, including but not limited to directed study, directed research, and Honors College theses and projects. These learning opportunities provide students with meaningful opportunities to work directly with a faculty member on individually designed content that integrates didactic knowledge throughout their program of study. The course focuses on broadening the student’s area of interest, expertise, and career choices.

EXER.4220 Exercise Prescription & Programming (Formerly 38.422) - Credits: 3

This course provides an essential foundation for exercise prescription and programming, and sound educational practice. Factors that impede or enhance exercise compliance and progress are explored. Clinical teaching skills, safety, and professional behavior are also addressed.
This course provides an in-depth presentation of the behavioral and neuroscientific foundations of human movement control, coordination, and the learning of movement skills. Topics include an introduction to the cellular basis of neurophysiology, discussion of the contributions of the sensory and motor systems, and learning the major theories of motor control and the acquisition of motor skill and their importance in rehabilitation, teaching and sport performance. The ultimate goal is for students to develop a unified conceptual framework for motor control and learning and how these relate to the optimization of intervention strategies.

EXER.4250 Clinical Exercise Physiology - Credits: 3

This course will examine the pathophysiology and exercise considerations associated with a variety of diseases and disorders. Students will utilize case studies to apply the principles of exercise testing, prescription, and programming within these medically stable special populations. These diseases and special populations may include (but are not limited to): older adults, arrhythmias, obesity, hypertension, asthma, COPD, post-myocardial infarction, diabetes, arthritis, osteoporosis, cancer, cerebral palsy, musculoskeletal concerns, developmental disorders, and intellectual disabilities.

EXER.4260 Motor Control and Learning Laboratory - Credits: 1

This laboratory course provides a hands-on experience with the concepts and topics centered around the behavioral and neuroscientific foundations of human movement control, coordination, and the learning of movement skills. It is designed to examine the principles of motor learning by examining physiological, psychological, and neuromotor factors that affect motor control, the acquisition of motor skills and performance. Students will learn to apply motor learning and control skills to coaching movement and physical activity.

EXER.4280 Exercise Prescription & Programming Laboratory - Credits: 1

This laboratory course will expand upon topics taught in the lecture, examining methods for assessing and improving various elements of health and fitness, including (but not limited to): body composition, aerobic fitness, muscle strength, muscle power, muscle endurance, flexibility, balance, and movement. Students will demonstrate competency of administering a variety of health and fitness assessments and master utilizing information gleaned from these assessments to appropriately prescribe exercise programming for individuals.

EXER.4300 Exercise is Medicine - Credits: 3

Healthcare is a business that requires students and workers who understand its complexity and constant changes. Health promotion experts are positioned to lead the charge a reducing healthcare costs and improving patient and client outcomes, in the community or the workplace. This student-driven capstone course will focus on the concepts and skills necessary to develop, promote and implement effective health and wellness programs where the central tenets are "Exercise is Medicine" and "Exercise is Business Relevant". Students will learn how to bridge the gap between the fields of exercise, health, wellness, and management and how to successfully communicate their ideas to a variety of business, sport, and health organizations.
PUBH.1000 Environmental Health Seminar (Formerly 31.100) - Credits: 0

This required, non-credited seminar for Freshman and Sophomore Environmental health Students explores current affairs and controversies in environmental health theory and practice. Readings and outside speakers will supplement short lectures, faculty and student-led discussions.

PUBH.1010 Public Health Seminar (Formerly PUBH.101) - Credits: 1

This course is designed to orient first year Public Health students to the College of Health Sciences and the University as a whole. The general purpose of the course is to help students identify their areas of interest in Public Health and teach students valuable skills that will maximize their likelihood of success in achieving their academic and professional goals. Areas of priority will be time management and study skills, critical thinking, and communication.

PUBH.1021 Introduction to Public Health (Formerly 30.102) - Credits: 3

Public health topics, both historical and contemporary are of importance to all citizens and to societal decisions. This survey course provides a foundation for understanding public health through exposure to current health care and policy issues viewed through the perspective of multiple disciplines. Methodology for understanding population health and developing critical thinking and decision-making skills in the analysis of public health issues using a population-based perspective will be developed. The course will provide an ecological understanding of the causation and prevention of disease with an emphasis on health issues that affect society as a whole.

PUBH.2010 Community Health and Environment (Formerly 31.201) - Credits: 3

This course emphasizes the concepts, philosophy, and principles of public health and their relationship to physical, mental, and social well-being of the community. The focus is on the prevention of disease, the promotion and maintenance of health, and the provision of environmental and personal health services through organized community effort.

PUBH.2030 Technology in Public Health (Formerly 31.203) - Credits: 3

A lecture and hands-on course designed to help students better understand the role of computers and information technology in public health. Students will be guided through the use of various software applications that enhance public health efforts, including: word processing, database design and management, spreadsheets, presentations, geographical information systems (mapping health data), and internet based applications for social networking to address health related issues, as well as other uses. Discussions of what the future may hold for health information technology will also be included. Hands-on assignments will help students become more proficient with PC based software.

PUBH.2040 Intro to Health Promotion (Formerly 31.204) - Credits: 3

This course focuses on the role health education plays in the development of healthful patterns of living. A philosophy of health education emphasizing holistic health will be generated. The organization and administration of school, community, health care facility, and workplace health education programs are introduced.

PUBH.2050 Social Determinants of Health (Formerly 31.303, and PUBH.3030) - Credits: 3

This course introduces students to the concept of social determinants of health, and strongly emphasizes the influence of social power relations on public health. There is a focus on how social, economic and political factors affect the level and distribution of individual, community, and population health. Students will examine health and social inequalities and explore potential solutions for their elimination.

PUBH.2060 Research Methods in Public Health (Formerly 31.206) - Credits: 3

Introduction to research methodologies used in the study of community and environmental health problems. Students will discuss actual research studies conducted by UMASS Lowell faculty in the College of Health Sciences.

PUBH.2070 The U.S. Healthcare System (Formerly 31.321 and PUBH.3210) - Credits: 3

This introductory course focuses on the organization, financing and delivery of healthcare in the United States. Students will learn about the public and private sectors of the healthcare system and examine the effects of market competition and government regulation. Students will be exposed to healthcare systems of other countries. Students will also explore major issues currently facing providers, hospitals as well as the pharmaceutical and health insurance industries in the United States.

PUBH.2080 Principles of Environmental Health Science (Formerly PUBH.208) - Credits: 3
This is a survey course that provides an overview of the rapidly growing field of environmental health, through an introduction to the links between environmental stressors and impacts on public health. The course will explore human and industrial activities that impact on health such as overpopulation, food production, air and water pollution, waste, toxic substances, pests, and global climate change. The course will also examine the types of diseases and illnesses that result from environmental impacts. These impacts have multiple causes and understanding these can in turn provide clues as to the most effective prevention options. Students will develop skills of interest in greater detail through short writing assignments. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PUBH.2110 Sustainable Development (Formerly PUBH/S7.2111) - Credits: 3

This course examines workplace and regional factors that shape the prospects for sustainable prosperity and worker and community empowerment. The course begins by reviewing recent trends in the distribution of income and wealth and the industrial structure of the New England economy. The historical dynamics shaping work organization and regional development are examined. Several industry case studies are selected because of their importance to the regional and national economy. The case studies provide focus for studying the strategic choices made by firms in mature industries and newly emerging regions; the basis of competitive advantage for Japanese firms and the response of American rivals; and the influence of the product cycle and regional institutions on capture or retention of emerging and mature industries. The final section of the course focuses on the prospects for sustainability of the organization of production and its environmental impact, incentives for skill development and technological innovation, and shared prosperity. A central course objective is to foster an understanding of the links between the workplace and region in the pursuit of sustainable development and shared prosperity.

PUBH.3011 Program Planning in Health Promotion (Formerly 31.301) - Credits: 3

This course is the first of a two course series designed to introduce undergraduate Public Health students studying Community Health and Health Promotion to the concepts and principles underlying the planning principles geared toward promoting health and preventing disease in a variety of settings. The course emphasizes practical utility of the concepts as they relate to the students’ future health education/promotion professional activities. The foundation of the course will be the skills necessary to conduct a needs assessment and develop a comprehensive program to address a health concern affecting a specific population in a particular setting.

PUBH.3020 Health Communication (Formerly 31.302) - Credits: 3

This course explores the uses of a variety of established and emerging health communications strategies, techniques, and modalities. Students will consider the ethical considerations pertinent to the use of assorted health communications approaches in health promotion. The course discusses the concepts of health literacy and eHealth literacy. Awareness and sensitivity toward cultural, ethnic, and religious diversity will be particularly emphasized when discussing various communication techniques in relation to particular health issues. Meets Core Curriculum Essential Learning Outcome for Written and Oral Communication (WOC).

PUBH.3040 Politics and Advocacy in Public Health (Formerly 31.304) - Credits: 3

Public health is inherently political because it attempts to characterize and prevent societal factors influencing disease and well-being. As a result, public health professionals must be effective advocates for policies and actions that improve people’s health. This course introduces students to the political underpinnings of public health. By studying the political contexts of public health issues, students will explore the interface of government, law, economic interests, and social movements for public health. They will learn about the role of advocacy in promoting, implementing and sustaining effective public health policy.

PUBH.3050 Introduction to Epidemiology (Formerly 31.305) - Credits: 3

This course is designed to introduce basic epidemiological methods used in the study of current major health problems. Content includes explanation of the scope and focus of epidemiology, simple measures of disease frequency and association used in the study of the distribution and
determinants of disease, types of epidemiological study designs, and practical applications. Emphasis on interpretation of epidemiological information and application of findings. Prerequisite: Community Health and an elementary statistics course. Required for seniors in Community Health Education; open by permission to other upper division students in Health Professions. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Quantitative Literacy (QL).

PUBH.3060 Community Health Assessment (Formerly 31.306 Socio-Ecological Health Assessment) - Credits: 3

This course focuses on building health assessment skills of Public Health professionals. The course will introduce students to concepts of Community Health Assessments and guide students to practice skills necessary to conduct them. The course will emphasize the importance of using assessment results to make programmatic and policy decisions and will direct participants in how to communicate findings to allow policymakers, health professionals, and members of the public to take action to improve Public Health. Meets Core Curriculum Essential Learning Outcome for Critical Thinking/Problem Solving (CTPS).

PUBH.3070 Introduction to Public Health Policy (Formerly PUBH.221 and PUBH.2210) - Credits: 3

One of the core functions of Public Health is developing policies and plans that support individuals and community health efforts. This course introduces students to the legal, ethical, economic and regulatory dimensions of healthcare and public health policy. Students will explore local, state and national governmental agency roles in public health policy. Students will learn about the implications of laws and regulations that impact Community Health and Safety.

PUBH.3100 Infectious Disease (Formerly PUBH.310) - Credits: 3

This course introduces students to the fundamentals of communicable diseases and how humans and the environment affect their distribution and impact. The course will provide an overview of infectious diseases, how these diseases affect humans, vectors and sources of these diseases. The course will also cover infectious disease surveillance, outbreak investigation and response as well as prevention planning and bioterrorism.

PUBH.3160 Environmental Health in Practice (Formerly 31.316/19.507) - Credits: 3

Through a combination of class lectures, field trips, and a service learning project, this course is designed to introduce students to the daily responsibilities of an environmental health professional. The class will provide in-depth knowledge and hands-on understanding of topics such as food safety, indoor air quality, water quality, waste water disinfection, and chemicals management. Through lectures and guest speakers students will understand the challenges facing environmental health professionals and the resources available to them. Students will undertake a final group project for a health board or other organization.

PUBH.3710 Chemicals and Health (Formerly 31.371) - Credits: 3

Provides a broad overview of how the design, manufacture, use and disposal of chemicals and chemical products affect health and ecosystems. Provides an in-depth overview of how chemicals are monitored in the environment (including biomonitoring), how their risks are characterized, and the prevention of chemical risks through safer chemical design. Meets Core Curriculum Essential Learning Outcome for Written & Oral Communication (WOC).

PUBH.4010 Public Health Senior Seminar - Credits: 3

The Public Health Senior Seminar prepares public health students for their capstone experience. Students will reflect on their career plans and their current state of preparedness for the next steps in professional development. This course provides an overview of the current state of various professions in public health and the future of public health practice and ethics, both nationally and internationally. Meets Core Curriculum Essential Learning Outcome for Social Responsibility and Ethics (SRE).

PUBH.4011 Implementation and Evaluation in Health Promotion - Credits: 3

This course is the second in a two course series designed to introduce undergraduate Public Health students studying Community Health and Health Promotion to the concepts and principles surrounding implementation and evaluation of programs geared toward promoting health and preventing disease in a variety of settings. This course emphasizes practical utility of the concepts as they relate to the students’ future health education/promotion professional activities. The foundation of the course will be the skills necessary to develop an implementation and evaluation strategy for a planned health promotion initiative, taking into consideration the phases of implementation and evaluation, ethical considerations, and resources and skills required to implement and evaluate a successful health promotion program.

PUBH.4030 Mind, Body and Health (Formerly 31.403) - Credits: 3
The interconnectedness of the mind, body, and spirit is integral to achieving "wellness". It is also important to acknowledge the impact each of these three areas of wellness has upon each of the others. The growing body of research indicating the significant effects of things such as stress, anger, optimism, and healthy relationships on health status will be analyzed and evaluated. Practical strategies related to health advising will be shared and experimented with during the semester. In this senior level course, we will explore these and many other areas of mind, body, and spirit awareness that are critical to consider when conducting health education programs.

PUBH.4050 Communication Techniques in Health Promotion (Formerly 31.405) - Credits: 3

This course focuses upon the communication techniques and mass media approaches necessary to promote and implement effective health promotion programs and activities. Awareness and sensitivity toward cultural, ethnic, and religious diversity will be particularly emphasized when discussing various communication techniques in relation to particular health issues. Meets Core Curriculum Essential Learning Outcome for Written & Oral Communication (WOC).

PUBH.4090 Service Learning in Community Health (Formerly 31.409) - Credits: 3

This course is designed to serve as a service learning experience in the fall semester of students' senior year in Health Education. Students will be expected to participate in a pre-determined community health project happening in the City of Lowell for a minimum of 40 hours. During the course of this experience, students will provide the community health organization with their time, knowledge, and effort, and will, in return, gain tremendous experience in the organization, development, implementation, and/or evaluation of Community Health Education and Promotion Projects. Collaboration with various professionals involved in the programs and projects will certainly add to students' understanding of what a Health Educator does! An integral piece of this service learning experience will be the bi-monthly seminar geared toward assuring the connection between the community experience and the theoretical and academic framework from which it is derived. Through the use of readings, discussions, student presentations, and guest speakers, students will gain wonderful experience in terms of what it means to "build the capacity of a community". Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL).

PUBH.4100 Public Health Capstone (Formerly 31.410) - Credits: 6

This capstone is the culminating experience for all students in the BS in public health that allows students to integrate, synthesize and apply the knowledge of public health gained throughout their undergraduate program. It can be structured as a cumulative, integrative and scholarly experience or an applied experience or inquiry project. Each student will craft an experience that is appropriate for his/her professional goals in aspirations. Projects may include internships, research papers, honors theses, or other appropriate activities that apply a range of public health competencies and skills. Students create a portfolio of work and/or research poster for the experience demonstrating proficiency in the domains of public health.

PUBH.4130 Public Health Administration - Credits: 3

The class will introduce students to the basics of public health program administration including planning, evaluation, and management. Through lectures, guest seminars, site visits and research, students will build and understanding of different types of agencies and organizations involved in public health administration and their roles and responsibilities. They will learn the steps of development, implementation, and evaluation of a public health program at a local or state agency. Students will also study basics of the management of public health agencies, including staff management, budgeting, stakeholder engagement, conflict resolution, and risk communication. Students will be required to apply concepts learned in class to a real life public health problems.

PUBH.4140 Program Management in Health (Formerly 31.414) - Credits: 3

The concepts of program management including budgeting, managing partner relationships, grant writing, and managing technology resources, and quality assurance which are essential functions for individuals working in public health agencies, are presented. Students will be expected to develop a grant proposal for an agency. This course is an integrative experience and resources form all other relevant coursework will be called upon.

PUBH.4160 Environmental Health Practicum (Formerly 31.416) - Credits: 10

This course is designed to provide students real world practical experience in the field of environmental health, as final preparation for their BS Degree. This 32 hour/week internship opportunity situates students in an environmental health setting most conducive to his or her needs and interests. Placements can vary from health boards and health departments to non-profit agencies, government agencies, university research institutes, and industry. Students work directly with an academically and professionally qualified preceptor to assure their progress in the field. The faculty supervisor is responsible for periodic meetings and correspondence to also assure appropriate development.
PUBH.4930 Directed Study (Formerly 31.493) -
Credits: 1-6
Suggested Degree Pathway for Nursing - 3.5-year degree

For students who entered fall 2020 and beyond.

Freshman Year

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Spring Semester

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Sophomore Year

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Spring Semester

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### Junior Year

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#### Senior Year

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**Total Minimum Credits = 120**

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1This course may be taken either in Fall or Spring.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS. If you need assistance, please contact your advisor.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

Last Updated: 8/24/2021.
Suggested Degree Pathway for Nursing - 4-year degree

For students who entered fall 2020 and beyond.

### Freshman Year

**Fall Semester**

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**Spring Semester**

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### Sophomore Year

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**Spring Semester**

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<tbody>
<tr>
<td>HSCI.2520</td>
<td>Physiological Chemistry II</td>
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<td>HSCI.2540</td>
<td>Physiological Chemistry Laboratory II</td>
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<td>HSCI.3060</td>
<td>Introduction to Gerontology (SS)</td>
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<td>NURS.2120</td>
<td>Introduction to Nursing Practice (DCA)</td>
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<tr>
<td>NURS.2120L</td>
<td>Introduction to Nursing Practice Laboratory</td>
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<tr>
<td>NURS.2120R</td>
<td>Introduction to Nursing Practice Medication Calcs</td>
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### Junior Year

#### Fall Semester

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<tr>
<td>HSCI.3400</td>
<td>IPE Research Methods (IL)</td>
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<tr>
<td>NURS.3100</td>
<td>Health Promotion Risk Reduction Families I</td>
<td>5</td>
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<tr>
<td>NURS.3110</td>
<td>Health Promotion and Risk Reduction of Families Practicum I (AIL)</td>
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#### Spring Semester

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<tr>
<td>NURS.3140</td>
<td>Health Promotion Risk Reduction Families II</td>
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<tr>
<td>NURS.3150</td>
<td>Health Promotion Family Practicum II (SRE)</td>
<td>4</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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<tr>
<td>xxxx.xxxx</td>
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### Senior Year

#### Fall Semester

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<tr>
<td>NURS.4100</td>
<td>Health Promotion Risk Reduction of Families III</td>
<td>5</td>
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<tr>
<td>NURS.4110</td>
<td>Health Promotion Risk Reduction of Families III Practicum (CTPS)</td>
<td>4</td>
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### Spring Semester

<table>
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<tr>
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<th>Course Name</th>
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<tr>
<td>NURS.4130</td>
<td>Role Transition (WOC)</td>
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<tr>
<td>NURS.4140</td>
<td>Role Transition Practicum</td>
<td>6</td>
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<tr>
<td>NURS.4150</td>
<td>Community Health Project</td>
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<td><strong>Total</strong></td>
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**Total Minimum Credits = 120**

1This course may be taken either in Fall or Spring.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS. If you need assistance, please contact your advisor.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy.

[https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf](https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf)

[https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
for details.

Last Updated: 8/24/2021
<table>
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<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>NURS.1010</td>
<td>Strategies for Acad Success (Formerly 33.101)</td>
<td>1</td>
<td>This introductory course will assist nursing students to learn strategies for creating greater academic, professional, and personal success. Specific attention will be given to exploring the profession of nursing, academic integrity, goal setting, time management, critical thinking and communicating with others. Consideration will be given to note taking skills, test reading and studying, writing, test-taking strategies, library use and research techniques, wellness and stress management, and campus resources.</td>
</tr>
<tr>
<td>NURS.1030</td>
<td>Academic Strategies Portfolio Seminar (Formerly 33.103)</td>
<td>1</td>
<td>Nursing students with a diploma in nursing, associate degree in nursing, or second baccalaureate degree will submit a portfolio to demonstrate how they have met the course objectives. The portfolio will show evidence of goal setting and time management, UML library orientation for literature searches, understanding of academic integrity and writing and referencing using APA style. Students will participate in seminar(s) on communication, cultural sensitivity, and conflict resolution.</td>
</tr>
<tr>
<td>NURS.2100</td>
<td>Nursing Fundamentals (Formerly 33.210)</td>
<td>2</td>
<td>This course enables students to begin their basic knowledge of nursing. The course provides an organizing framework, based on Gordon’s functional health patterns, that is strictly nursing. Therapeutic nursing interventions are incorporated into the more detailed discussion of each of the functional health patterns. A separate laboratory component is included for demonstration and practice of nursing interventions. At the conclusion of this course students will demonstrate competency in performing basic nursing intervention for individuals in a clinical setting.</td>
</tr>
<tr>
<td>NURS.2100L</td>
<td>Nursing Fundamentals Lab (Formerly 33.210L)</td>
<td>1</td>
<td></td>
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<tr>
<td>NURS.2110</td>
<td>Nursing Assessment and Skills (Formerly 33.313 and NURS.3130)</td>
<td>2</td>
<td>This course introduces students to the foundations of communication, nursing assessment, and psychomotor skills guided by standards of nursing practice. Emphasis is placed on the integration and application of these skills through the use of critical thinking.</td>
</tr>
<tr>
<td>NURS.2110L</td>
<td>Nursing Assessment and Skills Lab (Formerly 33.313L/ NURS.3130L)</td>
<td>1</td>
<td>This laboratory course introduces students to the foundations of communication, nursing assessment, and psychomotor skills guided by standards of nursing practice. Emphasis is placed on the integration and application of these skills through the use of critical thinking.</td>
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<tr>
<td>NURS.2120</td>
<td>Introduction to Nursing Practice (Formerly 33.212)</td>
<td>3</td>
<td>Nursing as a health profession is introduced in this foundation course. The course is organized using functional health patterns. Within the context of the American Nurses Association Standards of Clinical Practice, standards of professional performance are introduced and standards of care are emphasized. Students, at the completion of this course, will demonstrate an understanding of the nursing process and competencies to perform basic nursing interventions in a laboratory and a clinical setting. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).</td>
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<tr>
<td>NURS.2120L</td>
<td>Introduction to Nursing Practice Laboratory (Formerly 33.212L)</td>
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</tr>
<tr>
<td>NURS.2120R</td>
<td>Introduction to Nursing Practice Medication Calcs (Formerly 33.212R)</td>
<td>1</td>
<td>This course reviews the mathematics necessary to complete drug calculations. This course reviews the mathematics necessary to complete drug calculations using dimensional analysis. It covers the metric and household system of weights and measures. The focus of the course is on the completion of drug dosages for oral and parenteral medication.</td>
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<tr>
<td>NURS.2180</td>
<td>Pharmacology for Nursing Practice (Formerly 33.318/NURS.3180)</td>
<td>3</td>
<td>This course provides an overview of pharmacology as it relates to nursing practice. Students connect knowledge regarding the nursing process to pharmacotherapeutics throughout body systems and the lifespan.</td>
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<tr>
<td>NURS.3010</td>
<td>Research in Nursing and Health Care (Formerly 33.301)</td>
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This course provides an overview of the research process. Health care research interests and the methodology of various disciplines are examined. Through a review of research studies, students examine the basic steps in the process of research. Ethical problems in the world of research are explored and students learn how research influences health care practice and policy. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

NURS.3060 Health Assessment (Formerly 33.306) - Credits: 3
This combined didactic and laboratory course builds on the students' professional nursing education and experiences through the inclusion of health assessment information as applied to the professional nursing role in the community setting. Emphasis is on systematic data collection including thorough history taking, physical examination, screening and risk-factor recognition.

NURS.3070 Concepts for Baccalaureate Nursing (Formerly 33.307) - Credits: 3
This course is designated as a transition course for registered nurse students pursuing a baccalaureate degree with a major in nursing. This course aims to refine critical thinking skills and analyze nursing's unique contribution to health care. Consideration is given to the interrelationships of theory, research, and practice. Special emphasis is placed on the concepts of health promotion and risk reduction as they relate to individuals and families who are at risk for or experiencing health problems. This course includes a practicum component that focuses on the development of interventions to promote the health of individuals and families at risk.

NURS.3080 Health Promotion in Nursing (Formerly 33.308) - Credits: 2
This course is designed as a transition course for registered nurse students pursuing a baccalaureate degree with a major in nursing. It introduces the theory and research related to the concepts of health promotion and risk reduction. These concepts are presented as essential components of professional nursing practice. This course includes a clinical practicum which focuses on the development of interventions to promote the health of individuals and families. This course aims to refine critical thinking skills and analyze nursing's unique contribution to health care. Consideration is given to the interrelationships of theory, research, and practice.

NURS.3090 Health Promotion in Nursing Practice Practicum (Formerly 33.309) - Credits: 3
This course is a clinical practicum which focuses on the development of interventions to promote the health of individuals and families. This course aims to refine critical thinking skills and analyze nursing's unique contribution to health care. Consideration is given to the interrelationships of theory, research and practice.

NURS.3100 Health Promotion and Risk Reduction Families I (Formerly 33.310) - Credits: 5
This course focuses on health promotion and risk reduction with young individuals and families who are responding to potential or actual physical and psychosocial health problems. Content is centered on holistic nursing care from a lifespan perspective beginning in pregnancy and ending with adolescence.

NURS.3110 Health Promotion and Risk Reduction of Families I Practicum (Formerly 33.311) - Credits: 4
This community-based clinical course is focused on health promotion of young families including childbearing women, infants, children, and adolescents. A portion of the clinical experience consists of establishing a relationship by the student with a family, first four semesters of nursing curriculum. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL).

NURS.3120 Concepts of Professional Nursing (Formerly 33.312) - Credits: 2
Nursing as a health profession is introduced in this foundation course. The concepts of health promotion, communication, critical thinking, culture, nursing theory and research, and therapeutic nursing interventions are presented. Within the context of the American Nurses’ Association Standards of Clinical Nursing Practice, standards of professional performance are introduced and standards of care are emphasized. First four semesters of nursing curriculum.

NURS.3140 Health Promotion and Risk Reduction Families II (Formerly 33.314) - Credits: 5
This course focuses on health promotion and risk reduction with adults and their families who are responding to potential or actual biopsychosocial health problems. Content is centered on holistic nursing care throughout the adult lifespan.

NURS.3150 Health Promotion and Risk Reduction of Families II Practicum (Formerly 33.315) - Credits: 4
In this clinical course, students provide nursing care to adult clients and their families. The focus is the development of specifically tailored therapeutic interventions to promote the health of these clients and assist with potential or actual health problems.

**NURS.3200 Community-Focused Health and Policy (Formerly 33.320) - Credits: 3**

This course provides a foundation to community health nursing with the community, family and individual as Client. This course presents an overview of the US health care delivery system with an emphasis on the role of government in healthcare, Medicaid, and current efforts at healthcare reform.

**NURS.3210 Independent Study (Formerly 33.321) - Credits: 1**

Independent Study on a topic chosen by the student and agreed on by the faculty member.

**NURS.3220 Independent Study (Formerly 33.322) - Credits: 3**

**NURS.3230 Independent Studies (Formerly 33.323) - Credits: 3**

Independent Studies

**NURS.3240 Community-Focused Project Implementation (Formerly 33.324) - Credits: 2**

This course focuses on improving the health of one aspect of the community. Students analyze health problems in identified communities. Interventions for community as client are developed and implemented and the effectiveness of applied interventions in evaluated.

**NURS.3250 Community-Focused Project Dissemination (Formerly 33.325) - Credits: 1**

This one credit course focuses on the dissemination of the results of a community based program. Students develop presentations which describe methods used to identify, intervene and evaluate the health problems of a community. Students are required to present their findings at a formal dissemination venue identified by faculty.

**NURS.4100 Health Promotion and Risk Reduction of Families III (Formerly 33.410) - Credits: 5**

This course addresses the nursing care of adults with acute and chronic conditions. Particular attention is paid to nursing care of adults with increasing complex illnesses and acuity levels.

**NURS.4110 Health Promotion and Risk Reduction of Families III Practicum (Formerly 33.411) - Credits: 4**

In this clinical course, students provide nursing care to adults in adult inpatient and outpatient settings. The focus of the experience is the development of specifically tailored therapeutic interventions in providing care to adults with acute and chronic illness.

**NURS.4120 Community Health and Health Policy (Formerly 33.412) - Credits: 4**

This course analyzes the development of policy and its impact on the health of populations. Students apply epidemiology and community health science to population-based nursing practice. Students identify a community health problem that can be addressed through health promotion activities.

**NURS.4130 Role Transition (Formerly 33.413) - Credits: 4**

This capstone course focuses on the transition to the professional nursing role. Content includes professional issues, trends, and leadership and management principles which impact on nursing practice. Students analyze nursing practice in relation to the standards of professional performance. Meets Core Curriculum Essential Learning Outcome for Written & Oral Communication (WOC).

**NURS.4140 Role Transition Practicum (Formerly 33.414) - Credits: 6**

During this clinical experience the student works collaboratively with nurse preceptor and other members of the health team. The student becomes increasingly self-directed in carrying out the professional nursing role.

**NURS.4150 Community Health Project (Formerly 33.415) - Credits: 2**

The student applies the ANA Public Health Nursing Scope and Standards of Nursing Practice with community as client. Teams of students utilize community assessment data collected from previous semester to develop, implement and evaluate a community health promotion activity.

**NURS.4200 Leadership in Nursing (Formerly 33.420) - Credits: 3**

This course focuses on leadership roles, responsibilities, and opportunities for the professional nurse. Course content includes professional issues, trends, and leadership and managerial principles pertinent to healthcare and nursing practice. Students explore professional perspectives, norms,
and ethical standards essential in values-driven management and leadership.

NURS.4210 Selected Topics in Nursing (Formerly 33.421) - Credits: 3

Selected Topics in Nursing is a course for advanced undergraduates in the RN-BS option. The content will vary from semester to semester depending on the research interest of the faculty member(s) teaching the course.
Programs

The Kennedy College of Sciences offers undergraduate programs leading to the degree of Bachelor of Science with majors in Biology, Chemistry, Computer Science, Environmental Science, Mathematics, Meteorology and Atmospheric Science, and Physics. All departments in the college also offer graduate degrees (for further information see the graduate catalog).

The Bachelor of Science degree is designed to provide a specialized education in one or more of the basic sciences. Specialized Bachelor of Science curricula, which are offered in areas of science and mathematics, provide opportunities for major and minor program options but afford greater opportunities for major specialization than are permitted in comparable Bachelor of Arts curricula.

Minor areas of study are offered by all science departments. College majors may also wish to consider minors offered by the social sciences, humanities, and fine arts departments, and specialized course sequences of the Francis College of Engineering.

Below is a list of undergraduate majors and minors offered in the Kennedy College of Sciences.

Majors

- Biology: B.S. General OptionBioinformatics OptionBiotechnology OptionEcology,Evolution and Organismal Biology Option
- Engineering Physics: B.S. Electrical and Computer Engineering OptionMechanical Engineering Option
- Physics: B.S. General OptionAstronomy and Astrophysics OptionRadiological Health Physics Option

Minors

- Biology (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Chemistry (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Climate Change and Sustainability (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Computer Science (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Geology (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Mathematics (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Physics
- Robotics (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Sound Recording Technology (through Music Department) For Computer Science Majors (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

College of Sciences
Degree Pathways are a semester-by-semester sequence of courses recommended for successful completion of a degree, diploma, credential or certificate from the university. Students should follow the degree pathway appropriate to their catalog year. A student’s catalog year is typically defined by the date of their entry into the University of Massachusetts Lowell.

### Biology
- **General Option**
  - fall 2021 and beyond
  - fall 2020 - spring 2021
  - fall 2015 - spring 2020
  - fall 2014 - spring 2015
- **Bioinformatics Option**
  - fall 2021 and beyond
  - fall 2020 - spring 2021
  - fall 2015 - spring 2020
  - fall 2014 - spring 2015
- **Biotechnology Option**
  - fall 2021 and beyond
  - fall 2020 - spring 2021
  - fall 2015 - spring 2020
  - fall 2014 - spring 2015
- **Ecology, Evolution and Organismal Biology Option**
  - fall 2021 and beyond
- **Ecology Option**
  - fall 2020 - spring 2021
  - fall 2015 - spring 2020
  - fall 2014 - spring 2015

### Chemistry
- **General Option**
  - fall 2017 and beyond
  - fall 2015 - spring 2017
- **Biochemistry Option**
  - fall 2020 and beyond
- **Forensic Science Option**
  - fall 2020 and beyond
  - fall 2017 - spring 2020
  - fall 2015 - spring 2017
- **Bio-Cheminformatics Option**
  - fall 2020 and beyond
- **Cybersecurity Option**
  - fall 2020 and beyond
- **Data Science Option**
  - fall 2020 and beyond

### Computer Science
- **General Option**
  - fall 2020 and beyond
  - fall 2015 - spring 2020
- **Bio-Cheminformatics Option**
  - fall 2020 and beyond
- **Cybersecurity Option**
  - fall 2020 and beyond
- **Data Science Option**
  - fall 2020 and beyond

### Engineering Physics
- **Electrical and Computer Engineering Option**
  - fall 2022 and beyond
- **Mechanical Engineering Option**
  - fall 2022 and beyond

### Environmental Science
- **Atmospheric Science Option**
  - fall 2018 - spring 2020
  - fall 2015 - spring 2018
• Environmental Science Option fall 2018 and beyond
• Environmental Studies Option  
  fall 2015 - spring 2018  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Environmental Geoscience Option fall 2015 - spring 2018  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Geoscience Option  
  fall 2018 and beyond

Mathematics  
Mathematics: B.S.
• General Option  
  fall 2015 and beyond  
  fall 2012 - spring 2015  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Applied Computational Math Option  
  fall 2015 and beyond fall 2013 - spring 2015  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Probability/Statistics Option  
  fall 2015 and beyond fall 2012 - spring 2015  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Computer Science Option  
  fall 2015 and beyond fall 2012 - spring 2015  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Business Applications Option  
  fall 2015 and beyond  
  fall 2012 - spring 2015  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
• Bioinformatics Option  
  fall 2015 and beyond fall 2013 - spring 2015  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

• Teaching Option  
  fall 2015 and beyond fall 2012 - spring 2015  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Mathematics: B.A.
• fall 2015 and beyond  
• fall 2012 - spring 2015  
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

Meteorology and Atmospheric Science  
• fall 2020 and beyond

Physics
• General Option  
  fall 2015 and beyond  
  fall 2013 - spring 2015
• Astronomy and Astrophysics Option fall 2021 and beyond
• Radiological Health Physics Option  
  fall 2018 and beyond fall 2015 - spring 2018  
  fall 2013 - spring 2015
• Photonics Option fall 2013 - spring 2015
Major

Students majoring in Biology prepare for a variety of careers which contribute to our understanding of basic life processes and the solution of problems related to health and the environment. Many students graduating with Bachelor's degrees are employed by institutions involved in bio-medical research or environmental field studies, while others become science educators. Degree recipients often choose to continue their education in professional (medical, veterinary, dental) schools or by matriculating into masters and doctoral programs. Since their training in science is integrated with an education in humanities and social sciences, graduates are not only prepared to excel in expanding the base of knowledge in their field of expertise, but are able to understand and respond to social and ethical issues arising from these advances.

The undergraduate program ensures a strong foundation in supporting science and mathematics and provides the essential background needed for a career in modern biology. Several of upper-level electives are available, and the curriculum is sufficiently flexible so that students may tailor it to meet their specific career goals and entrance requirements of professional schools and postgraduate programs. Although it is not required, students are encouraged to conduct original research as a capstone to their undergraduate experience. Students are able to obtain credit toward graduation for research, but more importantly, many research projects lead to student-authored publications in professional journals and presentations at scientific meetings.

The Bachelor of Science in Biology offers four options:

- General Option
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Bioinformatics Option
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Biotechnology Option
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Ecology, Evolution and Organismal Biology Option

Pre-Medical and other Pre-Professional Programs

The curriculum in the Department of Biological Sciences prepares many of our students for entry to prominent schools of medicine, dentistry, veterinary medicine, osteopathic medicine, optometry, podiatry, and chiropractic. Students interested in health-related professional careers should meet at their earliest convenience with the University Pre-Health Professions Advisor, who along with a university wide committee, will assist them with course selection and guide them through the application process for admission to the professional school of their choice. For more information regarding the UMass Lowell Pre-Health Professions program visit the Pre-Health Professionals Advising (https://www.uml.edu/Advising/Pre-Health-Advising/default.aspx) website.

BACHELOR’S-TO-MASTER’S

An accelerated five-year course of study leading to the BS and MS degrees in Biological Sciences is available to full-time students who have a grade-point average of 3.0 or above at the end of their junior year. Interested students, after evaluation and acceptance by the Department’s graduate committee, meet with the graduate coordinator to design a plan for completion of requirements for both degrees within a five-year time frame. Up to 6 credits of graduate courses (500 level or higher) may be used by a student in the BS/MS program for both graduate and undergraduate degrees. Graduate Record Exam scores are not required.

The objective of our graduate programs is to foster critical thinking and to develop skills needed for independent laboratory study. This is accomplished, in part, by offering advanced lecture, seminar and laboratory courses. While it is possible to complete MS requirements without independent research (thesis or project option) student research is what most distinguishes graduate from undergraduate study. All full-time M.S. degree students are, therefore, strongly urged to elect thesis or project options. The Department of Biological Sciences also collaborates with the Department of Chemistry in offering the Ph.D. Option in Biochemistry. Laboratory thesis research is a required component of this program. For more information, see graduate catalog (https://www.uml.edu/resources/catalog-archive/current/Graduate.pdf).

For additional information about programs contact the Department of Biological Sciences (https://www.uml.edu/Sciences/biology/Contact-Us.aspx).

Ecology, Evolution and Organismal Biology Option

The Ecology, Evolution and Organismal Biology option offers students a strong foundation in the basic sciences of biology, chemistry, and physics, as well as advanced courses in ecology, evolutionary biology and environmental biology. Principles of Ecology, Evolutionary Biology, and Climate Change: Science, Communication, and Solutions are added to the core requirements in Biological Sciences. Students may choose from advanced courses in biology, including Botany, Invertebrate...
Zoology, and Genomics.

Electives are also available in several interdisciplinary fields, including, analytical chemistry, environmental economics, environmental law, hydrogeology, and environmental geochemistry.

This option provides students with the theoretical background and hands-on training needed for careers or graduate study in diverse fields such as environmental biotechnology, conservation biology, public health, toxicology, bioremediation, and biological assessment of environmental quality.

View the complete Degree Pathway (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf).

### Suggested Degree Pathway for Biology - Ecology Option

**For students who entered fall 2020 to spring 2021.**

#### Freshman Year

##### Fall Semester

<table>
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<th>Course Name</th>
<th>Cr.</th>
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<td>Principles of Biology I</td>
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<tr>
<td>BIOL.1170L</td>
<td>Experimental Biology I</td>
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<td>BIOL.1160</td>
<td>Freshmen Seminar</td>
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<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
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<td>CHEM.1230L</td>
<td>Chemistry I Lab</td>
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##### Spring Semester

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#### Sophomore Year

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Junior Year

Fall Semester

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Senior Year

Fall Semester

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Spring Semester

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Total Minimum Credits = 120

1Courses may be taken either in fall or spring term of academic year.

2Any UML course xxxx.1010 and above will fulfill the Free Elective requirement (exception, Math courses must be above the level of Calculus I and Chemistry courses must be above the level of Organic Chemistry II w/Lab). Additionally Biology lecture and laboratory courses (BIOL prefix) may be taken to fulfill the Free Elective requirement. Courses with LIFE prefix cannot be used.

3Ecology Elective w/Lab can be replaced by 2 semesters of Senior Research (BIOL.4110L (https://www.uml.edu/catalog/courses/BIOL/4110L) and BIOL.4120L (https://www.uml.edu/catalog/courses/BIOL/4120L)).

4The Core Curriculum Essential Learning Outcomes for
Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) are fulfilled outside the Biology major. See the DCA course listing [here](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) and the SRE course listing [here](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill these requirements.

Ecology elective courses selected from the approved list (total of 4 courses, minimum of 1 with corresponding lab). Courses can be taken at the graduate level with permission of the instructor.

As needed to reach a minimum of 120 credits.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum [policy](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS [here](https://www.uml.edu/Enrollment/SiS/default.aspx). If you need assistance, please contact your advisor.

**Restriction on off-campus study:**

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_Last updated: 6/10/2021_

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### Suggested Degree Pathway for Biology - Bioinformatics Option

**For students who entered fall 2021 and beyond.**

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### Freshman Year

#### Fall Semester

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Total 15

#### Spring Semester

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<tr>
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Total 15

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### Sophomore Year

#### Fall Semester

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### Fall Semester

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<td>Cell and Tissue Elective 3/7</td>
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### Spring Semester

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<td>Organisms, Evolution and Environment Elective 3/7</td>
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### Junior Year

### Fall Semester

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The Arts and Humanities (AH) and Social Sciences (SS) perspectives are subsets of the Breadth of Knowledge requirements in the Core Curriculum. No more than two Breadth of Knowledge courses can be taken with the same four-letter prefix.

The Core Curriculum also includes seven Essential Learning Outcomes (ELOs). The Diversity and Cultural Awareness (DCA) ELO is met outside the major requirements. See the DCA course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill these requirements.

PHIL.4010 (https://www.uml.edu/catalog/courses/PHIL/4010) Bioethics and Genetics Research is required. It is an AH course and satisfies the SRE requirement.

The Class Search tool (https://www.uml.edu/student-dashboard/#class-search/filters) can be used to identify AH and SS courses that simultaneously satisfy the DCA or SRE requirement.

The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your college-based professional advisor and/or faculty advisor to determine how best to satisfy the Core Curriculum requirements.

Students are required to take one course from the Organisms, Evolution, and Environment (OEE) category and one from the Cell and Tissue (CT) category to ensure they have adequate Breadth of Knowledge at the sophomore level. Students should consult with their advisor regarding course selection to satisfy the OEE and CT elective requirements. BIOL.2055 (https://www.uml.edu/catalog/courses/BIOL/2055) Introduction to Bioinformatics.

4 Students must complete six (6) upper-level electives three (3) of which must be lab courses. These courses are selected from two different categories:

- Bioinformatics Electives: Four (4) of the six upper-level electives must be selected from an approved list of bioinformatics courses. Two (2) of these bioinformatics electives must be lab courses. BIOL.4050L (https://www.uml.edu/catalog/courses/BIOL/4050L) Bioinformatics.

- General Biology Electives: The remaining two (2) upper-level electives can be selected from all upper-level BIOL

- Organisms, Evolution, and Conservation BIOL.2055 (https://www.uml.edu/catalog/courses/BIOL/2055)

- BIOL.2200 (https://www.uml.edu/catalog/courses/BIOL/2200) Principles of Cellular Biology
- BIOL.2520 (https://www.uml.edu/catalog/courses/BIOL/2520) Physiology

Students must complete six (6) upper-level electives three (3) of which must be lab courses. These courses are selected from two different categories:

- Bioinformatics Electives: Four (4) of the six upper-level electives must be selected from an approved list of bioinformatics courses. Two (2) of these bioinformatics electives must be lab courses. BIOL.4050L (https://www.uml.edu/catalog/courses/BIOL/4050L) Bioinformatics.

- General Biology Electives: The remaining two (2) upper-level electives can be selected from all upper-level BIOL
courses, and one (1) of these must have a lab component.

5Free Electives can be satisfied by any UML course xxxx.1010 or above, with the following exceptions:

- Courses with the MATH prefix must be above the level of Calculus I.
- Courses with the LIFE prefix may NOT be used.
- Additional Biology courses can be used, but NO MORE than 60 credits of BIOL coursework may be applied towards the minimum 120 credits requirement to graduate.

NOTE: Labs can be taken as a 3 credit lecture with a 1 credit lab or both combined into a 4 credit class. In addition, some lab courses have a 3 credit lecture with 2 credit lab for a total of 5 credits. Additionally, two labs can be replaced by taking the 4 credit senior research courses BIOL.4110L (https://www.uml.edu/catalog/courses/BIOL/4110L) and BIOL.4120L (https://www.uml.edu/catalog/courses/BIOL/4120L)

6Free Elective can vary from 0-3 credits depending on the number of 1 credit or 2 credit labs completed. For example:

- If a student completes no more than three 1 credit labs (whether the lab is a separate course or combined with the lecture into a 4 credit class), then Free Elective will be a 3 credit class.
- However, if three 2 credit labs are completed, then the student will have earned 3 additional credits which can be used to satisfy Free Elective.
- Other combinations can result in Free Elective being 1 or 2 credits.

7Courses may be taken in either semester of the year listed.

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(https://www.uml.edu/catalog/courses/ENGL/1020) (CW)
MATH.1380 (https://www.uml.edu/catalog/courses/MATH/1380) Calculus for Life Sciences I 4
Total 1 5

Sophomore Year

Fall Semester

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Spring Semester

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Junior Year

Fall Semester

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Spring Semester

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Senior Year

Fall Semester

<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL.4510</td>
<td>Senior Seminar (AIL), (WOC), (IL)</td>
<td>2</td>
</tr>
<tr>
<td>BIOL.3/4xxx</td>
<td>Biology Elective</td>
<td>4/5</td>
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</tbody>
</table>

Academic Catalog 2021 - 2022 / Biological Sciences - General Information
<table>
<thead>
<tr>
<th>Course #</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL.3/4xxx</td>
<td>Biology Elective w/Lab</td>
<td>4/6</td>
</tr>
<tr>
<td>xxxxx.xxx</td>
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Spring Semester

<table>
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<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL.3/4xxx</td>
<td>Biology Elective w/Lab</td>
<td>4/5</td>
</tr>
<tr>
<td>xxxxx.xxx</td>
<td>Free Elective</td>
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</tr>
<tr>
<td>xxxxx.xxx</td>
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</tr>
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</table>

**Total Minimum Credits = 120**

1. The Arts and Humanities (AH) and Social Sciences (SS) perspectives are subsets of the Breadth of Knowledge requirements in the Core Curriculum. No more than two Breadth of Knowledge courses can be taken with the same four-letter prefix.

2. The Core Curriculum also includes seven Essential Learning Outcomes (ELOs). The Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) are met outside the major requirements. See the DCA course listing and the SRE course listing for a full list of classes that fulfill these requirements.

3. The Class Search tool can be used to identify AH and SS courses that simultaneously satisfy the DCA or SRE requirement.

4. Students in the General Option must complete six (6) upper-level biology electives of which three (3) must have labs. Labs can be taken as a 3 credit lecture with a 1 credit lab or both combined into a 4 credit class. In addition, some lab courses have a 3 credit lecture with 2 credit lab for a total of 5 credits. Additionally, two (2) of the three (3) electives with labs may be replaced by taking the 4 credit senior research courses BIOL.4110L and BIOL.4120L.

5. Free Elective can vary from 0-3 credits depending on the number of 1 credit or 2 credit labs completed. For example:

   - If a student completes no more than three 1 credit labs (whether the lab is a separate course or combined with the lecture into a 4 credit class), then Free Elective will be a 3 credit class.
• However, if a student completes no more than 3 labs and each lab is a separate 2-credit lab, then the student will have earned three additional BIOL credits which can be used to satisfy Free Elective.
• Other combinations can result in Free Elective being 1 or 2 credits.

Courses may be taken in either semester of the year listed.

Current UMass Lowell students should use their Advisement Report in SIS (https://www.uml.edu/Enrollment/SiS/default.aspx). If you need assistance, please contact your advisor.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last updated: 1/28/2022

Suggested Degree Pathway for Biology - Ecology, Evolution and Organismal Biology Option

For students who entered fall 2021 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>C r.</th>
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</thead>
<tbody>
<tr>
<td>BIOL.1110</td>
<td>Principles of Biology I</td>
<td>3</td>
</tr>
<tr>
<td>BIOL.1170L</td>
<td>Experimental Biology I</td>
<td>1</td>
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<tr>
<td>BIOL.1160</td>
<td>Freshmen Seminar</td>
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<tr>
<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
<td>3</td>
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<tr>
<td>CHEM.1230L</td>
<td>Chemistry I Lab</td>
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<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
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<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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Spring Semester

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<tbody>
<tr>
<td>BIOL.1120</td>
<td>Principles of Biology II</td>
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<tr>
<td>BIOL.1180L</td>
<td>Experimental Biology II</td>
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<tr>
<td>CHEM.1220</td>
<td>Chemistry II (SCL)</td>
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<td>CHEM.1240L</td>
<td>Chemistry II Lab</td>
<td>1</td>
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<tr>
<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
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<tr>
<td>MATH.1380</td>
<td>Calculus for Life Sciences I</td>
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Sophomore Year

Fall Semester

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<tbody>
<tr>
<td>BIOL.2xxx</td>
<td>Organisms, Evolution and Environment Elective/BIOL</td>
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<tr>
<td>CHEM.2210</td>
<td>Organic Chemistry I</td>
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<td>CHEM.2290L</td>
<td>Organic Chemistry IB Lab</td>
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<td>MATH.2830</td>
<td>Statistics (MATH)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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### Spring Semester

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<tr>
<td>CHEM.2230 (<a href="https://www.uml.edu/catalog/courses/CHEM/2230">https://www.uml.edu/catalog/courses/CHEM/2230</a>)</td>
<td>Organic Chemistry IIB</td>
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<td>CHEM.2300L (<a href="https://www.uml.edu/catalog/courses/CHEM/2300L">https://www.uml.edu/catalog/courses/CHEM/2300L</a>)</td>
<td>Organic Chemistry IIB Lab</td>
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<tr>
<td>BIOL.2330L (<a href="https://www.uml.edu/catalog/courses/BIOL/2330L">https://www.uml.edu/catalog/courses/BIOL/2330L</a>)</td>
<td>Experimental Methods in Biology</td>
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<tr>
<td>BIOL.2350 (<a href="https://www.uml.edu/catalog/courses/BIOL/2350">https://www.uml.edu/catalog/courses/BIOL/2350</a>)</td>
<td>Genetics (CTPS), (QL)2/6</td>
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<td>Free Elective 3</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)1</td>
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### Senior Year

#### Fall Semester

<table>
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<tbody>
<tr>
<td>BIOL.4510 (<a href="https://www.uml.edu/catalog/courses/BIOL/4510">https://www.uml.edu/catalog/courses/BIOL/4510</a>)</td>
<td>Senior Seminar (AIL), (WOC), (IL)</td>
<td>2</td>
</tr>
<tr>
<td>xxxx.3/4xxx</td>
<td>Ecology Elective w/Lab4/6</td>
<td>4-5</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective 3</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective 3</td>
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<tr>
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<tr>
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#### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>BIOL.3/4xxx (<a href="https://www.uml.edu/catalog/courses/BIOL">https://www.uml.edu/catalog/courses/BIOL</a>)</td>
<td>Biodiversity Elective w/Lab4/6</td>
<td>4-5</td>
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<tr>
<td>xxxx.3/4xxx</td>
<td>Ecology Elective 4/6</td>
<td>3</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Free Elective 3</td>
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</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective 3</td>
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### Junior Year

#### Fall Semester

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<tr>
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<tbody>
<tr>
<td>BIOL.2xxx (<a href="https://www.uml.edu/catalog/courses/BIOL">https://www.uml.edu/catalog/courses/BIOL</a>)</td>
<td>Cell and Tissue Elective2/6</td>
<td>3</td>
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<tr>
<td>BIOL.3150 (<a href="https://www.uml.edu/catalog/courses/BIOL/3150">https://www.uml.edu/catalog/courses/BIOL/3150</a>)</td>
<td>Principles of Ecology</td>
<td>3</td>
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<tr>
<td>PHYS.1030 (<a href="https://www.uml.edu/catalog/courses/PHYS/1030">https://www.uml.edu/catalog/courses/PHYS/1030</a>)</td>
<td>General Physics I (STEM)</td>
<td>3</td>
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<tr>
<td>PHYS.1030L (<a href="https://www.uml.edu/catalog/courses/PHYS/1030L">https://www.uml.edu/catalog/courses/PHYS/1030L</a>)</td>
<td>General Physics I Lab</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)1</td>
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<tr>
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#### Spring Semester

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<thead>
<tr>
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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>BIOL.4260 (<a href="https://www.uml.edu/catalog/courses/BIOL/4260">https://www.uml.edu/catalog/courses/BIOL/4260</a>)</td>
<td>Evolutionary Biology</td>
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<tr>
<td>PHYS.1040 (<a href="https://www.uml.edu/catalog/courses/PHYS/">https://www.uml.edu/catalog/courses/PHYS/</a>)</td>
<td>General Physics II</td>
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</tbody>
</table>

### Total Minimum Credits = 120

1. The Arts and Humanities (AH) and Social Sciences (SS) perspectives are subsets of the Breadth of Knowledge requirements in the Core Curriculum. No more than two Breadth of Knowledge courses can be taken with the same four-letter prefix.

2. The Core Curriculum also includes seven Essential Learning Outcomes (ELOs). The Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) are met outside the major requirements. See the DCA course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) and the SRE course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill these requirements.
The Class Search tool (https://www.uml.edu/student-dashboard/#class-search/filters) can be used to identify AH and SS courses that simultaneously satisfy the DCA or SRE requirement.

The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your college-based professional advisor and/or faculty advisor to determine how best to satisfy the Core Curriculum requirements.

Students are required to take one course from the Organisms, Evolution, and Environment (OEE) category and one from the Cell and Tissue (CT) category to ensure they have adequate Breadth of Knowledge at the sophomore level. Students should consult with their advisor regarding course selection to satisfy the OEE and CT elective requirements.BIOL.2400 (https://www.uml.edu/catalog/courses/BIOL/2400) Evolution, Ecology, and Conservation is recommended as the OEE elective for the Ecology, Evolution and Organismal Biology option as it is a pre-requisite for upper-level Ecology, Evolution and Organismal Biology option electives.

- Organisms, Evolution, and Environment Electives
  BIOL.2055 (https://www.uml.edu/catalog/courses/BIOL/2055) Introduction to Bioinformatics
- Cell and Tissue Electives
  BIOL.2200 (https://www.uml.edu/catalog/courses/BIOL/2200) Principles of Cellular Biology
  BIOL.2520 (https://www.uml.edu/catalog/courses/BIOL/2520) Physiology

3 Free Electives can be satisfied by any UML course xxxx.1010 or above, with the following exceptions:

- Courses with the MATH prefix must be above the level of Calculus I.
- Courses with the LIFE prefix may NOT be used.
- Additional Biology courses can be used, but NO MORE than 60 credits of BIOL coursework may be applied towards the minimum 120 credits requirement to graduate.

4 Students must complete four (4) upper-level electives two (2) of which must be lab courses. These courses are selected from two different categories:

- Ecology Electives: Three (3) of the four upper-level electives must be selected from an approved list of ecology courses. One (1) of these ecology electives must be a lab course.
  BIOL.3500 (https://www.uml.edu/catalog/courses/BIOL/3500) Parasitic Protozoology
  BIOL.4050L (https://www.uml.edu/catalog/courses/BIOL/4050L) Bioinformatics
  BIOL.4360 (https://www.uml.edu/catalog/courses/BIOL/4360) Behavioral Ecology
  BIOL.4480 (https://www.uml.edu/catalog/courses/BIOL/4480) Form Feeds Function in Vertebrate Evolution
  BIOL.4670 (https://www.uml.edu/catalog/courses/BIOL/4670) Molecular Biology
  BIOL.4690L (https://www.uml.edu/catalog/courses/BIOL/4690L) Molecular Techniques
  BIOL.4840 (https://www.uml.edu/catalog/courses/BIOL/4840) Comparative Vertebrate
  BIOL.3060 (https://www.uml.edu/catalog/courses/BIOL/3060) / BIOL.3080L (https://www.uml.edu/catalog/courses/BIOL/3080L) Invertebrate Zoology /Invertebrate Zoology Lab
  BIOL.4480 (https://www.uml.edu/catalog/courses/BIOL/4480) Form Feeds Function in Vertebrate Evolution
Lab BIOL.4072
(https://www.uml.edu/catalog/courses/BIOL/4072) / BIOL.4072L
(https://www.uml.edu/catalog/courses/BIOL/4072L)
Data Science for Biologists / Data Science for Biologists
Lab BIOL.4550
(https://www.uml.edu/catalog/courses/BIOL/4550) / BIOL.4550L
(https://www.uml.edu/catalog/courses/BIOL/4550L)
Entomology / Entomology Lab BIOL.4800
(https://www.uml.edu/catalog/courses/BIOL/4800) / BIOL.4810L
(https://www.uml.edu/catalog/courses/BIOL/4810L)
Developmental Biology / Developmental Biology
Lab BIOL.5860
(https://www.uml.edu/catalog/courses/BIOL/5860)
Experimental Design and Analysis in Life
Science ENVI.3010
(https://www.uml.edu/catalog/courses/ENVI/3010)
GIS in Earth and Environmental Sciences ENVI.4100
(https://www.uml.edu/catalog/courses/ENVI/4100) / ENVI.4120L
(https://www.uml.edu/catalog/courses/ENVI/4120L)
Soil Science / Soil Science Lab ENVI.4150
(https://www.uml.edu/catalog/courses/ENVI/4150)
Biogeochemical Cycles ENVI.4160
(https://www.uml.edu/catalog/courses/ENVI/4160) / ENVI.4170L
(https://www.uml.edu/catalog/courses/ENVI/4170L)
Climate Change: Science, Communication, and Solutions
/ Climate Change: Science, Communication, and Solutions
Lab ENVI.5020
(https://www.uml.edu/catalog/courses/ENVI/5020)
Freshwater Ecology ENVS.5010
(https://www.uml.edu/catalog/courses/ENVS/5010)
Wetlands Ecology ENVS.5810
(https://www.uml.edu/catalog/courses/ENVS/5810)
Understanding Massachusetts Contingency Plan GEOL.3140
(https://www.uml.edu/catalog/courses/GEOL/3140)
Hydrogeology GEOL.3150
(https://www.uml.edu/catalog/courses/GEOL/3150)
Environmental Geochemistry GEOL.3310
(https://www.uml.edu/catalog/courses/GEOL/3310)
Earth History GEOL.5010
(https://www.uml.edu/catalog/courses/GEOL/5010)
Paleoclimatology GEOL.5240
(https://www.uml.edu/catalog/courses/GEOL/5240)
Regional Hydrogeology GEOL.5250
(https://www.uml.edu/catalog/courses/GEOL/5250)
Groundwater Modeling
- Biodiversity Elective: The remaining one (1) upper-level elective must be selected from an approved list of upper-level list of biodiversity courses. BIOL.3060
(https://www.uml.edu/catalog/courses/BIOL/3060) / BIOL.3080L
(https://www.uml.edu/catalog/courses/BIOL/3080L)
Invertebrate Zoology / Invertebrate Zoology Lab BIOL.3420
(https://www.uml.edu/catalog/courses/BIOL/3420) / BIOL.3440L
(https://www.uml.edu/catalog/courses/BIOL/3440L)
Comparative Vertebrate Anatomy / Comparative Vertebrate Anatomy
Lab BIOL.4480
(https://www.uml.edu/catalog/courses/BIOL/4480)
Form Feeds Function in Vertebrate Evolution BIOL.4570
(https://www.uml.edu/catalog/courses/BIOL/4570) / BIOL.4590L
(https://www.uml.edu/catalog/courses/BIOL/4590L)
Metazoan Parasitology / Metazoan Parasitology
Lab BIOL.4550
(https://www.uml.edu/catalog/courses/BIOL/4550) / BIOL.4550L
(https://www.uml.edu/catalog/courses/BIOL/4550L)
Entomology / Entomology Lab

Note: Some labs can be taken as a 3 credit lecture with a 1 credit lab or both combined into a 4 credit class. In addition, some lab courses have a 3 credit lecture with 2 credit lab for a total of 5 credits.

Free Elective can vary from 1-3 credits depending on the
number of 1 credit or 2 credit labs completed. For example:

- If a student completes no more than two elective 1 credit labs (whether the lab is a separate course or combined with the lecture into a 4 credit class), then Free Elective will be a 3 credit class.
- However, if a student completes no more than two elective labs and each has a separate 2 credit lab, then the student will have earned two additional credits which can be counted towards Free Elective thus reducing it to one credit.

Courses may be taken in either semester of the year listed.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS. If you need assistance, please contact your advisor.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

Last updated: 2/10/2022

Suggested Degree Pathway for Biology - Biotechnology Option

For students who entered fall 2021 and beyond.

Freshman Year

Fall Semester

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<thead>
<tr>
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<th>Course Name</th>
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<tbody>
<tr>
<td>BIOL.1110</td>
<td>Principles of Biology I</td>
<td>3</td>
</tr>
<tr>
<td>BIOL.1170L</td>
<td>Experimental Biology I</td>
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<tr>
<td>BIOL.1160</td>
<td>Freshmen Seminar</td>
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</tr>
<tr>
<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
<td>3</td>
</tr>
<tr>
<td>CHEM.1230L</td>
<td>Chemistry I Lab</td>
<td>1</td>
</tr>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH(CW)</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
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<td>3</td>
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Spring Semester

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<tr>
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<th>Course Name</th>
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<tbody>
<tr>
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<td>BIOL.1180L</td>
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Sophomore Year

Fall Semester

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<td>Experimental Methods in Biology</td>
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<tr>
<td>CHEM.2210</td>
<td>Organic Chemistry I</td>
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### Junior Year

#### Fall Semester

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<td>Biotechnology Elective4/6</td>
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<td>PHYS.1030</td>
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### Senior Year

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<td>Biology Elective w/Lab4/6</td>
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**Spring Semester**

**Course#** | **Course Name** | **Cr.**
---|---|---
BIOL.4190 | Biochemistry | 3
BIOL.4210L | Biochemistry Techniques | 2
PHYS.1040 | General Physics II | 3
PHYS.1040L | General Physics II Lab | 1
xxxx.xxxx | Arts and Hum. Persp. (AH)1 | 3
xxxx.xxxx | Free Elective3 | 3
**Total** | 15 | 5
Free Elective

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<td>xx</td>
<td>0-2</td>
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<tr>
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Total Minimum Credits = 120

The Arts and Humanities (AH) and Social Sciences (SS) perspectives are subsets of the Breadth of Knowledge requirements in the Core Curriculum. No more than two Breadth of Knowledge courses can be taken with the same four-letter prefix.

The Core Curriculum also includes seven Essential Learning Outcomes (ELOs). The Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) are met outside the major requirements. See the DCA course listing [here](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) and the SRE course listing [here](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill these requirements.

The Class Search tool [here](https://www.uml.edu/student-dashboard/#class-search/filters) can be used to identify AH and SS courses that simultaneously satisfy the DCA or SRE requirement.

The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum [here](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your college-based professional advisor and/or faculty advisor to determine how best to satisfy the Core Curriculum requirements.

Students are required to take one course from the Organisms, Evolution, and Environment (OEE) category and one from the Cell and Tissue (CT) category to ensure they have adequate Breadth of Knowledge at the sophomore level. Students should consult with their advisor regarding course selection to satisfy the OEE and CT elective requirements. BIOL.2200 Principles of Cellular Biology is recommended as the CT elective as it is a pre-requisite for many upper-level Biotechnology electives.

- Organisms, Evolution, and Environment Electives
  - BIOL.2400
  - BIOL.2055
- Cell and Tissue Electives BIOL.2200

Free Electives can be satisfied by any UML course xxxx.1010 or above, with the following exceptions:

- Courses with the MATH prefix must be above the level of Calculus I.
- Courses with the LIFE prefix may NOT be used.
- Additional Biology courses can be used, but NO MORE than 60 credits of BIOL coursework may be applied towards the minimum 120 credits requirement to graduate.

Students must complete five (5) upper-level electives two (2) of which must be lab courses. These courses are selected from two different categories:

- Biotechnology Electives: Four (4) of the five upper-level electives must be selected from an approved list of biotechnology courses. Two (2) of these biotechnology electives must be lab courses. BIOL.3010 / BIOL.3030L / BIOL.4050L / BIOL.4200 / BIOL.4420 / BIOL.4480 / BIOL.4490L
- Recombinant Protein Production Techniques
- Genomics / Genomics Laboratory
- Advanced Cell Biology
- Form Feeds Function in Vertebrate Evolution

([Principles of Cellular Biology](https://www.uml.edu/catalog/courses/BIOL/2200))
([Physiology](https://www.uml.edu/catalog/courses/BIOL/2520))
(https://www.uml.edu/catalog/courses/BIO/L/4490L) Biology of Muscle
(https://www.uml.edu/catalog/courses/BIO/L/5490L) Stem Cell Biology
(https://www.uml.edu/catalog/courses/BIO/L/4600) Molecular Biology
(https://www.uml.edu/catalog/courses/BIO/L/4620) Cardiovascular Physiology
(https://www.uml.edu/catalog/courses/BIO/L/4630L) Developmental Biology
(https://www.uml.edu/catalog/courses/BIO/L/4670) Molecular Techniques
(https://www.uml.edu/catalog/courses/BIO/L/4690L) Virology
(https://www.uml.edu/catalog/courses/BIO/L/4720) Cell Culture
(https://www.uml.edu/catalog/courses/BIO/L/4760) Comparative Vertebrate Embryology
(https://www.uml.edu/catalog/courses/BIO/L/4800) Practical Protein Crystallography
(https://www.uml.edu/catalog/courses/BIO/L/4810L) Cancer Biology
(https://www.uml.edu/catalog/courses/BIO/L/4820) Developmental Biology Lab
(https://www.uml.edu/catalog/courses/BIO/L/4840) Human Neurobiology
(https://www.uml.edu/catalog/courses/BIO/L/4930) Immunology
(https://www.uml.edu/catalog/courses/BIO/L/4950L) Immunology II, Current Topics

General Biology Elective: The remaining one (1) upper-

level elective can be selected from all upper-level BIOL courses.

Note: Labs can be taken as a 3 credit lecture with a 1 credit lab or both combined into a 4 credit class. In addition, some lab courses have a 3 credit lecture with 2 credit lab for a total of 5 credits. Additionally, two labs can be replaced by taking the 4 credit senior research courses BIOL.4110L and BIOL.4120L.

Free Elective can vary from 0-2 credits depending on the number of 1 credit or 2 credit labs completed. For example:

- If a student completes no more than two 1 credit labs (whether the lab is a separate course or combined with the lecture into a 4 credit class), then Free Elective will be a 2 credit class. Since there are not many 2 credit classes, this could require completion of a full 3 credit class.
- However, if a student completes no more than 2 labs and each lab is a separate 2 credit lab, then the student will have earned two additional BIOL credits which can be used to satisfy Free Elective.

Courses may be taken in either semester of the year listed.


Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last updated: 2/23/2022

Suggested Degree Pathway for Exercise Science, Clinical Option - 3-Year Degree

For students who entered fall 2022 and beyond.

First Year
### Summer II Semester

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<td>College Writing I (CW)</td>
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<td>PSYC.1010</td>
<td>Introduction to Psychological Science (SS)</td>
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### Fall Semester

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<tr>
<td>BIOL.1110</td>
<td>Principles of Biology I</td>
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<td>BIOL.1170L</td>
<td>Experimental Biology I</td>
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<td>MATH.2830</td>
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### Spring Semester

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<td>BIOL.1120</td>
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<td>BIOL.1180L</td>
<td>Experimental Biology II</td>
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<td>EXER.2020</td>
<td>Introduction to Exercise</td>
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### Second Year

### Fall Semester

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<td>EXER.3150</td>
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### Spring Semester

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<td>EXER.3560</td>
<td>Pharmacology</td>
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<td>EXER.4220</td>
<td>Exercise Prescription &amp;Programming</td>
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### Total Minimum Credits = 122

1. Science Electives with Lab:
   - HSCI.2510
Academic Catalog 2021 - 2022 / Biological Sciences - General Information


- CHEM.1110 (https://www.uml.edu/catalog/courses/CHEM/1110) General Chemistry I and CHEM.1130L (https://www.uml.edu/catalog/courses/CHEM/1130L) General Chemistry Laboratory I


- HSCI.2520 (https://www.uml.edu/catalog/courses/HSCI/2520) Physiological Chemistry II and HSCI.2540 (https://www.uml.edu/catalog/courses/HSCI/2540) Physiological Chemistry Laboratory II

- CHEM.1120 (https://www.uml.edu/catalog/courses/CHEM/1120) General Chemistry II and CHEM.1140L (https://www.uml.edu/catalog/courses/CHEM/1140L) General Chemistry Laboratory II


4EXER.4210 (https://www.uml.edu/catalog/courses/EXER/4210) Directed Study in Health Promotion can be taken as a Free Elective.

5EXER.4200 (https://www.uml.edu/catalog/courses/EXER/4200) Clinical Exercise Physiology is offered in Senior Year, Fall Semester for December graduates.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS (https://www.uml.edu/Enrollment/SiS/default.aspx). If you need assistance, please contact your advisor.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last updated: 12/13/2021

BIOL.1110 Principles of Biology I (Formerly 81.111) - Credits: 3
Introduces topics such as the chemical and physical basis of life, its evolution, diversity, distribution, and interrelationships of life forms. The central theme of genetic replication, translation, expression, and selection will be emphasized as a unifying principle which determines and integrates structure and function at the cellular, individual population, and community levels of organization. Designed for those students who intend to pursue career options in the biological sciences, biotechnology or related areas such as medicine, biomedical research, radiological sciences or environmental sciences. It is the first-semester course of a two-semester sequence.

BIOL.1120 Principles of Biology II (Formerly 81.112) - Credits: 3
Serves as a continuation of the 81.111/81.112 sequence for those students who intend to pursue career options in the biological sciences or related professional areas such as medicine, biomedical research or environmental sciences. Molecular energy exchange in organisms (photosynthesis and respiratory metabolism), the common functional needs of support, locomotion, nutrition, internal communication and the maintenance of homeostasis are considered. Control and regulation of organisms at levels beyond the individual are considered through discussions of population and community ecology.

BIOL.1130 Introduction Experimental Biology I (Formerly 81.113) - Credits: 1
Presents a series of field trips and laboratory exercises designed to introduce the student to concepts of the distribution and maintenance of life. Specific consideration is given to the diversity and organization of local ecosystems; the continuation of life is considered through exercises covering mitosis, meiosis, genetics, and evolutionary biology.

BIOL.1140 Introduction to Experimental Biology II (Formerly 81.114) - Credits: 1
Provides laboratory experiments, analyses, and dissections designed to introduce the student to biological techniques and processes at the sub-cellular, cellular, and organ systems levels.

BIOL.1160 Freshman Seminar in Biology (Formerly 81.116) - Credits: 1
This course is designed to acclimate incoming students to their new University environment. Students will learn about the Biology program, its faculty and staff members, University resources, and other information useful for success.

BIOL.1170L Principles of Biology I Laboratory (Formerly 81.117) - Credits: 1
A laboratory course covering introduction to scientific inquiry in the biological sciences for majors in biology and related fields. Techniques that are important in biology (ex: microscopy, spectrophotometry and pipetting) are taught and these techniques are applied to the investigation of biological principles emphasizing basic cell and molecular biology, metabolism and fundamental processes of life.

BIOL.1180L Principles of Biology II Laboratory (Formerly 81.118) - Credits: 1
A laboratory course covering introduction to scientific inquiry in the biological sciences for majors in biology and related fields. Techniques that are important in biology (ex: microscopy, dissection) are taught and these techniques are applied to the investigation of basic biological principles emphasizing plant and animal diversity and organ systems.

BIOL.1120 Biology for Scientists (Formerly 81.122) - Credits: 3
Develops a basic understanding of biological topics relevant to students in the health sciences. Course will introduce students to biochemistry, cell biology, cellular respiration, cell replication, genetics, inheritance and molecular biology. Introduction to prions, viruses, prokaryotic and eukaryotic biology will also be covered.

BIOL.1240L Biology for Scientists Lab (Formerly 81.124) - Credits: 1
Develops a basic understanding of biological topics relevant to students in the health sciences. Course will introduce students to biochemistry, cell biology, cellular respiration, cell replication, genetics, inheritance and molecular biology. Introduction to prions, viruses, prokaryotic and eukaryotic biology will also be covered.

BIOL.1CO-OP Curricula Practical Training - Credits: 0-1
Curricula Practical Training. "Variable credit course, student chooses appropriate amount of credits when registering."

BIOL.2010 General Microbiology (Formerly 81.201) - Credits: 3
A study of the general properties of bacteria and viruses (anatomy, physiology, genetics, metabolism, cultivation, and growth); discussions include major microbial infections in man
(etiologic agent, antibiotics and chemotherapy) and an examination of the role of the microbes in the environment.

**BIOL.2030L General Microbiology Laboratory**  
(Formerly 81.203) - Credits: 2

A series of laboratory exercises covering basic qualitative and quantitative techniques commonly employed in a microbiology laboratory.

**BIOL.2055 Introduction to Bioinformatics (Formally BIOL.3050)** - Credits: 3

An introduction to the field of bioinformatics with some hands-on exploration of applications. Specific areas include scientific archives and information retrieval, genome organization and evolution, phylogenetic analysis, comparative genomics, transcriptomics, proteomics, structural bioinformatics, and systems biology. In addition to covering the biological principles underpinning the bioinformatic approaches to study the biology and evolution of genomes and systems, this course also imparts basic computational skills in data retrieval from databases in molecular, functional, and structural biology.

**BIOL.2100 Biology for Engineers (Formerly 81.210)** - Credits: 3

Develops a basic understanding of the science of biology for engineering students, including and introduction to biochemistry, cell biology, metabolism, genetics, genomics, molecular biology, cell growth, and nutrition. Both eukaryotic and prokaryotic biology will be covered.

**BIOL.2120L Biology for Engineers Laboratory**  
(Formerly 81.212) - Credits: 1

This laboratory course will build on BIOL.2100. It will provide an introduction to several basic biological techniques and approaches used in biological engineering laboratories.

**BIOL.2200 Principles of Cellular Biology**  
(Formerly 81.220) - Credits: 3

This course will cover basic topics in cell and molecular biology, including structures of proteins, lipids, carbohydrates and nucleic acids, structure of DNA and it replication and repair, transcription, and cell-cell communication. The molecular biology of cells and the regulation of cellular processes will be emphasized.

**BIOL.2330L Experimental Methods in Biology**  
(Formerly 81.233) - Credits: 2

This is a project-based course designed to introduce students to the methods of general biological laboratory research. Techniques will be introduced in the context of interrelated experiments during a semester-long project. Techniques will include, but are not limited to: making solutions, pipetting, using sterile technique, gel electrophoresis, DNA transformations, minipreps, and other molecular and microscopic methods.

**BIOL.2350 Genetics**  
(Formerly 81.235) - Credits: 4

The theories of both classical and molecular genetics are explored with emphasis on the experimental evidence which has laid the foundation for contemporary understanding of genetics, included is the nature of the genetic material, gene action, genetic recombination, gene regulation, gene interaction, the production and inheritance of genetic phenotypes, chromosomal mechanics, and the behavior of genes in populations.

**BIOL.2400 Evolution, Ecology and Conservation**  
(Formerly 81.240) - Credits: 3

Over 5 million species thrive in amazingly diverse habitats on Earth ranging from the extreme freezing cold of the poles to the lush warmth of the tropics. How did this fantastic diversity arise on our earth? How are these species intimately interconnected with one another, their communities and their ecosystem? How can we save this remarkable biodiversity from extinction? This course will address these key questions by examining the fundamental concepts of evolution, ecology and conservation biology. Students will be expected to attend a discussion section in which they will examine case studies and primary scientific literature.

**BIOL.2520 Physiology**  
(Formerly 81.252) - Credits: 3

Presents a comprehensive study of the fundamental mechanisms governing mammalian physiology. The role of cell physiology in determining systemic functions and coordinating biological control systems will be emphasized. Maintenance of homeostasis will be discussed in terms of biochemical, cytological, anatomical, and physical principles.

**BIOL.3000L Directed Research Experience II**  
(Formerly 81.300) - Credits: 2

**BIOL.3010 Microbiology**  
(Formerly 81.301) - Credits: 3

General properties of bacteria and viruses including anatomy, physiology, genetics, metabolism, cultivation, growth, control and their role in the ecosystems, and industry.

**BIOL.3030L Microbiology Laboratory**  
(Formerly 81.303) - Credits: 2
A series of laboratory exercises covering basic qualitative and quantitative techniques commonly employed in a microbiology laboratory including sterile technique, microscopy, enrichment and isolation, and prevention.

**BIOL.3050 Introduction to Bioinformatics - Credits: 3**

An introduction to the field of bioinformatics with some hands-on exploration of applications. Specific areas include scientific archives and information retrieval, genome organization, comparative genomics, transcriptomics, proteomics, structural bioinformatics, and systems biology. This course also imparts basic computational skills in data retrieval from the databases in molecular and structural biology.

**BIOL.3060 Invertebrate Zoology (Formerly 81.306) - Credits: 3**

A survey of the phyla of invertebrate animals. Discussions include their physiology, development, morphology, behavior, ecology and adaptations. Corequisite: 81.308

**BIOL.3080L Invertebrate Zoology Lab (Formerly 81.308) - Credits: 1**

A broad spectrum of living and preserved specimens are studied in the laboratory with regard to both structure and function. Corequisite 81.306

**BIOL.3150 Principles of Ecology (Formerly 81.315) - Credits: 3**

A series of lectures concerned with the interrelationships of organisms with their abiotic environment with emphasis on the New England area. Selected current topics will supplement the text.

**BIOL.3170L Principles of Ecology Laboratory (Formerly 81.317) - Credits: 2**

A series of laboratory exercises to supplement and illustrate lectures of 81.315. Field trips are an integral part of the course involving sampling and analysis of such ecosystem components as water, soil, invertebrate fauna and characteristic flora of various habitats. Directed readings, quizzes, practical exam and oral presentation of a research topic are integral parts of the course.

**BIOL.3200 Botany (Formerly 81.320) - Credits: 3**

Serves as an introduction to the study of the plant kingdom dealing with the structure, function, and diversity of plants with an emphasis on seed plants. The physiology, morphology, and taxonomy of plants is emphasized.

**BIOL.3220L Botany Laboratory (Formerly 81.322) - Credits: 1**

Emphasizes material covered in 81.320 using field and laboratory exercises.

**BIOL.3240 Economic Botany (Formerly 81.324) - Credits: 3**

Discussions on how humans use plants. Topics will include: Structure and characteristics of woods and their uses in construction of various items, agricultural uses of food plants and spices, poisonous plants, medicinal plants, plants used in religious ritual and plants used as hallucinogens, plants that have altered human history.

**BIOL.3420 Comp Vertebrate Anatomy (Formerly 81.342) - Credits: 3**

This course is designed to provide students a broad understanding of the anatomy of vertebrates with an emphasis on comparison between taxa and their evolutionary significance. Students will acquire knowledge and understanding of anatomical structure and terminology of vertebrates and an understanding of how these structures have evolved from ancestral forms. There will also be some reference to the fields of embryology, histology and paleontology in the course. This course may interest students who might want to go into various animal/human focused fields (e.g. veterinary science, medicine or graduate studies with more organismal focus), and students who simply want a course focused on vertebrates. However, students should note that this course does not focus on human nor veterinary anatomy. This course could also help undergraduates in the General Biology and Ecology Option satisfy free elective requirements.

**BIOL.3440L Comp Vertebrate Anatomy Laboratory (Formerly 81.344) - Credits: 2**

**BIOL.3500 Parasitic Protozoology - Credits: 3**

An introduction to the diversity of single-celled eukaryotes, i.e., protozoans, that are parasites of humans, domestic, and wild animals. Lectures emphasize the morphology, physiology, and life cycles of species of Plasmodium (Malaria), trypanosoma (Sleeping sickness, Chagas disease), Leishmania (Leishmaniasis), and Toxoplasma (Toxoplasmosis), and include their arthropod vectors when present (mosquitos, sand flys, kissing bugs). We will cover the basics of disease (symptoms and pathologies), treatments, and control measures. Contemporary research efforts will be emphasized.

**BIOL.3550 Plant-Animal Interactions - Credits: 3**
Many of our childhood biology lessons entail examples of plant-animal interactions, with macro-level examples that included bees pollinating flowers, squirrels burying acorns in the Fall and caterpillars eating holes in leaves. Yet there are many less obvious ways that plants and animals interact in our biosphere; this course will attempt to provide an overview of major themes in this field. We will delve into the evolutionary origins of how these relationships began and examine how these ecological interactions seem to sustain all biodiversity of Earth. By end of the course, students will be well versed in the technical jargon used in the field and will appreciate the importance of inter-species interactions between the animal and plant kingdom for evolutionary innovation and diversity.

BIOL.3620 Development and Evolution - Credits: 3

This course will introduce the concepts and methods of the field of evolutionary developmental biology. We will cover gene regulation and evolution. Through primary literature, discussion and presentation, we will explore how genetic changes to developmental processes contribute to evolutionary change.

BIOL.4010L Supervised Teaching Biology I (Formerly 81.401) - Credits: 1

Through observation, preparation of material and presentation of demonstrations in selected courses offered by the Department of Biological Sciences, the student becomes familiar with the materials and teaching/learning situations in biology.

BIOL.4020L Supervised Teaching Biology II (Formerly 81.402) - Credits: 1

Through observation, preparation of material and presentation of demonstrations in selected courses offered by the Department of Biological Sciences, the student becomes familiar with the materials and teaching/learning situations in biology.

BIOL.4050L Bioinformatics - Credits: 4

There is a growing need for bioinformaticians in research and industry as datasets are getting bigger and complex, making computational methods necessary for analysis. This hands-on course introduces principles, databases, software, and programming for the analysis and interpretation of molecular datasets. Emphasis is on practical assignments using computational approaches from a biologist’s perspective. Topics include genome assembly, variant detection, comparative genomics and transcriptomics, metagenomics, as well as data retrieval from databases and basic programming using Bash and R. A term project and computer-based exercises are designed to showcase the capabilities and limitations of bioinformatics tools used in genome research, as well as to develop skills in coding literacy.

BIOL.4062 Bioinformatic Tools in Sequence Analysis - Credits: 3

This hands-on course introduces databases, approaches, and software for the analysis and interpretation of molecular sequences. Practical assignments and a term project emphasize the application of computational approaches from a biologist’s perspective. Topics include genome assembly, transcriptomic analysis, and data retrieval from databases using both graphical user interfaces and basic computer programming using Bash and R. The class assignments are all computer-based exercises that are designed to showcase the capabilities and limitations of bioinformatics research and tools used in sequence analysis, as well as to develop skills in coding literacy.

BIOL.4062L Bioinformatic Tools in Sequence Analysis Lab - Credits: 1

This lab accompanies the lecture, with hands-on practical assignments to achieve a firmer understanding of bioinformatics tools and principles. Assignments and a term project emphasize the application of computational approaches from a biologist’s perspective. Topics include genome assembly, transcriptomic analysis, and data retrieval from databases using both graphical user interfaces and basic computer programming using Bash and R. The class assignments are all computer-based exercises that are designed to showcase the capabilities and limitations of bioinformatics research and tools used in sequence analysis, as well as to develop skills in coding literacy.

BIOL.4072 Data Science for Biologists - Credits: 3

Like many other areas of science and business, biology in increasingly defined by increasing amounts of available data. The ability to analyze, visualize, and make inferences from this data will become increasingly valuable for future biologists. Data science can be defined as the intersection between computer science, applied statistics, and knowledge of the application domain—in this case, biology. In this class we will apply methods such as generalized linear models, multi-level models, unsupervised learning, and basic neural networks to biological problems. Hands-on activities using programming will give students experience with steps of a data science project, including simulating, exploring, visualizing, drawing conclusions with statistics, and creating a reproducible analysis.

BIOL.4072L Data Science for Biologists Lab - Credits: 1

Each week we will focus on a different set of data science skills with a one-day project done in small teams. Hands-on activities
using data science programming languages will give students experience with steps of a data science project, including simulating, exploring, visualizing, drawing conclusions with statistics, and creating a reproducible analysis.

BIOL.4090 Photobiology (Formerly 81.409) - Credits: 3

Biological process involving light in plants and animals. Topics include mechanisms of light absorption, energy transduction, light reactions in photosynthesis, functions of color in flowering plants, visual systems and structural and pigment coloration in animals, pigmentation in animals affecting camouflage and reproductive strategies. In addition, the genetics involved in responses to light such as photoperiods, circadian rhythms, and seasonal cycles will be covered.

BIOL.4110L Senior Research Biology (Formerly 81.411) - Credits: 4

An individual, directed one-year research program for senior biology majors selected on the basis of previous academic performance at the end of the junior year. A topic will be chosen after consultation with a faculty member. A report of the research in the form of a thesis is required.

BIOL.4120L Senior Research: Biology (Formerly 81.412) - Credits: 4

An individual, directed one-year research program for senior biology majors selected on the basis of previous academic performance at the end of the junior year. A topic will be chosen after consultation with a faculty member. A report of the research in the form of a thesis is required.

BIOL.4190 Biochemistry (Formerly 81.419) - Credits: 3

Studies the structure and properties of proteins, carbohydrates, and lipids which combined with a discussion of elementary enzymology allows for detailed descriptions of several important degradative and biosynthetic pathways, their integration and regulation. Throughout the course, emphasis is on methods and practical application of fundamental information to the solution of problems of current biomedical interest.

BIOL.4200 Biochemistry II (Formerly 81.420) - Credits: 3

This course will focus on protein dynamics where students will gain facility with thermodynamics of protein folding/misfolding, catalysis, kinetics and binding equilibria as they apply to proteins and other molecules in biological systems. The central theme of this course is that living systems can be understood in terms of the fundamental principles defining the structure and energetics of biological molecules. Attention will be given to quantitative aspects of enzyme kinetics and molecular binding. Examples of how these principles apply to the understanding and treatment of human disease will be discussed.

BIOL.4210L Biochemistry Techniques (Formerly 81.421) - Credits: 2

A series of discussions and "hands on" laboratory exercises emphasizing techniques and use of equipment most commonly employed in biochemical-biomedical research laboratories. Techniques to be mastered include: cell culture, cell fractionation, enzyme purification, ultracentrifugation, UV-visible spectrophotometry, spectrofluorometry, various types of chromatography (thin layer, gas, gel exclusion, ion exchange), electrophoresis, liquid scintillation spectrometry, and the safe handling and application of radioisotopes to problems in biochemistry. Wherever possible, the principles presented in 81.419 will be used as a basis for experimentation using the above techniques. Meets Core Curriculum Essential Learning Outcome for Written & Oral Communication (WOC).

BIOL.4225 Advanced Topics in Biochemistry - Credits: 2

This seminar course will focus on the detailed discussion of the structure of proteins and other biological molecules and how the structure determines the function of those molecules.

BIOL.4230 Biology of Global Change (Formerly 81.423) - Credits: 3

An examination of the role of life processes in controlling the cycling of elements on the surface of the Earth and atmosphere from the molecular to the global level. Students will learn how the different physical components of Earth interact, how these interactions are influenced by life, and how they affect Earth’s habitability now and in the future.

BIOL.4260 Evolutionary Biology (Formerly 81.426) - Credits: 3

Examines the patterns and processes of biological evolution that have led to the diversity of life. Topics covered include the history of evolutionary thought, the evidence for evolution, the generation and maintenance of population-level variation, natural selection, adaptation, sexual selection, speciation, phylogenetics, molecular evolution, the fossil record and extinctions. In addition to lecture and textbook material, students will read and discuss classic and contemporary primary literature from evolutionary biology.
BIOL.4280 Molecular Biotechnology: Recombinant Protein Production (Formerly 81.428) - Credits: 3

Proteins are major targets of pharmaceuticals, and are themselves increasingly used as therapeutics. However both basic research and the pharmaceutical industry depends on availability of purified proteins that are often difficult to isolate from native sources. In this lecture course, students will learn basic and advanced theoretical background in expression and purification of recombinant proteins. It will cover a variety of expression systems including prokaryotic and eukaryotic cells. The course will also address traditional and new methods in recombinant protein purification. Furthermore, students will be introduced to some downstream applications such as crystallization screens and biochemical/biophysical studies.

BIOL.4300 Cancer Genomics - Credits: 3

Cancer is usually the result of genetic alterations acquired over a lifetime that enable a tumor to grow and spread. As a result, each tumor is unique and involves a complex combination of mutations--a part of the reason that cancers can be so hard to treat. To better understand the characteristics of these diseases and discover appropriate treatments, institutions have comprehensively profiled the genomic changes across thousands of people's tumors. That data is available for anyone with the right skills to analyze. In this class, we will delve into the genomics of cancer, as a way to learn how cancers develop, how molecular profiling technologies generate data about these cancers, and how bioinformatics approaches can harness these data to gain insight and discover treatments.

BIOL.4320 Genomics (Formerly 81.432) - Credits: 3

This course surveys the field of genomics, examining current technologies and their biological applications. Lectures cover genome organization, genome sequencing and annotation, functional genomics, evolutionary genomics, transcriptomics, proteomics and the role of bioinformatics in organizing and interpreting genomic data.

BIOL.4340L Genomics Laboratory (Formerly 81.434) - Credits: 1

A series of molecular laboratory and computer-based bioinformatics exercises providing practical experience in the collection and analysis of genomic-level data.

BIOL.4360 Behavioral Ecology - Credits: 3

Animals learn songs, practice agriculture, and craft tools. They build elaborate structures without a blueprint and migrate across the globe without a map. This course explores the mechanistic and evolutionary causes of animal behavior, A combination of lectures, discussions, and animal demos will introduce students to major themes in the field, while emphasizing experiments and ecological context as fundamental to the study of behavior. Students will discuss historic debates and emerging research on the evolution of exaggerated sexual ornaments and defensive structures, sensory bias, heritability of behavior, reciprocity & kinship, and the emergence of animal societies. By the end of the course, students will be able to interpret the behaviors of animals in an evolutionary framework. Students from other departments, including Psychology, and Environmental Science can join this course with instructor permission.

BIOL.4365L Field Techniques in Ecology - Credits: 5

This course will explore the fundamental concepts of field ecology. The goal of this course is to give students an immersive, research-oriented, hands-on learning experience that integrates the interactions of organisms with each other and with their abirotic environment in both aquatic and terrestrial ecosystems in Massachusetts and elsewhere in New England. Students will learn the natural history of these habitats and their organisms, engage in scientific field research, and develop sills in data collection, analysis, and interpretation. By the end of the course, students will have a working toolbox of field techniques to ask questions in population, community, and ecosystem ecology.

BIOL.4370 Biology and Evolution of Arthropoda (Formerly 81.437) - Credits: 3

A detailed examination of phylum Arthropoda from developmental, ecological, genetic, morphological and paleontological perspectives. Specific topics include the relationships of arthropods to protoarthropod-like groups including tardigrades and onychophorans, the evolution of segmentation, and current perspectives on relationships within the phylum.

BIOL.4380 Advanced Genetic Analysis - Credits: 3

This course explores fundamental concepts in classical and molecular genetics. We will examine how studies in genetic model organisms (including budding yeast, Drosophila, and C. elegans) have yielded remarkable insight into a host of biological mechanisms, including cell-signaling pathways, animal development, and gene regulation. Special emphasis will be placed on how geneticists design and interpret their studies. The semester will cover strategies ranging from the classical (screens, selection, complementation, and conditional mutants) to the modern approaches enabled by the genomic revolution (genetic engineering, gene misexpression, and genome-wide association studies).

BIOL.4390L Biology and Evolution of Arthropoda Laboratory (Formerly 81.439) - Credits: 1
An exploration of protoarthropod and arthropod diversity using live and preserved specimens of the major taxa including Tardigrada, Onychophora, Chelicerata, Crustacea, Myriapoda and Hexapoda. Students will learn to collect, dissect, identify, handle and care for live specimens.

**BIOL.4420 Advanced Cell Biology (Formerly 81.442)**
- Credits: 3

This is an advanced course in cell biology. In this course we will examine different areas of eukaryotic cell biology including: membrane structure and function, cell adhesion, intercellular communication, signal transduction, chemotaxis, receptor-mediated endocytosis and intracellular trafficking. Mechanisms underlying relevant human diseases will also be discussed. Upon completion of the course the student will have a strong understanding of cell biology, develop critical thinking processes, proficiency in scientific reading and how to communicate material succinctly.

**BIOL.4480 Form Feeds Function in Vertebrate Evolution - Credits: 4**

This course will provide you with a solid comparative knowledge of how vertebrates including humans have evolved, focusing on how anatomy (form) feeds function (physiology, biomechanics) in movement biology (Cardiorespiratory, sensing, locomotion, feeding). It is only by understanding our evolutionary history that you understand e.g. how vertebrates became Olympian movers, how humans became bipedal, why we use parts of the ancestral jaw to hear, and how we avoid choking when we swallow. Such knowledge is key for medical and veterinary school, but will also support you in biomedical and biotechnology fields as well as in various general science disciplines. This course emphasizes modes of thought, including the differences between evidence and inference, and between correlation and causality.

**BIOL.4490L Biology of Muscle - Credits: 4**

This course takes integrative approaches to exploring architecture, physiology and mechanics of vertebrate skeletal muscle as the main driver of movements in organisms including humans. Combining presentations and discussions of important publications with simple experiments and report-writing, the course hones a specialist-level understanding of how the organ structure is constructed, how cell-level phenomena govern contraction, how the nervous system controls muscle function, how muscle contractions are constrained by physics, and how muscle as an organ structure is able to mitigate those constraints. We will also build and use actuators inspired by muscle function.

**BIOL.4510 Senior Seminar in Biology (Formerly 81.451) - Credits: 2**

This course instructs students in developing effective writing and speaking skills required for preparation of scientific manuscripts and presentations, and communicating in the scientific world. Students will be required to prepare and present oral presentations and to submit written reports.

**BIOL.4550 Entomology - Credits: 3**

This course explores the diversity, evolution, and behaviors of insects. Insects are pollinators, undertakers, and parasites. They are master architects, and the inventors of flight and agriculture. Their societies can tower over elephants or fit in the palm of your hand. Plagues of locusts have shaped human history and wars have been won on the backs of fleas. This course emphasizes comparative natural history and experimentation as the foundation of innovations in entomology. Students will develop a solid understanding of the principles of insect biology that can be applied to medical, forensic, veterinary, agricultural, conservation and academic fields.

**BIOL.4550L Entomology Lab - Credits: 1**

This laboratory focuses on insect classification, development and behavior. Students will travel to local field sites to study and collect insects. Each student will curate a professional insect collection and develop a working knowledge of insect taxonomy through dissection and comparison of preserved specimens, including economically and medically important insects. Students will also rear a variety of social and solitary insects under experimental conditions and report their results. Labs on behavior will focus on insect communication, parental care, eusociality, and orientation.

**BIOL.4570 Metazoan Parasitology (Formerly 81.457) - Credits: 3**

An introduction to the diversity of metazoans (animals) that parasitize humans, livestock, other animals (both vertebrate and invertebrate), and plants. Lectures emphasize the morphology, form and function, physiology, systematics, evolution, life cycles and pathogenesis of several major parasitic groups. Formerly: Advanced Invertebrate Zoology.

**BIOL.4590L Metazoan Parasitology Laboratory (Formerly 81.459) - Credits: 1**

The purpose of the laboratory is to provide students an opportunity to identify and work with a variety of parasites that we discuss in lecture. We will work with preserved specimens, slide material, necropsies, and live specimens. Students will learn how to identify parasites and understand how they affect host biology.

**BIOL.4600 Stem Cell Biology (Formerly 81.460) -**
Credits: 3

The molecular and genetic characteristics of stem cells and their developmental potential will be explored. Lectures and readings will cover the development of embryonic, fetal and adult stem cells, and will examine their use in treating human disorders receiving widespread attention, including neurodegenerative diseases, heart disease, spinal cord injury and leukemia. The ethical, legal and social implications of stem cell research will also be discussed. Additional library investigation and a term paper or seminar will be required.

**BIOL.4620 Cardiovascular Physiology (Formerly 81.462) - Credits: 3**

This course will focus on human cardiovascular physiology in normal and diseased states. The objective of Cardiovascular Physiology is to reinforce the concept that the cardiovascular system can be understood in terms fundamental biophysical and cellular physiological principles. Quantitative aspects will be reinforced with problem sets in the accompanying lab course 81.463. Key concepts in the course will be placed in a medical context showing the underlying physiological concepts that lead to disease states such as; altered blood pressure, heart failure, valvular disease and arrhythmias.

**BIOL.4630-L Cardiovascular Physiology Lab (Formerly 81.463) - Credits: 1**

Cardiovascular Physiology Lab is designed to supplement Cardiovascular Physiology 81.462. The objective of the course is to teach cardiovascular system function using problems sets as well as clinical and pathophysiological examples.

**BIOL.4670 Molecular Biology (Formerly 81.467) - Credits: 3**

A study of the principles and specialized techniques of cloning, purifying, and manipulating recombinant DNA molecules.

**BIOL.4690 Molecular Techniques (Formerly 81.469) - Credits: 4**

Laboratory experiments and independent projects designed to illustrate current techniques and instrumentation used in genetic engineering. Included are restriction mapping, cloning, plasmid purification, blot hybridization, PCR, and DNA sequencing. Students are introduced to computer software utilized for DNA sequence analysis and manipulation.

**BIOL.4720 Virology (Formerly 81.472) - Credits: 3**

A study of bacterial, animal, and plant viruses, including viral structure, modes of replication, biochemistry of the infected cell, genetic properties, and viral oncogenesis. Emphasis is on virus cell interaction at the molecular level.

**BIOL.4760 Cell Culture (Formerly 81.476) - Credits: 4**

A series of lecture and laboratory exercises that will focus on the in vitro culture and analysis of multiple cell type commonly used in biomedical research laboratories. The lecture component will review methodologies used to establish immortalized cell lines, medium component for specific cell types, and techniques for genetically manipulating and analyzing cell lines. The laboratory exercises will emphasize the mastery of sterile techniques used to grow both established cell line and primary cultures, and molecular tools used for introducing recombinant genes and for analyzing cell growth and differentiation.

**BIOL.4800 Developmental Biology - Credits: 3**

This course covers the current understanding of the genetic, molecular, and cellular mechanisms that regulate animal development. Variation in developmental processes, including those involved in evolutionary change as well as disease, are discussed. Specific topics include: fertilization, determination of cell fate and differentiation, establishment of body plans, cell migration, organogenesis, morphogenesis, stem cells, and regeneration.

**BIOL.4810L Developmental Biology Lab - Credits: 1**

This course provides hands on experience in current methods and model systems used to investigate questions in developmental biology. Students will be exposed to a wide variety of embryonic systems, including intensively studied genetic model systems (e.g.C. elegans, zebrafish, mouse) and others with well-established experimental attributes (e.g. Chick, sea urchin). Analytical and experimental techniques used to explore invertebrate and vertebrate development include embryological manipulation, molecular and cell biology approaches. Conceptual topics include cell specification and differentiation, pattern formation, morphogenesis, and comparative embryology. This lab supplements the Developmental Biology lecture (BIOL.4800).

**BIOL.4820 Cancer Biology (Formerly 81.482) - Credits: 3**

A study of the genes and proteins implicated in the cause of human cancer and discussion of the complex behaviors of cancer cells that differ from their normal counterparts in human tissue. Lectures and original research papers will be used.

**BIOL.4840 Comparative Vertebrate Embryology - Credits: 3**
A comparative study of vertebrate embryological development focusing on the morphological development (e.g., Differentiation of tissues, organs, and systems) of vertebrates. Evolutionary relationships of the classes of vertebrates will be investigated through their anatomy. This course builds on concepts taught in Developmental Biology, providing more detailed analysis of tissue development in a comparative context.

BIOL.4880 Structural Biology (Formerly 81.488) - Credits: 3
Structural basis of the molecular biology of cells and the regulation of cellular processes will be discussed. This course will cover the fundamental knowledge about protein, nucleic acid and membrane structure in relation to central systems in biology. Topics to be discussed include structural enzymology, macromolecular assemblies for replication transcription, translation, membrane proteins, signal transduction, cell motility and transport, cell-cell interactions, the immune system, and virus structure.

BIOL.4890 Practical Protein Crystallography (Formerly 81.589 & 81.489) - Credits: 4
This course provides grounding in the principles and practice of protein x-ray crystallography. The course will be unique in format and provide both didactic and laboratory instruction. It is comprised of a series of lecture and laboratory exercises, with an emphasis on practical techniques and hands-on experience of modern protein crystallography. The course will cover the fundamental knowledge about x-ray physics, instrumentation and geometrical diffraction, protein crystallization, macromolecular data collection and processing, phase estimation and improvement, model building and refinement, and model assessment. Student will also be given a recently published structural paper for writing a report on the subject.

BIOL.4892 Crystallography and Structural Bioinformatics - Credits: 3
This course provides grounding in the principles and practice of protein x-ray crystallography, with some applications in structural bioinformatics and drug discovery. This course is comprised of a series of lecture with an emphasis on practical methodologies of modern protein crystallography and structural bioinformatics. The course will cover the fundamental knowledge about x-ray physics, instrumentation and geometrical diffraction, protein crystallization, macromolecular data collection and processing, phase estimation and improvement, model building and assessment, and some exploration of bioinformatics tools employed in molecular docking and virtual screening.

BIOL.4894L Crystallography and Structural Bioinformatics Lab - Credits: 1
This lab course provides grounding in the principles and practice of protein x-ray crystallography, with some applications in structural bioinformatics and drug discovery. It covers topics correlated with the co-requisite lecture course BIOL.4892.

BIOL.4900 Human Neurobiology (Formerly 81.490 & 81.590) - Credits: 3
A study of cellular and systems neurobiology with a focus on how these relate to human health and disease. Particular attention will be given to illustrating functional neuroanatomy and neurophysiology of the human CNS using investigations into the pathogenic mechanisms of a variety of human neurodegenerative diseases including epilepsy, Alzheimer’s Disease, Huntington’s Disease, ALS among others. Note: Graduate level enrollees will be responsible for additional reading and writing.

BIOL.4910L Senior Project: Biology (Formerly 81.491) - Credits: 4
Individual, directed one semester research project taken in the fall and/or spring. Presentation of an acceptable project plan at the time of registration is required. A project report is required.

BIOL.4920L Senior Project: Biology (Formerly 81.492) - Credits: 4
Individual, directed one semester research project taken in the fall and/or spring. Presentation of an acceptable project plan at the time of registration is required. A project report is required.

BIOL.4930 Immunology (Formerly 81.493 & 81.593) - Credits: 3
A study of the nature of the immune response with sections on antibody structure, function and production; antigen-antibody reactions; immunogenetics; and immune regulation, protection and injury.

BIOL.4940 Immunology II, Current Topics - Credits: 3
This course will focus on recent advances in the field of immunology including the study of immune development and activation, response to infection, vaccines, immunoregulation, cancer immunotherapy, and immune dysfunction. Expanding upon the foundational immunologic concepts covered in BIOL.4930/BIO.L.5930, students will gain knowledge of the innate and adaptive immune system at the structural,
molecular, cellular, and functional levels. The objectives of Advanced Topics in Immunology are to gain a comprehensive and practical understanding of current immunological principles in research and clinical/applied sciences, learn to critically read and evaluate scientific literature, learn to interpret data, and design experiments that rigorously test hypotheses.

BIOL.4945 Host-Pathogen Interactions - Credits: 3

This transdisciplinary course will examine the interface between pathogens and their hosts at multiple levels. We will begin with molecular and cellular interactions between host and pathogen species and will expand to include ecological patterns, behavioral biology, and host-pathogen co-evolution. Following an introduction to infectious disease, microbiology, and immunology, we will critically read and evaluate scientific literature. The objectives of Host-Pathogen Interactions are to gain a comprehensive and practical understanding of host-pathogen dynamics, pattern of disease ecology, and host-pathogen co-evolution. Students will learn to critically read and evaluate scientific literature, interpret data, and design experiments.

BIOL.4950L Immunology Laboratory (Formerly 81.495 & 81.595) - Credits: 2

A series of basic laboratory exercises dealing with the preparation, isolation and characterization of antigens, antibodies and effector cells.

BIOL.4960 Practicum Experience (Formerly 81.496) - Credits: 3

On-campus and/or off-campus experiences are developed by the student in consultation with a member of the student’s major department. Specific requirements will vary depending upon department policies and the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a scientific area and for applying techniques of problem solving and/or skills which are appropriate to the student’s major discipline. The practicum experience may not be substituted for a required course in the major.

BIOL.4970 Directed Study: Biological Science (Formerly 81.497) - Credits: 1

BIOL.4980 Directed Study: Biology (Formerly 81.498) - Credits: 2

BIOL.4991 Directed Study: Biology (Formerly 81.499) - Credits: 3

LIFE.1000 Introduction to Biology (Formerly 83.100) - Credits: 3

Presents environmental and organismal structural interrelationships and relates these to the chemical evolutionary basis of life. Not suitable for credit towards any degree in the Division of Sciences.

LIFE.1010 Life Science I (Formerly 83.101) - Credits: 3

Presents environmental and organismal structural interrelationships and relates these to the chemical evolutionary basis of life. Suitable as a Natural Science Elective for a degree in the Division of Sciences.

LIFE.1020 Life Science II (Formerly 83.102) - Credits: 3

Emphasis is on systems structure and function. The cellular organization of plants and animals leads into physiological processes of higher organisms with great emphasis on humans. Among topics considered are nutrition and digestion, cellular metabolism, circulation, respiration, excretion, nervous and skeletal-muscular systems. Also considered are the chemical interactions of these systems with immunity, hormonal and reproductive processes. Suitable as a Natural Science Elective for a degree in the Division of Sciences.

LIFE.1030L Life Science I Laboratory (Formerly 83.103) - Credits: 1

Concerned with experimentation and interpretation of some of the concepts of Life Science I. Suitable as a Natural Science Elective for a degree in the Division of Sciences.

LIFE.1040L Life Science II Laboratory (Formerly 83.104) - Credits: 1

Involved with experimentation and interpretation of some of the concepts of Life Science II. Suitable as a Natural Science Elective for a degree in the Division of Sciences.

LIFE.1050L Introduction to Biology Lab (Formerly 83.105) - Credits: 1

Introduction to Biology Laboratory is a co-requisite course for the Introduction to Biology online lecture course - 83.100. The two courses together fulfill a GenEd Science requirement. The lab course can be taken concurrently with the lecture course or subsequent to it. Weekly labs correspond directly with the chapter assignments provided by the 83.100 instructors.

LIFE.1060 Human Biology (Formerly 83.106) - Credits: 3
Human Biology is designed to be an accelerated online summer course for non-science majors. This course will cover the major organ systems of the human body (cardiovascular, digestive, nervous, excretory, etc.), how they function and the disorders that arise when these systems don’t function as they were intended.

LIFE.1070L Human Biology Laboratory - Credits: 1

This course is a laboratory course for non-science majors and is designed to accompany the Human Biology (LIFE.1060) lecture course. It will help reinforce the concepts investigated in the lecture course which involves the study of structure (anatomy) and function (physiology) of the major organ systems in the human body. Students will engage in the process of science, make observations, develop questions, collect and analyze data by performing virtual lab experiments, and communicate the results of scientific work in assigned weekly lab reports. Not suitable for credit towards any degree in the College of Sciences.

LIFE.1080 Biochemistry in the Kitchen - Credits: 3

This course is an integrated lecture and laboratory course for non-science majors and is designed to fulfill the core laboratory science requirement. The course will present fundamental principles of biochemistry in the context of cooking and foods to explain everyday phenomena. Class periods will include lecture and discussion and there will be laboratory assignments to be completed by the student.

LIFE.1100 Microbes and Society: Good, Bad and Ugly (Formerly 83.110) - Credits: 3

Examines historical aspects of microbial interactions with human society, including the use of microbes in food production, agriculture, biotechnology, industry and environmental preservation; explores bioterrorism, the problem of antibiotic resistance and surveys some historical and contemporary microbial diseases.

LIFE.1230 Nutrition and Disease (Formerly 83.123) - Credits: 3

Serves as an interdisciplinary survey course for students not majoring in biology, which deals with human nutrition as it relates to various chronic disease states. Methods of detection and treatment of the disorders are considered as well as general concepts of health promotion/disease prevention based on the Dietary Guidelines for Americans. Specific topics covered include the role of nutrition in: heart disease, diabetes, cancer, obesity, alcoholism, and eating disorders. Not suitable for credits toward any degree in the Division of Sciences.

LIFE.1250 Plants and Human Society (Formerly 83.125) - Credits: 3

This course is designed to introduce undergraduate students to the fascinating world of plants and their significance in our everyday world. The use of plants in medicine, agriculture, and industry and their importance to humans and our environment will be emphasized. This course is also designed to fulfill the core science elective requirement for the non-science major. Not suitable for credit towards any degree in the Division of Sciences.

LIFE.1270 Plants & Human Society Lab (Formerly 83.127) - Credits: 1

Plants and Human Society Laboratory is a co-requisite course for the Plants and Human Society online lecture course LIFE.1250. The two courses together fulfill the core science with laboratory requirement. The lab course can be taken concurrently with the lecture course or subsequent to it. Weekly labs correspond with the chapter assignments in the lecture course. Not suitable for credit towards any degree in the Division of Sciences.

LIFE.1990L Life Science 1000 level elective (Formerly 83.199) - Credits: 1

Life Science 1000 level elective.

LIFE.2140 Human Ecology (Formerly 83.214) - Credits: 3

Designed to reveal and discuss the increasing problems of overpopulation in regard to environmental deterioration, living space, limits of natural resources and the adverse effects of human alteration on destruction of the natural ecosystem. The implications of current literature and news items will be emphasized. Not suitable for credit towards any degree in the Division of Sciences.

SCIE.2000 Job Search Seminar - Credits: 1

The Job Search Seminar is designed to provide students with the necessary structure, resources, and support to facilitate their career development and the pursuit of career goals. Through a variety of interactive teaching methodologies and assignments, students will participate in a sequence of learning activities including self-assessment, career exploration, and the job search process. The latter will include resume and cover letter writing, the online search, professional networking, and strategic interviewing. The goal of the course is to assist each student in developing a sound plan of action in pursuing their career objectives.
# Suggested Degree Pathway for Chemistry - General Option

For students who entered fall 2017 and beyond.

## Freshman Year

### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.1010</td>
<td>(<a href="https://www.uml.edu/catalog/courses/ENGL/1010">https://www.uml.edu/catalog/courses/ENGL/1010</a>) / HONR.1100</td>
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<tr>
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### Spring Semester

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<th>Cr.</th>
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<tr>
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## Sophomore Year

### Fall Semester

<table>
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<th>Cr.</th>
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<tbody>
<tr>
<td>CHEM.3130</td>
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<tr>
<td>CHEM.2270L</td>
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<tr>
<td>PHYS.1410</td>
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## Junior Year

### Fall Semester

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<tbody>
<tr>
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[Academic Catalog 2021 - 2022 / Chemistry - General Information](https://www.uml.edu/catalog/academicCatalog/2021-2022/)
### Spring Semester

<table>
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<tr>
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<td>Analytical Chemistry II</td>
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<tr>
<td>CHEM.3160</td>
<td>Analytical Chemistry II Lab</td>
<td>2</td>
</tr>
<tr>
<td>CHEM.3450</td>
<td>Physical Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM.3500L</td>
<td>Physical Bioinorganic Lab</td>
<td>2</td>
</tr>
<tr>
<td>CHEM.3600</td>
<td>Responsible Chemist (SRE), (WOC)</td>
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### Total Minimum Credits = 120

1. By mutual agreement between a Chemistry faculty member and a student, Directed Research CHEM.4070 and CHEM.4080 may be utilized to fulfill this requirement.

2. CHEM.4030 Introductory Polymer Science I will be required of all majors entering as first-year students or transferring into the major effective Fall, 2017.

3. Chemistry majors must earn a grade of C- or higher in CHEM.1210 and CHEM.1220. Chemistry majors will not be allowed to proceed to CHEM.1220 without first earning a C- in CHEM.1210.

Chemistry majors will not be allowed to proceed to
CHEM.2210
(https://www.uml.edu/catalog/courses/CHEM/2210)
without first earning a C- in CHEM.1220

4The Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) is fulfilled outside the Chemistry major. See the DCA course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill this requirement.

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*Last updated: 9/19/2019*

### Suggested Degree Pathway for Chemistry - Biochemistry Option

For students who entered fall 2020 and beyond.

### Freshman Year

<table>
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<tbody>
<tr>
<td><strong>Course#</strong></td>
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<tr>
<td>ENGL.1010 (<a href="https://www.uml.edu/catalog/courses/ENGL/1010">https://www.uml.edu/catalog/courses/ENGL/1010</a>) / HONR.1100 (<a href="https://www.uml.edu/catalog/courses/HONR/1100">https://www.uml.edu/catalog/courses/HONR/1100</a>)</td>
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<tr>
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<table>
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<tbody>
<tr>
<td><strong>Course#</strong></td>
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<tr>
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### Sophomore Year

#### Fall Semester

<table>
<thead>
<tr>
<th><strong>Course#</strong></th>
<th><strong>Course Name</strong></th>
<th><strong>Cr.</strong></th>
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<tr>
<td>CHEM.2210 (<a href="https://www.uml.edu/catalog/courses/CHEM/2210">https://www.uml.edu/catalog/courses/CHEM/2210</a>)</td>
<td>Organic Chemistry I</td>
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### Junior Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>C r.</th>
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<tbody>
<tr>
<td>CHEM.3130</td>
<td>Analytical Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM.3150L</td>
<td>Analytical Chemistry I Lab</td>
<td>2</td>
</tr>
<tr>
<td>CHEM.3440</td>
<td>Physical Chemistry I</td>
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### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>C r.</th>
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</thead>
<tbody>
<tr>
<td>CHEM.3140</td>
<td>Analytical Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM.3160L</td>
<td>Analytical Chemistry II Lab</td>
<td>2</td>
</tr>
<tr>
<td>CHEM.3450</td>
<td>Physical Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM.3500L</td>
<td>Physical Bioinorganic Lab</td>
<td>2</td>
</tr>
<tr>
<td>CHEM.3600</td>
<td>Responsible Chemist (SRE), (WOC)</td>
<td>3</td>
</tr>
<tr>
<td>MATH.2830</td>
<td>Intro to Statistics</td>
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### Senior Year

#### Fall Semester

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<tbody>
<tr>
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<td>CHEM.4500</td>
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<td>xxxxx.xxxx</td>
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<td>xxxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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Total

16

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### Spring Semester

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<tr>
<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>CHEM.3140</td>
<td>Analytical Chemistry II</td>
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<tr>
<td>CHEM.3160L</td>
<td>Analytical Chemistry II Lab</td>
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<td>CHEM.3450</td>
<td>Physical Chemistry II</td>
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<tr>
<td>CHEM.3500L</td>
<td>Physical Bioinorganic Lab</td>
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<tr>
<td>CHEM.3600</td>
<td>Responsible Chemist (SRE), (WOC)</td>
<td>3</td>
</tr>
<tr>
<td>MATH.2830</td>
<td>Intro to Statistics</td>
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Total

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### Undergraduate / College of Sciences

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Spring Semester

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<tr>
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<td>Biochemistry II</td>
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<td>Molecular Elective</td>
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</table>

Total Minimum Credits = 121

1Chemistry majors must earn a grade of C- or higher in CHEM.1210 (https://www.uml.edu/catalog/courses/CHEM/1210) Chemistry I and CHEM.1220 (https://www.uml.edu/catalog/courses/CHEM/1220) Chemistry II.

- Chemistry majors will not be allowed to proceed to CHEM.1220 (https://www.uml.edu/catalog/courses/CHEM/1220) without first earning a C- in CHEM.1210 (https://www.uml.edu/catalog/courses/CHEM/1210)
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2It is recommended that students complete BIOL.1110 (https://www.uml.edu/catalog/courses/BIOL/1110) / BIOL.1170L (https://www.uml.edu/catalog/courses/BIOL/1170L). However, BIOL.2100 (https://www.uml.edu/catalog/courses/BIOL/2100) Biology for Engineers and BIOL.2020L (https://www.uml.edu/catalog/courses/BIOL/2020L) Biology for Engineers Laboratory will also satisfy this requirement.


4DCA recommended/DCA met outside major

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Last updated: 10/23/2019

Suggested Degree Pathway for Chemistry - Forensic Science Option

For students who entered fall 2020 and beyond.

Freshman Year

Fall Semester

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<tr>
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</thead>
<tbody>
<tr>
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### Spring Semester

<table>
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<tr>
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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
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<tr>
<td>CHEM.1050</td>
<td>Intro. to Discipline of Chemistry</td>
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<td>CHEM.1210</td>
<td>Chemistry I</td>
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<td>CHEM.1230L</td>
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<td>MATH.1310</td>
<td>Calculus I (MATH)</td>
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### Sophomore Year

#### Fall Semester

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<tbody>
<tr>
<td>CHEM.2210</td>
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<tr>
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#### Spring Semester

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<th>Cr.</th>
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<tbody>
<tr>
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<td>Organic Chemistry Lab IIA</td>
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<td>CHEM.2600</td>
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<td>PHYS.1440</td>
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<td>MATH.2340</td>
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### Junior Year

#### Fall Semester

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<th>Course Name</th>
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<tbody>
<tr>
<td>CHEM.3130</td>
<td>Analytical Chemistry I</td>
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Spring Semester

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Senior Year

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<td>BIOL.1110</td>
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Spring Semester

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<td>CHEM.4030</td>
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Total Minimum Credits = 122

1CHEM.4030
Introductory Polymer Science I will be required of all majors entering as first-year students or transferring into the major effective Fall, 2017.

2Chemistry majors must earn a grade of C- or higher in CHEM.1210
Chemistry I and CHEM.1220
Chemistry II.

- Chemistry majors will not be allowed to proceed to CHEM.1220
  without first earning a C- in CHEM.1210
- Chemistry majors will not be allowed to proceed to CHEM.2210
  without first earning a C- in CHEM.1220

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum
You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements. Current UMass Lowell students should use their Advisement Report in SIS (http://www.uml.edu/Enrollment/Sis/default.aspx). If you need assistance, please contact your adviser.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

_Last updated: 1/06/2020_
CHEM.1010 Applied Chemistry for Non-Scientists (Formerly 84.101) - Credits: 3
Provides an understanding of basic chemical principles -- atomic structure, bonding and interparticle forces, physical and chemical properties of matter through hands-on examination of matter and the application of principles to understanding the chemistry of current issues (e.g., environmental chemistry, biochemistry, food and drug chemistry) and the analysis of problems dealing with these issues. This course is not available for credit for Science or Engineering majors.

CHEM.1020 Forensic Science for the Non-Scientist (Formerly 84.102) - Credits: 3
This course presents the inherently fascinating topics of crime and criminal investigations as a pathway for teaching the fundamental chemical concepts most often covered in an introductory non-majors course. This course capitalizes on the surge of interest in the scientific investigation of crime (as sparked by CSI and other television shows) and will collate the theme of forensic science with the fundamentals of chemistry. The course material will be continually updated with each offering.

CHEM.1040 Consumer Science 4-1-1: An Essential Guide - Credits: 3
This course introduces chemical principles through the context of examining current and topical consumer items such as drugs, food, dietary supplements and personal care products. Information presented will enhance awareness and confidence in understanding the products, scientific reports, news articles and making decisions about the utilization of available products. Chemistry 1040 is a combined lecture and lab demonstration course for non-science majors designed to fulfill the science with lab perspective (SCL) breadth of knowledge degree requirement.

CHEM.1050 Intro to the Discipline of Chemistry (Formerly 84.105) - Credits: 1
This course provides an introduction to chemistry as a career. Required of chemistry majors, it discusses historical aspects of the field and modern career paths, including academic and industrial chemistry. Students are presented with information regarding career opportunities in chemistry, including: analytical/environmental, forensics, inorganic, organic, materials, pharmaceutical/biochemistry, polymer, and theoretical/physical. They are also given an introduction to graduate school and teaching opportunities often pursued following the B.S. degree. In addition to lectures by the instructor, guests from industry and government laboratories are invited to discuss "what it means to be a chemist".

CHEM.1100 General Chemistry I (Formerly 84.111) - Credits: 3
Provides a one-semester survey of inorganic chemistry: the structure and properties of matter, chemical reactions, stoichiometry, gas laws, solution chemistry, kinetics, equilibrium, and acid-base chemistry.

CHEM.1120 General Chemistry II (Formerly 84.112) - Credits: 3
Surveys the basic principles of organic chemistry and biochemistry with emphasis on biochemical aspects of carbohydrates, lipids, proteins and nucleic acids. Various metabolic pathways are also emphasized.

CHEM.1130L General Chemistry Laboratory I (Formerly 84.113) - Credits: 1
Lab experiments designed to illustrate the principles covered in 84.111.

CHEM.1140L General Chemistry Laboratory II (Formerly 84.114) - Credits: 1
Uses laboratory experiments designed to illustrate the principles discussed in 84.112.

CHEM.1150 Principles of Chemistry (Formerly 84.115) - Credits: 3
The course provides an introduction to the basic concepts of Chemistry with an emphasis on critical thinking, problem-solving, and computational skills required for more advanced Chemistry courses. Topics include measurement, chemical calculations, problem solving logic, units analysis, chemical reactions, the periodic table, basic bonding theory and solutions. No previous Chemistry experience is assumed. There is no lab component to this course.

CHEM.1210 Chemistry I (Formerly 84.121) - Credits: 3
Provides an introduction to the basic concepts of chemistry through classroom discussions and demonstrations. Topics include chemical calculations, atomic structures, the periodic table, basic bonding theory, solutions, liquids, and gases. Restricted to science, engineering, and engineering technology majors.

CHEM.1220 Chemistry II (Formerly 84.122) - Credits: 3
Serves as a continuation of CHEM.1210. Topics include
CHEM.1230L Chemistry I Laboratory (Formerly 84.123) - Credits: 1

Studies experimental chemical principles and chemical transformation that is coordinated with topics considered in 84.121. Some of the more important reactions of elements, oxides, acids, bases, and salts are examined. Other topics include chemical separation, purification, preparation of inorganic salts, quantitative determinations dealing with the formula of a compound, gas laws, and colligative properties. Careful techniques and precise measurements are stressed. Restricted to science, engineering, and engineering technology majors.

CHEM.1240L Chemistry II Laboratory (Formerly 84.124) - Credits: 1

Serves as a continuation of the laboratory study begun in CHEM.1230L that is coordinated with topics of CHEM.1220. Topics include: thermochemistry, kinetics, spectroscopy, titration, pH, equilibrium reaction and constants. Some aqueous solution reactions and organic reactions are examined. Accurate measurements and precise instrumental and apparatus operation are expected. Restricted to science, engineering, and engineering technology majors.

CHEM.1350 Honors Chemistry I (Formerly 84.135) - Credits: 3

A more in-depth view of the topics covered in Chemistry I, (84.121). Topics include chemical reactions and calculations, atomic history and structures, the behavior of gases and bonding theory. Open to students enrolled in the Honors Program, and may be taken instead of 84.121.

CHEM.1360 Honors Chemistry II (Formerly 84.136) - Credits: 3

A continuation of 84.135. A more in-depth view of the topics covered in Chemistry II (84.122). Topics include solutions, kinetics, thermodynamics, acids and bases, chemical equilibrium, electrochemistry and solubility. Open to students enrolled in the Honors Program, and may be taken instead of 84.122.

CHEM.2040 Introduction to Organic and Polymer Chemistry (Formerly 84.204) - Credits: 3

This course is a one-semester overview of organic chemistry for plastics engineering majors. Organic chemistry and its associated principles underscore a broad component of the plastics engineering curriculum. It is desirable therefore for such students to develop a basic appreciation of the fundamental reactions in organic chemistry, as well as an understanding of the interaction of organic compounds with their environment. Students will therefore be expected to secure a basic understanding of, e.g., chemical bonding, the chemistry of alkanes, alkenes, alkynes, aromatic compounds, substitution and elimination reactions, reactions of organic alcohols, ethers, epoxides, aldehydes and ketones, carboxylic acids, and amine compounds. When appropriate, examples will be provided that relate to those typical polymerization reactions (e.g. free-radical or ionic) employed to manufacture commercial polymer materials. Coverage will include synthesis of organic chemicals and polymers from natural and sustainable materials.

CHEM.2050L Principles Of Organic Chemistry Laboratory (Formerly 84.205) - Credits: 1

Introduction to the basic skills and techniques used in the synthesis, purification, and characterization of representative organic compounds. Open to Chemical Engineering students only.

CHEM.2210 Organic Chemistry I (Formerly 84.221) - Credits: 3

CHEM.2210 is the first course of a two-semester sequence of organic chemistry for students majoring in Chemistry, Chemical Engineering, Biological Sciences as well as pre-medical, pre-dental, pre-pharmaceutical and pre-veterinary students. The course focuses on acid-base properties, functional group labels, conformational analyses, sterochemistry, substitution, elimination and addition reactions of organic molecules. Curved arrow mechanisms and the relationship between organic structure and reactivity are emphasized. Aspects of organic spectroscopy are also introduced.

CHEM.2220 Organic Chemistry IIA (Formerly 84.222) - Credits: 3

A continuation of CHEM.2210 including an introduction to infrared and NMR spectroscopy and biochemistry. The application of organic reactions in multi-step synthesis is stressed.

CHEM.2230 Organic Chemistry IIB (Formerly 84.223) - Credits: 3

The course covers the chemical and mechanistic principles of organic reactions utilized in biological systems. Spectroscopy, organic reactions and related mechanisms of bio-molecules or small molecules in biological systems will be discussed from a
functional group perspective. Multiple examples from medicinal chemistry, chemical biology and biochemistry will be used to illustrate the concepts. Knowledge of organic mechanistic arrow-pushing formalism is required.

CHEM.2270L Organic Chemistry Laboratory IA (Formerly 84.227) - Credits: 2

Laboratory work designed to emphasize the techniques of organic synthesis and the use of instrumentation for identification and characterization of organic compounds. Required for chemistry majors.

CHEM.2280L Organic Chemistry Laboratory IIA (Formerly 84.228) - Credits: 2

A continuation of 84.227 including an introduction to semimicro organic techniques. Planning and successfully carrying out reactions published in the chemical literature are emphasized. Required for chemistry majors.

CHEM.2290L Organic Chemistry Laboratory IIB (Formerly 84.229) - Credits: 1

Reviews techniques, skills, and heuristic approaches in the synthesis, purification, and identification of organic compounds. IR, GC, and NMR instrumental methods are included. For Biology and Health Science majors.

CHEM.2300L Organic Chemistry Lab IIB (Formerly 84.230) - Credits: 1

A continuation of 84.229/Chemistry 2290L. Biology and Health Science Majors.

CHEM.2600 Information Retrieval (Formerly 84.260) - Credits: 2

An introduction to the important chemical and chemical-related reference sources including journals, patents, technical publications, and compiled reference works, and instructions in their use. Assignments require the use of each source discussed. On-line searching using computerized chemical and chemical related databases is also introduced. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

CHEM.2800L Undergraduate Independent Study - Credits: 1-3

This is a guided study course for students who are working in a research lab or another type of chemistry-based research. Students will work with a faculty mentor to design and conduct a research project during the semester and they will prepare a report of their findings at the end of the semester. Credits earned in this course cannot be used to fulfill the advanced Chemistry elective courses or requirements for the Chemistry minor. This course can only be used for up to 3 hours of free elective credit.

CHEM.3010 Special Topics: Chemistry (Formerly 84.301) - Credits: 3

CHEM.3030 Forensic Science I (Formerly 84.303) - Credits: 3


CHEM.3040 Forensic Science II (Formerly 84.304) - Credits: 3

Drug Analysis I, Drug Analysis II, Chemistry of combustion and Arson, Chemistry of color and colorants, Analysis of ink and paints, Chemistry of polymers, Analysis of fibers and papers.

CHEM.3050L Forensic Science I Laboratory (Formerly 84.305) - Credits: 1


CHEM.3060L Forensic Science II Laboratory (Formerly 84.306) - Credits: 1


CHEM.3130 Analytical Chemistry I (Formerly 84.313) - Credits: 3

Focuses on the evaluation of analytical data, aqueous and non-aqueous acid-base systems, oxidation reduction and complexation equilibria, solubility and precipitation, solvent extraction, ion-exchange and chromatographic methods.

CHEM.3140 Analytical Chemistry II (Formerly
84.314) - Credits: 3
Introduces modern instrumental methods of chemical analysis. Topics to be discussed include ultraviolet, infrared nuclear magnetic resonance, emission and atomic absorption spectroscopy. Mass spectrometry, chromatography, thermal and electrochemical methods of analysis will also be covered.

CHEM.3150L Analytical Chemistry Laboratory I
(Formerly 84.315) - Credits: 2
Experiments emphasizing the topics presented in 84.313 are conducted.

CHEM.3160L Analytical Chemistry Laboratory II
(Formerly 84.316) - Credits: 2
Presents laboratory experiments designed to complement the coverage of topics in 84.314.

CHEM.3390 Physical Chemistry Principles (Formerly 84.339) - Credits: 2
A one-semester course designed for plastics engineering majors. Physical chemical concepts of importance to plastics and polymeric materials are emphasized and include kinetics, spectroscopy, phase rule, and statistical thermodynamics.

CHEM.3440 Physical Chemistry I (Formerly 84.344) - Credits: 3
Covers basic physical chemical topics: laws of thermodynamics, solutions, chemical and phase equilibria, electrochemistry, kinetics, atomic, and molecular structure. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

CHEM.3450 Physical Chemistry II (Formerly 84.345) - Credits: 3
CHEM.3450 serves as a continuation of CHEM.3440. Topics covered include the failures of classical physics that led to the rise of quantum mechanics, the postulates of quantum mechanics, the particle-in-a-box, the harmonic oscillator, the rigid rotator, the hydrogen atom and multi-electron atoms. Applications of these quantum mechanical models to chemistry and spectroscopy are discussed, along with aspects of chemical bonding.

CHEM.3460L Physical Chemistry Laboratory I
(Formerly 84.346) - Credits: 2
Laboratory work designed to exemplify principles covered in 84.344. Required for chemistry majors. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS).

CHEM.3470L Physical Chemistry Laboratory II
(Formerly 84.347) - Credits: 1
Provides laboratory work designed to exemplify the principles of chemical kinetics, equilibrium, and spectroscopy.

CHEM.3500L Physical Bioinorganic Laboratory
(Formerly 84.350) - Credits: 2
Coordination compounds are utilized in a core of experiments to illustrate basic physiochemical techniques and analysis of experimental data in electrochemistry and kinetics. A project lab is carried out to apply and extend techniques learned.

CHEM.3600 The Responsible Chemist (Formerly 84.360) - Credits: 3
This course is required of chemistry majors and addresses ethical, regulatory, and environmental aspects of their profession. Students are exposed to a wide range of research integrity issues that include TSCA (Toxic Substance Control Act), SOPs (Standard Operating Procedures) and quality management. Compliance issues include an overview of OSHA (Occupational Safety and Health Administration) and EPA (Environmental Protection Agency), as well as an introduction to patent law. The importance of maintaining integrity in their discipline is emphasized, and case studies are presented for study and discussion. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE) and Essential Learning Outcome for Written & Oral Communication (WOC).

CHEM.4020L Organic Synthesis and Characterization Lab - Credits: 3
An advanced project-based organic chemistry laboratory course. Students will separate mixtures of compounds by chromatographic methods, elucidate structures using spectroscopic techniques and consult the chemical literature to design and execute a multi-step synthesis. Emphasis on laboratory work with discussion of theoretical background.

CHEM.4030 Polymer Science I (Formerly 84.403) - Credits: 3
Coverage of step and chain growth polymerizations, kinetics and mechanism, copolymerization, ionic and free radical polymerizations, and industrially important polymers.
CHEM.4070 Undergraduate Thesis (Formerly 84.407) - Credits: 3

Research in biochemistry, electrochemistry or analytical, organic, inorganic, physical or polymer chemistry. Progress report required.

CHEM.4080 Undergraduate Thesis II (Formerly 84.408) - Credits: 3

A continuation of 84.407. Both semesters must be taken and not more than six credits may be used in meeting degree requirements. A written thesis and seminar are required. The written thesis is to follow the conventional form of introduction, literature survey, data, results, and conclusions. One copy of the thesis must be filed in the Department office.

CHEM.4430 Advanced Inorganic Chemistry (Formerly 84.443) - Credits: 3

The chemical behavior, structure and methods of preparation and nomenclature of the more common elements and their compounds.

CHEM.4450L Advanced Inorganic Lab (Formerly 84.445) - Credits: 2

Laboratory to study the reactions of ions in aqueous solutions and to carry out inorganic syntheses and characterizations.

CHEM.4500 Introduction To Biochemistry (Formerly 84.450) - Credits: 3

An introductory study of the fundamental principles of biochemistry including the chemistry of proteins, carbohydrates, nucleic acids and lipids, thermodynamics, kinetics and mechanisms of enzyme action, intermediary metabolism and selected topics in molecular biology.

CHEM.4510 Biochemistry II - Credits: 3

A continuation of CHEM.4500 with emphasis on metabolic pathways of amino acids and nucleic acid, biosynthesis of proteins and selected topics in molecular biology and various areas of biochemistry. This course will be co-convened with CHEM.5510, the graduate version of Biochemistry II.

CHEM.4550L Laboratory in Modern Biochemistry and Biophysics - Credits: 2

This is a laboratory course designed to teach basic biochemistry techniques using a series of well-characterized proteins in a research-like setting. The course will meet twice a week throughout the semester. The first half of the semester will be focused on teaching specific biochemical techniques. In the second half of the semester, students will develop an independent research question using protein(s) from a list using the techniques that were learned in the first half of the semester. Students will produce a report using an ACS journal style based on their results and they will also present their results to the class at the end of the semester.

CHEM.4880 Computational Chemistry - Credits: 3

The field of computational chemistry involves the quantitative treatment of the quantum and classical depiction of atoms and molecules. The first part of the class will involve the quantum chemistry approach which will include semi-empirical theory, the Hartree-Fock model, post-Hartree-Fock models, and Density Functional Theory. Quantum chemistry calculations will be performed using the Gaussian software package. The second part will include classical dynamics of molecules using Molecular Mechanics concepts and empirical force-fields. Students will be introduced to numerical algorithms for the calculation of atomic forces and numerical schemes for the integration of Newton’s equations of motion. Students will learn how to set up, initialize, and run Molecular Dynamics simulations.
Bachelor's-to-Master's

The Computer Science Department offers a five-year combined BS/MS program, in which students earn both Bachelor and Master of Science degrees.

Computer Science majors who want to take advantage of this program should consider taking one or two qualifying graduate courses during their senior years. COMP.5020 (https://www.uml.edu/catalog/courses/COMP/5020) Foundations of Computer Science and COMP.5030 (https://www.uml.edu/catalog/courses/COMP/5030) Algorithms are good choices. Either of these can count as an undergraduate computer science elective and as a master's degree course. Only credits beyond the 120 required for the BS can be double-counted.

The rules governing double-counting of courses are as follows:

- Any graduate course allowed for graduate computer science credit may be taken as an undergraduate course and double-counted.
- With the permission of the undergraduate coordinator, certain project-oriented pairs of graduate courses may be taken for the undergraduate project sequence, and may be double-counted.
- The double-counting of 4000-level courses requires case-by-case Graduate Committee approval.

Students must satisfy prerequisites before they enroll in courses. Please note that some graduate courses offered by the Computer Science Department do not carry credit even for Computer Science students. For example, you cannot receive credit for COMP.5000 (https://www.uml.edu/catalog/courses/COMP/5000)

To be accepted into this program, you must have good grades and apply in your junior year. For more information, see graduate catalog.

For additional information about BS/MS program, contact the Department of Computer Science. (https://www.uml.edu/Sciences/computer-science/Contact.aspx)

Suggested Degree Pathway for Computer Science - General Option

For students who entered fall 2020 and beyond.

Freshman Year

Fall Semester

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Spring Semester

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Sophomore Year

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<td>Organization of Programming Languages</td>
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<td>COMP.3080 (<a href="https://www.uml.edu/catalog/courses/COMP/3080">https://www.uml.edu/catalog/courses/COMP/3080</a>)</td>
<td>Operating Systems</td>
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## Senior Year

### Fall Semester

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### Spring Semester

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Total: 12

## Junior Year

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<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>COMP.3040 (<a href="https://www.uml.edu/catalog/courses/COMP/3040">https://www.uml.edu/catalog/courses/COMP/3040</a>)</td>
<td>Foundations of Computer Science</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Natural Science with Lab (SCL)</td>
<td>4</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)2 - CS Ethics</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective 6</td>
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Total: 14

### Spring Semester

<table>
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<tr>
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<tr>
<td>COMP.xxxx (<a href="https://www.uml.edu/catalog/courses/COMP">https://www.uml.edu/catalog/courses/COMP</a>)</td>
<td>Project Course II</td>
<td>3</td>
</tr>
<tr>
<td>COMP.xxxx (<a href="https://www.uml.edu/catalog/courses/COMP">https://www.uml.edu/catalog/courses/COMP</a>)</td>
<td>Computer Science Elective 5</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Technical Elective 4</td>
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</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective 6</td>
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</table>

Total: 12

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The Spring Semester includes courses such as Organization of Programming Languages, Operating Systems, and various electives. The Senior Year includes courses like Analysis of Algorithms, Project Course, and Computer Science Electives. The Junior Year focuses on foundational courses like Foundations of Computer Science and Computer Architecture, along with a variety of electives and core courses.
Total Minimum Credits = 120

1Calculus IA and IB will be required instead of Calculus I as is stipulated by the Department of Mathematical Sciences on a per-student basis.

2The Core Curriculum Essential Learning Outcomes for Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) are fulfilled outside the Biology major. See the DCA course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) and the SRE course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill these requirements.

Natural Science Electives

- CS students must complete 12 credits of natural science courses.
- These are courses offered by one of the four natural science departments in the College of Sciences: Biological Sciences, Chemistry, Environmental, Earth, and Atmospheric Sciences, Physics, and Applied Physics.
- Courses that fulfill this requirement must be classified as required or elective courses for the majors in those departments (with some exceptions).
- This requirement may also be satisfied by completing three 3-credit courses that do not include labs plus one 4-credit course that does include a lab (totaling 13 credits rather than 12), but the Computer Science faculty recommends that students take three 4-credit courses that do include labs as laid out in the course grid.
- This requirement may also be satisfied by completing two 4-credit courses including their lab for eight credits and then taking two more 3-credit lectures (totaling 14 credits rather than 12), but the Computer Science faculty recommends that students take three 4-credit courses that do include labs as laid out in the course grid.
- Specific courses may be recommended for different CS Options.
- See the CS Dept. Policy on Natural Science Electives for more detailed information.

Technical Electives

- CS students must complete 6 credits of technical electives.
- These are courses offered by the College of Sciences (this is our college) or the College of Engineering.
- Courses that fulfill this requirement must be classified as required or elective courses for the majors in those departments.
- In general, INFO.xxxx (https://www.uml.edu/catalog/courses/INFO) courses may not be used to fulfill this requirement.
- To use a CS course as a technical elective, it must at the 3000, 4000, or 5000 level.
- Specific courses may be recommended for different CS Options.

Computer Science Electives

- CS students must complete two courses (6 credits) of computer science electives.
- These courses must be at the 3000 level or higher.
- These may be any non-required courses offered by the CS Department that are not taken to fill other slots. (That is, courses cannot be double counted.)
- Specific courses may be recommended for different CS Options.

Free Electives

- CS students must complete 12 credits of almost any course offered by the university.
- Courses taken to fulfill this requirement must not be below the level of any required course.
- Specific courses may be recommended for different CS Options.
- More detailed information may be found on the CS Dept. Policy on General Electives.

Notes:

- Courses listed in slots may generally be taken in any order, within the confines of specified course prerequisites.
Some CS Options may put constraints on the ordering of these electives.

Faculty advisors recommend that two-course sequences (such as Chemistry I and II) be taken in successive semesters rather than taking part 1 and then waiting one or more semesters to take part 2.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS. If you need assistance, please contact your adviser.

Restriction on off-campus study:
Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

Last Updated 10/23/2020.

### Suggested Degree Pathway for Computer Science - Bio-Cheminformatics Option

For students who entered fall 2020 and beyond.

#### Freshman Year

##### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td></td>
</tr>
<tr>
<td>COMP.1010</td>
<td>Computing I (STEM)</td>
<td>3</td>
</tr>
<tr>
<td>COMP.1030L</td>
<td>Computing I Lab</td>
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<tr>
<td>MATH.1310</td>
<td>Calculus I (MATH)</td>
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<td>BIOL.1110</td>
<td>Principals of Biology I (SCL)</td>
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### Spring Semester

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<th>Course Name</th>
<th>Cr.</th>
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<tr>
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<tr>
<td>COMP.1040L</td>
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<td>MATH.1320</td>
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<td>xxxx.xxxx</td>
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#### Sophomore Year

##### Fall Semester

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<td>COMP.2010R</td>
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<td>Course#</td>
<td>Course Name</td>
<td>Cr.</td>
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<td>MATH.2190</td>
<td>Discrete Structures I</td>
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<tr>
<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
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<td>CHEM.1230L</td>
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**Spring Semester**

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<tbody>
<tr>
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<td>COMP.2040</td>
<td>Computing IV (AIL)</td>
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<tr>
<td>MATH.3220</td>
<td>Discrete Structures II</td>
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<td>ENGL.2200</td>
<td>Oral &amp; Written Communication for Computer Science (AH), (WOC)</td>
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<td>CHEM.1220</td>
<td>Chemistry II</td>
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**Junior Year**

**Fall Semester**

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<tbody>
<tr>
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<td>COMP.3050</td>
<td>Computer Architecture</td>
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<td>Probability &amp; Statistics I</td>
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**Spring Semester**

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<tr>
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<tbody>
<tr>
<td>COMP.3010</td>
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<tr>
<td>COMP.3080</td>
<td>Operating Systems</td>
<td>3</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Technical Elective</td>
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<tr>
<td>xxxx.xxxx</td>
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**Senior Year**

**Fall Semester**

<table>
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<tbody>
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<td>Analysis of Algorithms (CTPS), (IL), (QL)</td>
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<tr>
<td>COMP.xxxx</td>
<td>Project Course I</td>
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<td>COMP.xxxx</td>
<td>CS BioInfo Elective4</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)2</td>
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**Spring Semester**

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<thead>
<tr>
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<tr>
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<td>Project Course II</td>
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<td>CS BioInfo</td>
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</table>
Total Minimum Credits = 121

1Calculus IA and IB will be required instead of Calculus I as is stipulated by the Department of Mathematical Sciences on a per-student basis.

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Last Updated 10/23/2020

Suggested Degree Pathway for Computer Science - Data Science Option

For students who entered fall 2020 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>ENGL.1010</td>
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<tr>
<td>COMP.1010</td>
<td>Computing I</td>
<td>3</td>
</tr>
<tr>
<td>COMP.1030L</td>
<td>Computing I Lab</td>
<td>1</td>
</tr>
<tr>
<td>MATH.1310</td>
<td>Calculus I (MATH)</td>
<td>4</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)/</td>
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<tr>
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Spring Semester

<table>
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<th>Cr.</th>
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<tbody>
<tr>
<td>ENGL.1020</td>
<td>College Writing II</td>
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### Sophomore Year

#### Fall Semester

<table>
<thead>
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<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP.2010</td>
<td>Computing III with Lab</td>
<td>4</td>
</tr>
<tr>
<td>COMP.2010R</td>
<td>Assembly Language Programming with Lab</td>
<td>4</td>
</tr>
<tr>
<td>MATH.2190</td>
<td>Discrete Structures I</td>
<td>3</td>
</tr>
<tr>
<td>MATH.2210</td>
<td>Linear Algebra I</td>
<td>3</td>
</tr>
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<td>EECE.2650</td>
<td>Logic Design</td>
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#### Spring Semester

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<tbody>
<tr>
<td>ENGL.2200</td>
<td>Oral &amp; Written Communication for Computer Science (AH), (WOC)</td>
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</tr>
<tr>
<td>COMP.2040</td>
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### Junior Year

#### Fall Semester

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<tr>
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<tbody>
<tr>
<td>COMP.3040</td>
<td>Foundations of Computer Science</td>
<td>3</td>
</tr>
<tr>
<td>COMP.3050</td>
<td>Computer Architecture</td>
<td>3</td>
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<td>MATH.2310</td>
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<td>xxxx.xxxx</td>
<td>Sciences with Lab Persp. (SCL)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)2 - CS Ethics</td>
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#### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP.3010</td>
<td>Organization of Programming Languages</td>
<td>3</td>
</tr>
<tr>
<td>COMP.3080</td>
<td>Operating Systems</td>
<td>3</td>
</tr>
<tr>
<td>COMP.4220</td>
<td>Machine Learning</td>
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<td>xxxx.xxxx</td>
<td>Sciences with Lab Persp. (SCL)</td>
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</tr>
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### Senior Year

#### Fall Semester

#### Spring Semester

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### Graduates of All Colleges

---
## Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>COMP.4040</td>
<td>Analysis of Algorithms (CTPS), (IL), (QL)</td>
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<tr>
<td>COMP.xxxx</td>
<td>Data Science Elective3</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Natural Science with Lab</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)2</td>
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## Spring Semester

<table>
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<tr>
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<td>Data Science Elective3</td>
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<td>Computer Science Elective</td>
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### Total Minimum Credits = 120

1. Calculus IA and IB will be required instead of Calculus I as is stipulated by the Department of Mathematical Sciences on a per-student basis.

2. The Core Curriculum Essential Learning Outcomes for Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) are fulfilled outside the Biology major. See the DCA course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) and the SRE course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill these requirements.

3. Data Science Electives:
   - COMP.3090 (https://www.uml.edu/catalog/courses/COMP/3090) Database I
   - COMP.4200 (https://www.uml.edu/catalog/courses/COMP/4200) Artificial Intelligence
   - COMP.4210 (https://www.uml.edu/catalog/courses/COMP/4210) Data Mining
   - COMP.4230 (https://www.uml.edu/catalog/courses/COMP/4230) Computer Vision I
   - COMP.4420 (https://www.uml.edu/catalog/courses/COMP/4420) Natural Language Processing
   - COMP.4600 (https://www.uml.edu/catalog/courses/COMP/4600) Selected Topics: Big Data System Design
   - COMP.5400 (https://www.uml.edu/catalog/courses/COMP/5400) Visual Analytics
   - COMP.5411 (https://www.uml.edu/catalog/courses/COMP/5411) Data Visualization

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.


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catalog policy
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
for details.

_Last Updated 10/23/2020_

**Suggested Degree Pathway for Computer Science - Cybersecurity Option**

For students who entered fall 2020 and beyond.

**Freshman Year**

**Fall Semester**

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
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</tr>
<tr>
<td>COMP.1010</td>
<td>Computing I (STEM)</td>
<td>3</td>
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<tr>
<td>COMP.1030L</td>
<td>Computing I Lab</td>
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<td>MATH.1310</td>
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**Spring Semester**

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<tbody>
<tr>
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<td>COMP.1040L</td>
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<td>MATH.1320</td>
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**Sophomore Year**

**Fall Semester**

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<tr>
<th>Course#</th>
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<tr>
<td>COMP.2010</td>
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<td>COMP.2030</td>
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<td>MATH.2190</td>
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**Spring Semester**

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<td>EECE.2650</td>
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<td>MATH.3220</td>
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## Fall Semester

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<td>COMP.3040</td>
<td>Foundations of Computer Science</td>
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<tr>
<td>COMP.3050</td>
<td>Computer Architecture</td>
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<td>COMP.4130</td>
<td>Data Communications I</td>
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<tr>
<td>MATH.3860</td>
<td>Probability &amp; Statistics</td>
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## Spring Semester

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<td>xxxx.xxxx</td>
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## Total Minimum Credits = 120

1. Calculus IA and IB will be required instead of Calculus I as stipulated by the Department of Mathematical Sciences on a per-student basis.

2. The Core Curriculum Essential Learning Outcomes for Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) are fulfilled outside the Biology major. See the DCA course listing [here](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) and the SRE course listing [here](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill these requirements.

3. Cybersecurity students must complete at least two courses from School of Criminology & Justice Studies. The following CRIM (SS) courses are recommended:

   - CRIM.1010 [Link](https://www.uml.edu/catalog/courses/CRIM/1010) The Criminal Justice System (DCA)
   - CRIM.1150 [Link](https://www.uml.edu/catalog/courses/CRIM/1150) Introduction to Homeland Security
   - CRIM.2030 [Link](https://www.uml.edu/catalog/courses/CRIM/2030) Technology and the Criminal Justice System
   - CRIM.2210 [Link](https://www.uml.edu/catalog/courses/CRIM/2210)
Criminology

- CRIM.2480
  (https://www.uml.edu/catalog/courses/CRIM/2480)
  Terrorism (international and domestic)

Natural Science Elective Requirements

- Students must complete at least 12 credits of Natural Science Elective courses.
- At least two of these courses must be scheduled with the co-requisite lab.
- This requirement may be satisfied by taking three courses with lab (12 credits total), or by taking two courses with lab and two courses without lab (14 credits total).
- The following courses fulfill this requirement:
  - BIOL.1110
    (https://www.uml.edu/catalog/courses/BIOL/1110) / BIOL.1170L
    (https://www.uml.edu/catalog/courses/BIOL/1170L) Principles of Biology I w/Lab;
  - BIOL.1120
    (https://www.uml.edu/catalog/courses/BIOL/1120) / BIOL.1180L
    (https://www.uml.edu/catalog/courses/BIOL/1180L) Principles of Biology II w/Lab;
  - CHEM.1210
    (https://www.uml.edu/catalog/courses/CHEM/1210) / CHEM.1230L
    (https://www.uml.edu/catalog/courses/CHEM/1230L) Chemistry I w/Lab;
  - CHEM.1220
    (https://www.uml.edu/catalog/courses/CHEM/1220) / CHEM.1240L
    (https://www.uml.edu/catalog/courses/CHEM/1240L) Chemistry II w/Lab;
  - ENVI.2010
    (https://www.uml.edu/catalog/courses/ENVI/2030L) Earth Systems: Geosphere w/Lab;
  - ENVI.2020
    (https://www.uml.edu/catalog/courses/ENVI/2020) / ENVI.2040L
    (https://www.uml.edu/catalog/courses/ENVI/2040L) Earth Systems: Atmosphere and Oceans w/Lab;
  - ENVI.2050
    (https://www.uml.edu/catalog/courses/ENVI/2050) / ENVI.2070L
    (https://www.uml.edu/catalog/courses/ENVI/2070L) Earth Systems: Biosphere & Global Change w/Lab;
  - ENVI.1100
    (https://www.uml.edu/catalog/courses/ENVI/1100) / ENVI.1120L
    (https://www.uml.edu/catalog/courses/ENVI/1120L) Global Environmental Studies w/Lab;
  - LIFE.1010
    (https://www.uml.edu/catalog/courses/LIFE/1010) / LIFE.1030L
    (https://www.uml.edu/catalog/courses/LIFE/1030L) Life Science I w/Lab;
  - LIFE.1020
    (https://www.uml.edu/catalog/courses/LIFE/1020) / LIFE.1040L
    (https://www.uml.edu/catalog/courses/LIFE/1040L) Life Science II w/Lab;

- Courses fulfilling this requirement must be classified as required or elective courses for the majors in those departments. There are some exception to this rule. For more details, contact program coordinator.

Cybersecurity Electives

- COMP.2350
  (https://www.uml.edu/catalog/courses/COMP/2350) Cyber Crime Investigation
- COMP.4200
  (https://www.uml.edu/catalog/courses/COMP/4200) Artificial Intelligence
- COMP.4210
  (https://www.uml.edu/catalog/courses/COMP/4210) Data Mining
- COMP.4420
  (https://www.uml.edu/catalog/courses/COMP/4420) Natural Language Processing
- COMP.5610
- COMP.6610
  (https://www.uml.edu/catalog/courses/COMP/6610)
  Advanced Topics in Network Security

**Free Electives**

- All students must complete a minimum of 120 credits to graduate.
- Free Electives are credits, beyond the specifically required coursework, necessary to meet this 120-credit minimum.
- Courses below the lowest-level required courses in the Computer Science major cannot be used as Free Electives. For example, no MATH course below Calculus I is acceptable.
- INFO.xxxx
  (https://www.uml.edu/catalog/courses/INFO) courses cannot be used as Free Electives.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS (https://www.uml.edu/Enrollment/SiS/default.aspx). If you need assistance, please contact your adviser.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be

formally approved
(https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf)

prior to enrollment. See the

catalog policy
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

for details.

*Last Updated 10/23/2020*
COMP.1000 Media Computing (Formerly 91.100) - Credits: 3
An introductory course to computer programming using multimedia applications such as images, video and audio. Linear data structures representing multimedia data are manipulated with loops and conditionals in the Python language.

COMP.1005 An Introduction to Programming for Data Science - Credits: 3
Linguists, chemists, business analysts, social scientists, and essentially everyone needs computational approaches to structure, analyze and present their data. However, non-experts are often intimidated to start programming and may struggle to see the numerous possibilities it may open up for their field of study. Using the poplar and easy-to-learn Python language, this course offers a practical introduction to basics of programming and how it can be used to analyze, structure, and visualize data. Students will also gain hands-on experience with a number of popular libraries useful for data preparation and analysis.

COMP.1010 Computing I (Formerly 91.101) - Credits: 3
Introduction to computing environments: introduction to an integrated development environment; C, C++, or a similar language. Linear data structures; arrays, records, and linked lists. Abstract data types, stacks, and queues. Simple sorting via exchange, selection, and insertion, basic file I/O. Programming style documentation and testing. Ethical and social issues. Effective Fall 2013, Co-req 91.103 Computing 1 Lab.

COMP.1020 Computing II (Formerly 91.102) - Credits: 3
Computing II focuses on the implementation and applications of data structures, including arrays, linked lists, stacks, queues, trees, binary trees, binary search trees, heaps, graphs, and hash tables. Recursive approaches are used. Performance analysis is discussed. Attention is paid to programming style, documentation, and testing. This course includes extensive laboratory work. Effective Fall 2013, Co-req: Computing 2 Lab.

COMP.1030L Computing I Lab (Formerly 91.103) - Credits: 1
This is the lab class for COMP.1010 Computing I. This class must be taken with COMP.1010 Computing I in the same semester.

COMP.1040L Computing II Lab (Formerly 91.104) - Credits: 1
This is a lab class for 91.102 Computing II. This class must be taken with 91.102 Computing II in the same semester.

COMP.1080 Intro to App Des & Mobile Comp (Formerly 91.108) - Credits: 3
This course is an introduction to design principles of applications ("apps") that run on mobile devices (smart phones and tablet computers). The course focuses on software interaction design and computational thinking. Students will gain theoretical knowledge and design skills in these domains by building a series of apps that run on the Android platform using MIT App Inventor software. The course will also include discussion of societal impacts of computing.

COMP.1110 First Year Seminar for Computer Science Students - Credits: 1
This course is designed to acclimate incoming students to their new University environment. Students will learn about the Computer Science field, the program at the University, its faculty, and other resources useful for success.

COMP.1120 Undeclared Science Seminar (Formerly 91.112) - Credits: 1
Discussions will be conducted on a wide range of topics in the sciences to familiarize the student with the programs, procedures, research, and educational opportunities at the University.

COMP.1130 Exploring the Internet (Formerly 91.113) - Credits: 3
An introduction to internet technologies and how they intersect with social, political, and economic issues. Includes: the history of the internet, how it’s presently managed, how information is transferred between servers and clients, collaborative web technologies, search engines, encryption, digital rights management, certificate authorities, phishing and other malware, and privacy concerns. Students will build a basic website using HTML and CSS.

COMP.2010 Computing III (Formerly 91.201) - Credits: 3
This course presents an introduction to object-oriented software development using the C++ programming language. The main ideas are encapsulation, class hierarchy and inheritance, polymorphism, copy control, operator
overloading, dynamic memory management, and templates. Additional topics include the Standard Template Library (containers and iterators), class design diagrams, and exception handling.

COMP.2010R Computing III Lab - Credits: 1

This is the lab class for COMP.2010 Computing III. This class must be taken with COMP.2010 Computing III in the same semester.

COMP.2030 Assembly Language Programming (Formerly 91.203) - Credits: 3

Presents the organization and operation of a conventional computer, including principal instruction types, data representation, addressing modes, program control, I/O, assembly language programming, including instruction mnemonics, symbolic addresses, assembler directives, system calls, and macros, the usage of text editors, symbolic debuggers, and loaders, and the use of pseudocode in guiding structured assembly language programming.

COMP.2030R Assembly Language Programming Lab - Credits: 1

This is the lab class for COMP.2030 Computer Organization and Assembly Language. This class must be taken with COMP.2030 in the same semester.

COMP.2040 Computing IV (Formerly 91.204) - Credits: 3

Advanced C++ programming, which deepens students’ understanding of object-oriented analysis and design. Basic software engineering principles and practice, including work with APIs. Topics may include program translation, web software, parsing, and regular expressions.

COMP.2110 Computer Science for SRT Applications (Formerly 91.211) - Credits: 3

This course is an introduction to C programming, with applications in sound recording technology. Students will write and execute several programs that perform operations pertinent to SRT, including manipulating MIDI codes, performing simple signal processing functions, processing sampled data, and synthesizing sound algorithmically. Not for computer science majors.

COMP.2120 Special Topics: Sound Thinking (Formerly 91.212) - Credits: 3

Special Topics: Sound Thinking is an interdisciplinary elective for students at the sophomore level and above that explores the intersection of computing and music. The course explores the properties of sound, musical form, non-traditional notation, music programming, the computer as a musical instrument, and live performance. It is co-taught by Music and Computer Science faculty.

COMP.2300 Introduction to Computer Security (Formerly COMP.3611) - Credits: 3

This course introduces students to introductory concepts in cybersecurity. The course will cover generic topics such as introduction to networks, security vulnerabilities in networking protocols, the confidentiality, integrity and availability (CIA) triad, basic cryptography concepts, key management, cryptographic protocols and practical applications of cryptography. For topics in computer security, this course will cover an overview of operation systems security (particularly Linux), password security, access control mechanisms, patching, vulnerability analysis, intrusion detection, auditing, system hardening, virtualization, and security policies. For topics in Network Security, this course will cover major threats affecting networks such as Denial of Service (DoS), brute-force, malicious packets, etc. There will be a high-level overview on network specific attacks such as replay, reflection and MitM and how modern authentication and communication protocols like SSH and TLS prevent them. For topics in application security, this course will overview major threats affecting application such as Buffer Overflows, Race Conditions, XSS, Injection attacks, etc. and techniques to prevent them.

COMP.2350 Cyber Crime Investigation (Formerly COMP.4611) - Credits: 3

This class introduces students to computer forensics and network forensics, which are two major components of digital forensics. The class covers topics including legal compliance, applicable laws, affidavits, root cause analysis, case law, chain of custody, digital Investigations, authentication of evidence, metadata, using virtual machines for analysis, how to testify, E-Discovery, HIPAA/FERPA, computer security act, Sarbanes-Oxley Act, Gramm-Leach-Bliley Act, Children’s Online Privacy Protection Act (COPPA), payment card industry data security standard (PCI DSS), state, US and international standards/Jurisdictions, laws and authorities, US Patriot Act, problem solving, log-file analysis, interlacing of device and network forensics, etc.

COMP.3010 Organization of Programming Languages (Formerly 91.301) - Credits: 3

Analytical approach to the study of programming languages. Description of the salient features of the imperative, functional, logical, and object-oriented programming paradigms in a suitable metalanguage such as Scheme. Topics include

COMP.3040 Foundations of Computer Science (Formerly 91.304) - Credits: 3

COMP.3050 Computer Architecture (Formerly 91.305) - Credits: 3
Examines the basic functional components of a computer system including the CPU, memory systems, and I/O systems. Each of these three areas will be developed in detail with a focus on the system design and component integration. Topics will include CPU control and ALU operation, computer timing, data address and I/O bus activity, addressing model, programmed and DMA I/O, and instruction sets and micro code.

COMP.3080 Operating Systems (Formerly 91.308) - Credits: 3
Presents an introduction to major operating systems and their components. Topics include processes, concurrency and synchronization, deadlock, processor allocation, memory management, I/O devices and file management, and distributed processing. Techniques in operating system design, implementation, and evaluation will be examined.

COMP.3090 Database I (Formerly 91.309) - Credits: 3
The Database I and II course pair provides students with a comprehensive introduction to data modeling, design of databases, use of database management systems for applications, and exploration into the building of databases. Database II focuses on database design with Entity-Relationship (E-R) models. Students design and implement a web-based database using MySQL and PHP.

COMP.3300 Introduction to Malware Analysis - Credits: 3
This course covers a variety of topics on malware analysis, including basic and advanced static analysis and dynamic analysis, virtual machines, assembly language, reverse engineering tools, anti-reverse engineering techniques, and shell code analysis. Students will be able to apply the techniques to detect malware behaviors in binaries and systems.

COMP.3310 Cyber Defense - Credits: 3
The course objectives are to - (1) train students on designing, implementing, and evaluating operating systems, enterprise networks, protocols, and services that are secure from modern threats and attacks and (2) train students on performing security and vulnerability analysis of the aforementioned technologies. The focus will be on highly used protocols such as Secure Shell (SSH), Remote Desktop Protocol (RDP), Active Directory (AD), Domain Name System (DNS), Transport Layer Security (TLS), Virtual Private Network (VPN), OpenID Connect (OID), OAuth, and services such as email servers and web servers. The overarching goal is to understand the underlying principles behind the technologies, what makes these technologies inherently insecure and the steps to make them more resilient to attacks.

COMP.3500 Special Topics (Formerly 91.350) - Credits: 3
Topics of mutual interest to the instructor and student(s). (Formerly 91.350).

COMP.4010 Software Project I (Formerly 91.401) - Credits: 3
Specification, design, and implementation of a one- or two-semester software project proposed to a directing faculty member. Projects may be proposed as a one- or two-semester effort based on faculty approval. A two-semester effort requires subsequent registration for COMP.4020 Prerequisite: Students must submit a proposal to the directing faculty member, obtain his/her signed approval, and forward a copy of the signed proposal to department chairperson.

COMP.4020 Software Project II (Formerly 91.402) - Credits: 3
A continuation of COMP.4010. Students must submit a
proposal to the directing faculty member, obtain his/her signed approval, and forward a copy of the signed proposal to the department chairperson.

COMP.4040 Analysis of Algorithms (Formerly 91.404) - Credits: 3

Development of more sophisticated ideas in data type and structure, with an introduction to the connection between data structures and the algorithms they support. Data abstraction. Controlled access structures. Trees, lists, stacks, queues, graphs, arrays, hash tables. Algorithm design strategies such as divide and conquer. Elementary techniques for analysis; asymptotic analysis, recursion equations, estimation methods, elementary combinatorial arguments. Examination of problem areas such as searching and sorting, and the indicated representations and algorithms. The student will use the techniques learned in this course and in previous courses to solve a number of logically complex programming problems using pseudocode, with an emphasis on establishing algorithmic correctness and estimating time and space complexity.

COMP.4060 Compiler Construction I (Formerly 91.406) - Credits: 3

Includes both theory and practice. A study of grammars; specification and classes; the translation pipeline: lexical analysis, parsing, semantic analysis, code generation and optimization; and syntax-directed translation. Use of automatic generation tools in the actual production of a complete compiler for some language.

COMP.4110 Software Engineering I (Formerly 91.411) - Credits: 3

Software Engineering is an essential discipline for any computer science major. In this class you will learn skills that will help you design and build software projects for advanced computer science classes. This course provides an introduction to systematic techniques for development of software, i.e., "the Engineering of Software". Topics to be discussed include software life-cycle, group coordination, requirements specification, software design, software testing and software maintenance. Emphasis is given to the development of one complex software system and the system documentation necessary for such a complete software product. The students will mock the software cycle via a medium-to-large semester-long project.

COMP.4120 Software Engineering II (Formerly 91.412) - Credits: 3

Software development methodologies for large-scale systems. Project organization, life cycle concept, data modeling, structured analysis and design, information hiding, and the use of computer-aided software engineering (CASE) tools. Team projects are required; these emphasize the design, documentation, and maintenance of complex software systems.

COMP.4130 Data Communications I (Formerly 91.413) - Credits: 3

This course provides an introduction to fundamental concepts in the design and implementation of computer communication networks, their protocols, and applications. Topics include: TCP/IP and OSI layered network architectures and associated protocols, application layer, network programming API (sockets), transport, congestion, flow control, routing, addressing, autonomous systems, multicast and link layer. Examples will be drawn primarily from the Internet.

COMP.4140 Data Communications II (Formerly 91.414) - Credits: 3

A continuation of 91.413. Topics include Multimedia Networks, network Management, Network Security, Wireless and Mobile Networks. Students will track discussion in IETF committees and work in a dedicated network laboratory.

COMP.4150 Internet of Things - Credits: 3

The course focuses on fundamental concepts and the state-of-the-art of the Internet of Things (IoT), IoT software, sensor signal processing, IoT networking systems, building IoT products using arduino, NodeMCU, IoT platforms and sensors, designing IoT solutions and mobile computing. Students will learn about the advantages of IoT, fog computing, the use of AI and blockchain technologies in IoT. Real-world applications and cases, such as smart homes, smart cars, and smart cities will be discussed and the future of IoT will be examined. At the end of this course, students will (1) obtain a solid understanding of IoT, fog computing, edge computing, the use of AI-blockchain technologies in IoT, (2) be able to apply data science in real-world applications and cases, such as smart homes, smart cars, smart cities, and healthcare.

COMP.4200 Artificial Intelligence (Formerly 91.420) - Credits: 3

Topics include: search techniques and their properties, including A*; game-playing, including adversarial and stochastic search; probabilistic reasoning, including Markov Decision Processes and Hidden Markov Models; and
reinforcement learning, including value iteration and q-learning. Topics are developed theoretically and with programming assignments. The course includes a student-directed final project and paper.

COMP.4210 Data Mining (Formerly 91.421) - Credits: 3
This introductory data mining course will give an overview of the models and algorithms used in data mining, including association rules, classification, and clustering. The course will teach the theory of these algorithms and students will learn how and why the algorithms work through computer labs.

COMP.4220 Machine Learning (Formerly 91.422) - Credits: 3
This introductory course gives an overview of machine learning techniques used in data mining and pattern recognition applications. Topics include: foundations of machine learning, including statistical and structural methods; feature discovery and selection; parametric and non-parametric classification; supervised and unsupervised learning; use of contextual evidence; clustering, recognition with strings; small sample-size problems and applications to large datasets.

COMP.4230 Computer Vision I (Formerly 91.423 & 91.523) - Credits: 3
Computer vision has seen remarkable progress in the last decade, fueled by the ready availability of large online image collections, rapid growth of computational power, and advances in representations and algorithms. Applications range from 3-D scene reconstruction, to visual Simultaneous Localization and Mapping (SLAM) for robotics, to real-time human body pose estimation. This introductory computer vision course explores various fundamental topics in the area, including the principles of image formation, local feature analysis, segmentation, multi-view geometry, image warping and stitching, structure from motion, and object recognition.

COMP.4240 Introduction to Reinforcement Learning - Credits: 3
This course provides a solid introduction to the field of Reinforcement Learning (RL) and Decision Making. The students will learn about the basic blocks, main approaches, and core challenges of Reinforcement Learning including tabular methods, Finite Markov Decision Processes, Dynamic Programming, Monte Carlo Methods, Temporal-Difference learning, policy search, function approximation, exploration, and generalization. Through a combination of lectures, and written and coding assignments, students will become well versed in key ideas and techniques for RL. Assignments will include the basics of reinforcement learning. In addition, students will advance their understanding and the field of RL through a final project.

COMP.4270 Computer Graphics I (Formerly 91.427) - Credits: 3
Introduction to graphics systems and concepts. History of graphics. Introduction to hardware, software, and mathematical tools. Graphics languages and APIs (OpenGL and other traditional and web-based libraries). Graphics data structures and algorithms for 2D and 3D modeling and viewing. Input, archiving, and display architectures.

COMP.4280 Computer Graphics II (Formerly 91.428) - Credits: 3
An advanced course in computer graphics for students familiar with basic issues in computer graphics. Details on hidden line and surface removal, 2D and 3D curve and surface generation, rendering, illumination, and color models, realism through precision (ray tracing) and imprecision (fractals), modern hardware architectures, and animation and simulation systems.

COMP.4290 Bioinformatics for CS - Credits: 3
Complete genomic sequences of human, other mammals, and numerous other organisms are known for some time. From early on, comparisons or analyses of genomic sequences require aids of computer programming. After brief introductions to molecular biology for Computer Science students, the course will examine computer algorithms used in bioinformatics problems including sequence alignment, phylogeny, DNA sequencing, and data analyses.

COMP.4420 Natural Language Processing (Formerly 91.442 & 91.542) - Credits: 3
This course introduces principles and techniques behind natural language processing (NLP), and covers a large selection of important automatic text processing tasks. Selected topics include n-gram language models, part-of-speech tagging, statistical parsing, word sense disambiguation, discourse segmentation, information extraction, sentiment analysis, machine translation. Quantitative techniques are emphasized, with a focus on applying statistical models to large collections of text. The course provides students with a hands-on experience in building a substantial NLP application of their choice.

COMP.4500 Mobile Robotics I (Formerly 91.450) - Credits: 3
An introduction to robotics, including laboratory. In the lab,
students build and program robots. Topics include sensors, locomotion, deliberative, reactive, and hybrid control architectures, computer vision, application domains, and current research.

COMP.4510 Mobile Robotics II (Formerly 91.451) - Credits: 3

Advanced topics in robotics, including laboratory. Topics to be covered include probabilistic methods, including sensor modeling, hidden Markov models, particle filters, localization, and map making. Research-level robots are used in the laboratories.

COMP.4600 Selected Topics (Formerly 91.460) - Credits: 3

Depends on faculty interest, student demand, and developments in the field.

COMP.4610 Graphical User Interface Programming I (Formerly 91.461) - Credits: 3

This is a first course in the design and implementation of graphical user interfaces (GUIs) for web-based environments. The course requires the completion of several client-side programming projects that are evaluated on design and layout of the user interface, coding style, and comprehensiveness of documentation. Students learn to create web pages using HTML, CSS, JavaScript, jQuery, and a variety of jQuery plugins. Server-side techniques using PHP and MySQL are explored if time permits. The course may be taken on its own, but is intended to be followed by 91.462 to complete a two-course CS project sequence.

COMP.4620 Graphical User Interface Programming II (Formerly 91.462) - Credits: 3

A second course in the design and implementation of graphical user interfaces for web-based environments. The course requires the completion of a semester-long project done with others as a team. It explores the writing of a project proposal, the development and presentation of alpha and beta versions, usability testing, and a final presentation to an external audience.

COMP.4630 Mobile App Programming I - Credits: 3

This is a first course in the design and implementation of mobile applications. The course requires the completion of several Android programming projects that are evaluated on the functional correctness, coding style, and documentation. Students learn the fundamental principles of Android components, application architectures, and common Android libraries to create non-trivial mobile applications. The course may be taken on its own, but is intended to be followed by Mobile App Programming II to complete a two-course CS project sequence.

COMP.4631 Mobile App Programming II - Credits: 3

A second course in the design and implementation of mobile applications on Android platform. The course requires the completion of a semester-long project done with others as a team. It explores the writing of a project proposal, the development and presentation of alpha and beta versions, usability testing, and a final presentation to an external audience.

COMP.4650 Introduction to IoT Security and Privacy - Credits: 3

The Internet of Things (IoT) has broad application domains including healthcare, smart home, retail, manufacturing, agriculture, environmental monitoring and industrial automation. This course introduces different aspect of IoT security and privacy on hardware, software, network, and data. The key objectives include: understanding IoT frameworks, applications and security and privacy concerns; being familiar with IoT hardware security; understanding IoT system security; mastering IoT network security; understanding the IoT data security and privacy.

COMP.4800 Honors Project I (Formerly 91.480) - Credits: 3

This course provides an undergraduate research experience for Computer Science majors enrolled in the Honors Program. Each student develops a project idea in consultation with the instructor. The student writes a proposal for the project, reads the relevant literature, performs the project, writes a project report or thesis, and makes an oral presentation about the project.

COMP.4810 Honors Project II (Formerly 91.481) - Credits: 3

In this course, students continue and complete the project started in 91.480 Honors Project I.

COMP.4900 Directed Studies in Computer Science (Formerly 91.490) - Credits: 1-4

Individual study for a student desiring more advanced or more specialized work. This course may not be taken more than twice and may not be substituted for scheduled offerings. Prerequisite: Students must submit a proposal to the directing faculty member, obtain his/her signed approval, and forward a
copy of the signed proposal to the department chairperson.

**COMP.4930 Cooperative Education in Computer Science (Formerly 91.493) - Credits: 1**

Supervision of cooperative educational experiences in Computer Science.

**MSIT.3010 Organization of Programming Languages (Formerly 94.301) - Credits: 3**

Analytical approach to the study of programming languages. Description of the salient features of the imperative, functional, logical, and object-oriented programming paradigms in a suitable metalanguage such as Scheme. Topics include iteration, recursion, higher-order functions, types, inheritance, unification, message passing, orders of evaluation, and scope rules. Elementary syntactic and semantic descriptions. Implementation of simple interpreters. Note: This course is for CS graduate students needing to fulfill prerequisite requirements. It is not available to CS undergraduates without specific permission from the Undergraduate Coordinator.

**MSIT.3040 Foundations of Computer Science (Formerly 94.304) - Credits: 3**

A survey of the mathematical foundations of Computer Science. Finite automata and regular languages. Stack Acceptors and Context-Free Languages. Turing Machines, recursive and recursively enumerable sets. Decidability. Complexity. This course involves no computer programming. This course is for CS graduate students needing it to fulfill prerequisite requirements. It is not available to CS undergraduates without specific permission from the Undergraduate Coordinator.

**MSIT.3050 Computer Architecture (Formerly 94.305) - Credits: 3**

Examines the basic functional components of a computer system including the CPU, memory systems, and I/O systems. Each of these three areas will be developed in detail with a focus on the system design and component integration. Topics will include CPU control and ALU operation, computer timing, data address and I/O bus activity, addressing model, programmed and DMA I/O, and instruction sets and microcode. This course is for CS graduate students needing it to fulfill prerequisite requirements. It is not available to CS undergraduates without specific permission from the Undergraduate Coordinator.

**MSIT.3080 Introduction to Operating Systems (Formerly 94.308) - Credits: 3**

Presents an introduction to major operating systems and their components. Topics include processes, concurrency and synchronization, deadlock, processor allocation, memory management, I/O devices and file management, and distributed processing. Techniques in operating system design, implementation, and evaluation will be examined. This course is for CS graduate students needing it to fulfill prerequisite requirements. It is not available to CS undergraduates without specific permission from the Undergraduate Coordinator.

**MSIT.4040 Analysis of Algorithms (Formerly 94.404) - Credits: 3**

Development of more sophisticated ideas in data type and structure, with an introduction to the connection between data structures and the algorithms they support. Data abstraction. Controlled access structures. Trees, lists, graphs, arrays; algorithms design strategies; backtracking, greedy storage, divide and conquer, branch and bound. Elementary techniques for analysis; recursion equations, estimations methods, elementary combinatorial arguments. Examination of problem areas such as searching, sorting, shortest path, matrix and polynomial operations, and the indicated representations and algorithms. The student will use the techniques learned in this course and in previous courses to solve a number of logically complex programming problems. This course is for CS graduate students needing it to fulfill prerequisite requirements. It is not available to CS undergraduates without specific permission from the Undergraduate Coordinator.
Learning Outcomes

Please view the Learning Outcomes for Environmental Sciences:

- Atmospheric Science
  (https://www.uml.edu/Academics/Provost-office/Student-Success/Student-Learning-Outcomes/sciences/env-sci-atmospheric.aspx)
- Environmental Science
  (https://www.uml.edu/Academics/Provost-office/Student-Success/Student-Learning-Outcomes/sciences/env-sci-env.aspx)
- Geoscience
  (https://www.uml.edu/Academics/Provost-office/Student-Success/Student-Learning-Outcomes/sciences/env-sci-geoscience.aspx)

Degree Pathways

Degree Pathways are a semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university.

Environmental Science

- Environmental Science Option fall 2018 and beyond
- Geoscience Option fall 2018 and beyond
- Environmental Studies Option fall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Environmental Geoscience Option fall 2015 - spring 2018
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Atmospheric Science Option fall 2018 - spring 2020
  (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
- Meteorology and Atmospheric Science
  - fall 2020 and beyond

Suggested Degree Pathway for Environmental Science - Atmospheric Science Option

For students who entered fall 2018 to spring 2020.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Credits</th>
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<tr>
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<td>Weather Forecasting Seminar</td>
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<td>ENGL.1010 / HONR.1100</td>
<td>College Writing I / FYSH (CW)</td>
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<td>ENVI.1010</td>
<td>Environmental Science Seminar (IL)</td>
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<td>Principles of Environment</td>
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<td>Course#</td>
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**Spring Semester**

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<tr>
<td>ENVL.2070L</td>
<td>Earth Systems: Bios. and Gl. Change Lab</td>
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<td>MATH.2720</td>
<td>Introduction to Programming with MATLAB</td>
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<td>MATH.2310</td>
<td>Calculus III</td>
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<td>PHYS.2450</td>
<td>Physical Properties of Matter</td>
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**Sophomore Year**

**Fall Semester**

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<td>ENVI.2020</td>
<td>Earth Systems: Atmosphere and Oceans (QL)</td>
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**Junior Year**

**Fall Semester**

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<td>Synoptic Meteorology1</td>
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<tr>
<td>ATMO.4130</td>
<td>Physical Meteorology1</td>
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<td>MATH.2340</td>
<td>Differential Equations</td>
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<td>Synoptic Weather Patterns</td>
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<td>ATMO.4100</td>
<td>Advanced Forecasting</td>
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<td>ATMO.4080</td>
<td>The Climate System</td>
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<td>MATH.3860</td>
<td>Probability and Statistics</td>
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### Senior Year

#### Fall Semester

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<tr>
<td>ATMO.4150</td>
<td>Atmospheric Dynamics</td>
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<td>ATMO.4930</td>
<td>Internship: Atmospheric Science</td>
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<td>xxxx.xxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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#### Spring Semester

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<tbody>
<tr>
<td>ATMO.4160</td>
<td>Advanced Dynamics1</td>
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<tr>
<td>ATMO.4710</td>
<td>Air Pollution / Environmental Pollution</td>
<td>3</td>
</tr>
<tr>
<td>ATMO.4500</td>
<td>Satellite and Radar Meteorology1</td>
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\[O(4500)\]

ATMO.4200 (https://www.uml.edu/catalog/courses/ATMO/4200)  Intro to Operational Numerical Weather Prediction1 (WOC), (AIL)  3

ENVL.4000 (https://www.uml.edu/catalog/courses/ENVL/4000)  Senior Seminar  1

xxxx.xxx  Free Elective  2

Total  1-5

### Total Minimum Credits = 120

1Course offered alternate years.

2The Core Curriculum Essential Learning Outcomes for Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) are fulfilled outside the EEAS major. See the DCA course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) and the SRE course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill these requirements.

3Capstone course. May be taken either semester of senior year. ATMO.4910 (https://www.uml.edu/catalog/courses/ATMO/4910) Directed Study or ATMO.4950 (https://www.uml.edu/catalog/courses/ATMO/4950) Honors Research: Atmospheric Science may also be used as a capstone course.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS (https://www.uml.edu/Enrollment/SiS/default.aspx). If you need assistance, please contact your adviser.

### Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcb18-274376.pdf) prior to enrollment. See the
Technical Electives

- ATMO.3250 (https://www.uml.edu/catalog/courses/ATMO/3250) Weather Communications
- ATMO.3400 (https://www.uml.edu/catalog/courses/ATMO/3400) Tropical Meteorology
- ATMO.3130 (https://www.uml.edu/catalog/courses/ATMO/3130) The Climate System
- ATMO.4710 (https://www.uml.edu/catalog/courses/ATMO/4710) Air Pollution
- ATMO.4870 (https://www.uml.edu/catalog/courses/ATMO/4870) Cloud Physics
- ATMO.4950 (https://www.uml.edu/catalog/courses/ATMO/4950) Honors Research: Atmospheric Science
- ATMO.4970 (https://www.uml.edu/catalog/courses/ATMO/4970) Research: Atmospheric Science
- ATMO.5xxxx (https://www.uml.edu/catalog/courses/ATMO) All ATMO graduate courses
- ENVI.3010 (https://www.uml.edu/catalog/courses/ENVI/3010) GIS in Earth & Environmental Science
- ENVI.4160 (https://www.uml.edu/catalog/courses/ENVI/4160) Climate Change Science, Communication & Solutions
- ENVI.5xxx (https://www.uml.edu/catalog/courses/ENVI) All ENVI graduate courses
- GEOL.3150 (https://www.uml.edu/catalog/courses/GEOL/3150) Environmental Geochemistry
- GEOL.5xxxx (https://www.uml.edu/catalog/courses/GEOL) All GEOL graduate courses
- MATH.2210 (https://www.uml.edu/catalog/courses/MATH/2210) Linear Algebra I
- MATH.2220 (https://www.uml.edu/catalog/courses/MATH/2220) Linear Algebra II
- MATH.3620 (https://www.uml.edu/catalog/courses/MATH/3620) Numerical Analysis I
- MATH.4450 (https://www.uml.edu/catalog/courses/MATH/4450) Partial Differential Equations
- MATH.4660 (https://www.uml.edu/catalog/courses/MATH/4660) Stat Programs Using SAS

Last updated: 11/20/2019

Suggested Degree Pathway for Environmental Science - Geoscience Option

For students who entered fall 2018 and beyond.

Freshman Year

Fall Semester

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<th>Course#</th>
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<tr>
<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
<td>3</td>
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<td>CHEM.1230L</td>
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<tr>
<td>Course#</td>
<td>Course Name</td>
<td>Cr.</td>
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<tr>
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<tr>
<td>CHEM.1220</td>
<td>Chemistry II (SCL)</td>
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</tr>
<tr>
<td>CHEM.1240L</td>
<td>Chemistry II Lab</td>
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<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
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<td>ENVI.2010</td>
<td>Earth Systems: Geosphere</td>
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<tr>
<td>ENVI.2030L</td>
<td>Earth Systems: Geosphere Lab (QL), (CTPS)</td>
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<tr>
<td>MATH.1320</td>
<td>Calculus II</td>
<td>4</td>
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<tr>
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**Spring Semester**

<table>
<thead>
<tr>
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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>ENVI.2050</td>
<td>Earth Systems: Biosphere and Global Change</td>
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<tr>
<td>ENVI.2070L</td>
<td>Earth Systems: Biosphere and Global Change Lab</td>
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<tr>
<td>GEOL.3080</td>
<td>Earth Materials II</td>
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<td>GEOL.3100</td>
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<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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**Junior Year**

**Fall Semester**

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<tbody>
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<td>GEOL.3150</td>
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<td>GEOL.3190</td>
<td>Earth Surface Processes</td>
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<td>PHYS.1030</td>
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## Spring Semester

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Total: 1 7

## Senior Year

### Fall Semester

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<td>Soil Science</td>
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<td>xxxx.xxxx</td>
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### Spring Semester

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<td>Applied Geophysics</td>
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Total Minimum Credits = 120

1Alternatively: Calc 1A (MATH.1280) + Calculus IB (MATH.1290) = Calculus I (MATH.1310)

2The Core Curriculum Essential Learning Outcomes for Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) are fulfilled outside the EEAS major. See the DCA course listing and the SRE course listing for a full list of classes that fulfill these requirements.

3Courses offered alternate years.

4Technical Electives:

- ATMO.4080 (The Climate System)
- ATMO.5xxx (All ATMO graduate classes)
- ENVI.4150 (Biogeochemical Cycles)
- ENVI.4160 (Climate Change Science, Communication & Solutions)
- ENVI.4170L
Climate Change: Science, Communication & Solutions

- ENVI.5xxx
  (https://www.uml.edu/catalog/courses/ENVI) All ENVI graduate courses
- GEOL.3040
  (https://www.uml.edu/catalog/courses/GEOL/3040) Igneous & Metamorphic Petrology
- GEOL.3060L
  (https://www.uml.edu/catalog/courses/GEOL/3060L) Igneous & Metamorphic Petrology Lab
- GEOL.3410
  (https://www.uml.edu/catalog/courses/GEOL/3410) Environmental and Engineering Geology
- GEOL.3520
  (https://www.uml.edu/catalog/courses/GEOL/3520) Sedimentation & Stratigraphy
- GEOL.3540L
  (https://www.uml.edu/catalog/courses/GEOL/3540L) Sedimentation & Stratigraphy Lab
- GEOL.4950
  (https://www.uml.edu/catalog/courses/GEOL/4950) Honors Research: Geoscience
- GEOL.4970
  (https://www.uml.edu/catalog/courses/GEOL/4970) Research: Geoscience
- GEOL.5xxx
  (https://www.uml.edu/catalog/courses/GEOL) All GEOL graduate courses

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Last updated: 5/23/2018

Suggested Degree Pathway for Environmental Science - Environmental Science Option

For students who entered fall 2018 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#x</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
<td>3</td>
</tr>
<tr>
<td>CHEM.1230L</td>
<td>Chemistry I Lab</td>
<td>1</td>
</tr>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
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<tr>
<td>ENVI.1010</td>
<td>Environmental Science Seminar (IL)</td>
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<td>ENVI.1200</td>
<td>Principles of Environmental Science</td>
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<tr>
<td>MATH.1310</td>
<td>Calculus I (MATH)1</td>
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Spring Semester

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<tbody>
<tr>
<td>CHEM.1220</td>
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<td>CHEM.1240L</td>
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<td>ENGL.1020</td>
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<tr>
<td>ENVI.2010</td>
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### Sophomore Year

#### Fall Semester

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<td>LIFE.1030L</td>
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<td>ENVI.2020</td>
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<td>ENVI.2040L</td>
<td>Earth Systems: Atmosphere &amp;Oceans Lab (CTPS)</td>
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<tr>
<td>GEOL.3070</td>
<td>Earth Materials I</td>
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<td>GEOL.3090L</td>
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<td>xxxxx.xxxx</td>
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#### Spring Semester

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<tbody>
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### Junior Year

#### Fall Semester

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<tbody>
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<td>ENVI.3010</td>
<td>GIS in Earth and Environmental Science</td>
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<td>GEOL.3130</td>
<td>Environmental Geochemistry (WOC), (AIL)</td>
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<td>GEOL.3190</td>
<td>Earth Surface Processes</td>
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<td>Earth Surface Processes Lab</td>
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<td>PHYS.1030</td>
<td>General Physics I (STEM)</td>
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#### Spring Semester

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<tbody>
<tr>
<td>ATMO.4080</td>
<td>The Climate System</td>
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<tr>
<td>GEOL.3140</td>
<td>Hydrogeology</td>
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<tr>
<td>GEOL.3310</td>
<td>Earth History</td>
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<tr>
<td>GEOL.3330</td>
<td>Earth History Lab</td>
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### Senior Year

#### Fall Semester

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<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>ENVI.4100</td>
<td>Soil Science</td>
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<td>ENVI.4120L</td>
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<td>ENVI.4170</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)2</td>
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#### Spring Semester

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<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>ATMO.4710</td>
<td>Air Pollution / Environmental Pollution</td>
<td>3</td>
</tr>
<tr>
<td>ENVI.5100</td>
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<tr>
<td>ENVI.4000</td>
<td>Senior Seminar</td>
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</tr>
<tr>
<td>ENVI.4150</td>
<td>Biogeochemical Cycles</td>
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</table>

**Total Minimum Credits = 120**

1Alternatively: Calc 1A (MATH.1280) + Calculus 1B (MATH.1290) = Calculus I (MATH.1310)

2The Core Curriculum Essential Learning Outcomes for Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) are fulfilled outside the EEAS major. See the DCA course listing and the SRE course listing for a full list of classes that fulfill these requirements.

3Technical Electives:

- ATMO.4710
- ATMO.5xxx
- ENVI.4950
- ENVI.4970
- ENVI.5xxx
- GEOL.3040
- GEOL.3060L
- GEOL.3410
- GEOL.3520
Sedimentation & Stratigraphy
- GEOL.3540L
  (https://www.uml.edu/catalog/courses/GEOL/3540L)
- GEOL.4560
  (https://www.uml.edu/catalog/courses/GEOL/4560)
  Applied Geophysics
- GEOL.5xxx
  (https://www.uml.edu/catalog/courses/GEOL) All GEOL graduate courses

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Last updated: 5/23/2018

Suggested Degree Pathway for Meteorology and Atmospheric Science
For students who entered fall 2020 and beyond.

Freshman Year
Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>ATMO.1020</td>
<td>Weather Forecasting Seminar1</td>
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<tr>
<td>ENGL.1010</td>
<td>College</td>
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Spring Semester

<table>
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<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
<td>3</td>
</tr>
<tr>
<td>CHEM.1230L</td>
<td>Chemistry I Lab</td>
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<tr>
<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
<td>3</td>
</tr>
<tr>
<td>ENVI.2010</td>
<td>Earth Systems: Geosphere</td>
<td>3</td>
</tr>
<tr>
<td>ENVI.2030L</td>
<td>Earth Systems: Geosphere Lab (CTPS), (QL)</td>
<td>1</td>
</tr>
<tr>
<td>MATH.1320</td>
<td>Calculus II</td>
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Sophomore Year
Fall Semester

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<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>ATMO.2140</td>
<td>Meteorology Analysis Lab1</td>
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<tr>
<td>CHEM.1220</td>
<td>Chemistry II (SCL)</td>
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<tr>
<td>CHEM.1240L</td>
<td>Chemistry II Lab</td>
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### Junior Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>ATMO.3080</td>
<td>Synoptic Meteorology</td>
<td>3</td>
</tr>
<tr>
<td>ATMO.4130</td>
<td>Physical Meteorology</td>
<td>3</td>
</tr>
<tr>
<td>MATH.2340</td>
<td>Differential</td>
<td>3</td>
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#### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>ENVI.2050</td>
<td>Earth Systems: Bios. and Gl. Change</td>
<td>3</td>
</tr>
<tr>
<td>ENVI.2070L</td>
<td>Earth Systems: Bios. and Gl. Change Lab</td>
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<tr>
<td>MATH.2720</td>
<td>Introduction to Programming with MATLAB</td>
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<tr>
<td>MATH.2310</td>
<td>Calculus III</td>
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<td>PHYS.2450L</td>
<td>Physical Properties of Matter</td>
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<td>Physics III Lab</td>
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</table>

Total 15

### Senior Year

#### Fall Semester

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<th>Course Name</th>
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<tbody>
<tr>
<td>ATMO.4150</td>
<td>Atmospheric Dynamics</td>
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<tr>
<td>ATMO.4930</td>
<td>Internship: Atmospheric Science</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
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<tr>
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Total 15

#### Spring Semester

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<tbody>
<tr>
<td>ATMO.4160</td>
<td>Advanced Dynamics</td>
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Total 3
Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

### Technical Electives

- **ATMO.3250**
  [Weather Communications](https://www.uml.edu/catalog/courses/ATMO/3250)
- **ATMO.3400**
  [Tropical Meteorology](https://www.uml.edu/catalog/courses/ATMO/3400)
- **ATMO.3130**
  [The Climate System](https://www.uml.edu/catalog/courses/ATMO/3130)
- **ATMO.4710**
  [Air Pollution](https://www.uml.edu/catalog/courses/ATMO/4710)
- **ATMO.4870**
  [Cloud Physics](https://www.uml.edu/catalog/courses/ATMO/4870)
- **ATMO.4950**
  [Honors Research: Atmospheric Science](https://www.uml.edu/catalog/courses/ATMO/4950)
- **ATMO.4970**
  [Research: Atmospheric Science](https://www.uml.edu/catalog/courses/ATMO/4970)
- **ATMO.5xxx**
  [All ATMO graduate courses](https://www.uml.edu/catalog/courses/ATMO)
- **ENVI.3010**
  [GIS](https://www.uml.edu/catalog/courses/ENVI/3010)

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<tbody>
<tr>
<td>160</td>
<td>ATMO.4710</td>
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<td>ENVL.5100</td>
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<td></td>
<td>ATMO.4500</td>
<td>Satellite and Radar Meteorology</td>
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<td>ATMO.4200</td>
<td>Intro to Operational Numerical Weather Prediction</td>
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<td>ENVI.4000</td>
<td>Senior Seminar</td>
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</table>

**Total Minimum Credits = 120**

1Course offered alternate years.

2The Core Curriculum Essential Learning Outcomes for Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) are fulfilled outside the EEAS major. See the DCA course listing and the SRE course listing for a full list of classes that fulfill these requirements.

3Capstone course. May be taken either semester of senior year.

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Restriction on off-campus study:
in Earth & Environmental Science

- **ENVI.4160**
  (https://www.uml.edu/catalog/courses/ENVI/4160)
  Climate Change Science, Communication & Solutions

- **ENVI.4170L**
  (https://www.uml.edu/catalog/courses/ENVI/4170L)
  Climate Change: Science, Communication & Solutions

- **ENVI.5xxx**
  (https://www.uml.edu/catalog/courses/ENVI) All ENVI graduate courses

- **GEOL.3150**
  (https://www.uml.edu/catalog/courses/GEOL/3150)
  Environmental Geochemistry

- **GEOL.5xxx**
  (https://www.uml.edu/catalog/courses/GEOL) All GEOL graduate courses

- **MATH.2210**
  (https://www.uml.edu/catalog/courses/MATH/2210)
  Linear Algebra I

- **MATH.2220**
  (https://www.uml.edu/catalog/courses/MATH/2220)
  Linear Algebra II

- **MATH.3620**
  (https://www.uml.edu/catalog/courses/MATH/3620)
  Numerical Analysis I

- **MATH.4450**
  (https://www.uml.edu/catalog/courses/MATH/4450)
  Partial Differential Equations

- **MATH.4660**
  (https://www.uml.edu/catalog/courses/MATH/4660)
  Stat Programs Using SAS

_Last updated: 12/11/2019_
ATMO.1020 Weather Forecasting Seminar (Formerly 85.102) - Credits: 1
Introduction to forecasting techniques including use of upper air observations and numerical forecast guidance. This course is intended primarily for students majoring in the various options of environmental science. It does not satisfy specific science requirements for majors in the Division of Science.

ATMO.1200 The Nature of Science (Formerly 85.120) - Credits: 3
In this course students are introduced to the role of critical thinking in the development of scientific theories. Several major areas of science are explored with a focus on the link between conceptual thought and the resulting physical laws. The importance to society of scientists and citizens making informed decisions on science/technology issues are examined. Methods to gather and assess data are discussed and a number of examples of the use of scientific principles to prove fact or fraud are studied. The students will learn how to question propositions put before them.

ATMO.1410 Weather and Climate (Formerly 85.141) - Credits: 3
General meteorology course. Topics include atmospheric composition, solar radiation, temperature, moisture and condensation relationship between air pressure and wind, weather patterns, severe weather, optical phenomena in the atmosphere, and the behavior and possible change of climate. Appropriate for KCS major science elective.

ATMO.1430L Weather and Climate Laboratory (Formerly 85.143) - Credits: 1
The laboratory encourages students to apply knowledge from the lectures to a variety of atmospheric and climatic phenomena developed from data analysis, experimentation, and maps. Synthesis and critical thinking are encouraged in the solution of problems.

ATMO.1500 The Physical Science of Climate Change - Credits: 3
Due to the complexity of climate change, there are many important dimensions to the problem, including political, economic, social, and ethical. This course focuses on the physical science dimension of climate change: what are the key scientific principles that are needed to understand the causes and physical impacts of climate change, and to evaluate possible responses and their likely effectiveness The class is offered for both science and non-science majors.

ATMO.1520L The Physical Science of Climate Change Lab - Credits: 1
This laboratory is designed to accompany the lecture material of The Physical Science of Climate Change (ATMO.1500), which focuses on the key scientific principles that are needed to understand the causes and physical impacts of climate change, and to evaluate possible responses and their likely effectiveness. The course is offered for both science and non-science majors.

ATMO.1990L Atmospheric Sciences 1000 level elective Lab(Formerly 85.199) - Credits: 1
Atmospheric Sciences 1000 level elective Lab.

ATMO.2130L Atmospheric Science Laboratory (Formerly 85.213) - Credits: 1
The plotting and analysis of meteorological data is introduced, with the goal of understanding the basis for various ways of looking at weather systems. After each technique is introduced, students will see the computer counterpart using the workstations in the weather lab. Both the strengths and weaknesses of automated displays are made clear to students, thus making them better able to interpret the computer images on a daily basis.

ATMO.2140L Meteorology Analysis Laboratory (Formerly 85.214) - Credits: 1
The use of the skew-T diagram to understand the vertical structure in the atmosphere is the main focus of this course. Students will learn to plot and analysis atmospheric sounding data, and to recognize various structures in the analyzed data. Both hand and computer-aided analysis will be compared.

ATMO.2340 Scientific FORTRAN Programming (Formerly 85.234) - Credits: 3
A basic course in computer programming using FORTRAN 90/95. Topics include programming arithmetic, decisions, repetition, input/output structures, arrays and array processing, and simple algorithms for searching and sorting.

ATMO.2910 Practicum in Meteorology (Formerly 85.291) - Credits: 1-3
ATMO.3010 Atmospheric Thermodynamics (Formerly 85.301) - Credits: 3
The variables of state, Charles’ law, Boyle’s law, equation of state for an ideal gas, mixtures of gases. Thermodynamics of dry air, water vapor and moist air. Clausius-Clapeyron

ATMO.3040 Methods in Meteorology (Formerly 85.304) - Credits: 3
The application of vector analysis to dynamic meteorology. Three-dimensional divergence and vorticity, circulation, and solenoids. Selected ordinary and partial differential equations of fluid mechanics and their solutions. Spectral decomposition of hemispheric wave motion.

ATMO.3050 Methods in Meteorology II (Formerly 85.305) - Credits: 3
Fundamentals of numerical weather prediction. Data analysis methods in meteorology using the techniques of curve fitting, correlation, and power spectrum analysis. Solution of stability problems.

ATMO.3080 Synoptic Meteorology (Formerly 85.308) - Credits: 3
Explores techniques of synoptic analysis including graphical subtraction, thickness analysis, isentropic analysis, streamlines and trajectories, divergence and vorticity. The use of a computer to perform these computations is explored through student projects.

ATMO.3090 Forecasting and Synoptic Techniques II (Formerly 85.309) - Credits: 3
Explores three-dimensional structure and dynamics of mid-latitude storm systems; capabilities and limitations of the barotropic model; quasi-geostrophic model; and operational primitive equation models. Some mesoscale phenomena are covered as time permits including coastal cyclogenesis, thermal lows, and sea-breeze circulations.

ATMO.3130 Physical Climatology (Formerly 85.313) - Credits: 3
Atmospheric processes determining the climate: solar and terrestrial radiation, elevation and thermal properties of surfaces, atmospheric circulations and eddy conduction between the atmosphere and land or sea surfaces, heat and water balance of earth’s surface and the atmosphere; hydrologic cycle; and climatic simulation models.

ATMO.3400 Tropical Meteorology (Formerly 85.340) - Credits: 3
An introduction to the tropical atmosphere including tropical climatology, structure and dynamics of easterly waves, tropical cyclones and monsoonal circulations.

ATMO.3500 Satellite and Radar Meteorology (Formerly 85.350) - Credits: 3
Explores theory and applications of radar, satellites, and lidar. Use of satellite imagery as a forecasting aide, theory and use of satellite profiling, and application of conventional and Doppler radar to severe weather and short term forecasting. Use of lidar and other profiling techniques to determine vertical temperature structure and turbulence.

ATMO.4030 Physical Meteorology (Formerly 85.403) - Credits: 3
Explores solar and terrestrial radiation processes and the heat balance of the atmosphere; fundamentals of radiation theory; radiative transfer processes in the atmosphere; atmospheric condensation processes; and nucleation theory and the growth of water drops and ice crystals by condensation, sublimation and accretion.

ATMO.4080 The Climate System (Formerly 85.408) - Credits: 3
The course covers the main elements of the climate system--the atmosphere, ocean, biosphere, solid earth, and cryosphere--and the primary source of energy, the sun. The elements are examined in terms of observed structure and important physical processes, the ways in which they interact, and how they can be modeled. The global energy budget is discussed and both natural and human-caused climate change are considered.

ATMO.4100 Advanced Forecasting (Formerly 85.410) - Credits: 3
Advanced analysis techniques and their use as forecasting tools are explored in both manual and computer formats. Techniques include moisture advection, moist isentropic trajectories, boundary layer destabilization, and other state-of-the-art techniques. Application of techniques to small and mesoscale phenomena.

ATMO.4120 Synoptic Weather Patterns (Formerly 85.412) - Credits: 3
This course is focused on applying meteorological theory to real weather patterns, with an emphasis on how the theory helps to understand the broad forcing mechanisms for each pattern as well as gaining an appreciation for the individual characteristics of each example. Topics will include nor’easters, back-door cold fronts, Alberta clippers, upper-air blocking,
snow squalls, and stationary fonts. Analysis techniques will use digital display software as well as manual analysis of plotted weather data. In addition to individual homework, some case studies will be examined in small groups.

**ATMO.4150 Atmospheric Dynamics (Formerly 85.415) - Credits: 3**


**ATMO.4160 Advanced Atmospheric Dynamics (Formerly 85.416) - Credits: 3**


**ATMO.4200 Introduction to Operational Numerical Weather Prediction (Formerly 85.420) - Credits: 3**

In this class, the student will learn the structure and science behind modern numerical weather prediction models and how to use them to solve real-world issues facing modern meteorological consultants. The student will learn how to operate and apply a modern numerical weather prediction model to study such issues as offshore wind farm siting, solar power prediction, and energy load forecasting. Students should be prepared to use Linux-based PC’s (supplied) to perform and submit projects.

**ATMO.4500 Satellite and Radar Meteorology (Formerly 85.450) - Credits: 3**

This course explores the theory behind the operation of radar, satellites, and lidar. It demonstrates the use of satellite imagery as a forecasting aid, and the application of conventional and Doppler radar to severe weather and short term forecasting. Additional topics include the techniques used to determine vertical profiles of temperature, moisture and turbulence using lidar and satellite data.

**ATMO.4710 Air Pollution (Formerly 85.471) - Credits: 3**

**ATMO.4840 Space Weather (Formerly 85.484) - Credits: 3**

Space Weather is an emerging field of space science focusing on understanding the conditions and processes on the sun, in the interplanetary space, and in the Earth's magnetosphere, ionosphere and thermosphere that can influence the performance and reliability of space-borne and ground-based technological systems and can endanger human life or health. This course is an introduction level course. It applies knowledge learned in Physics I and II in particular in electromagnetics to a real situation: space. The course introduces the present knowledge of space phenomena and the physical understanding of the plasma environment from the sun to the earth's ionosphere and in the heliosphere. Regions in space to be discussed include solar surface, solar wind, bow shock, magnetosheath, magnetosphere, magnetotail, radiation belts, ring currents, and ionosphere. Among space plasma physics theories, single particle theory, kinetic theory, and magnetohydrodynamics, which describe charged particle motion in electromagnetic fields and its consequences, are introduced and applied to space environment.

**ATMO.4870 Cloud Physics (Formerly 85.487) - Credits: 3**

The course considers the physical processes involved in the formation of clouds and precipitation, and the properties of clouds. Topics include the thermodynamics of dry and moist air, with emphasis on moist air saturation; atmospheric dynamics leading to instabilities, convection, and air mixing; the formation and growth of air droplets, ice crystals, clouds, and the initiation of precipitation.

**ATMO.4910 Directed Study (Formerly 85.491) - Credits: 1-3**

Students, through regular and frequent consultation with the instructor, undertake independent study of a particular area of meteorology.

**ATMO.4930 Internship: Atmospheric Science (Formerly 85.493) - Credits: 1-3**

Work experience with private or public employer. Written report and supervisor evaluation required.

**ATMO.4950 Honors Research: Atmospheric Science (Formerly 85.495) - Credits: 3**

An individual or team research project carried out by qualified students with the approval of and supervision by a faculty member.

**ATMO.4960 Practicum Experience in Meteorology (Formerly 85.496) - Credits: 1-3**

Work experience with private or public employer. Written report and supervisor evaluation required.
A program of on-campus and/or off-campus experiences developed by the student in consultation with a faculty member and, when appropriate, a member of the staff of an off-campus firm. May be repeated up to a maximum of six credits. The practicum may not be substituted for a nonelective course in the major.

ATMO.4970 Research: Atmospheric Science - Credits: 3

An independent scientific research project carried out by a qualified senior under the supervision of a faculty member.

ENVI.1010 Environmental Science Seminar (Formerly 87.101) - Credits: 1

A survey of the field of environmental science, curriculum options, and career opportunities. Presentations by members of the department and guest speakers. This course is intended primarily for students majoring in the various options of environmental science. It does not satisfy specific science requirements for majors in the Division of Science, nor does it qualify as a science with lab perspective.

ENVI.1020 Environmental Problems Seminar (Formerly 87.102) - Credits: 1

A survey of environmental problems and issues. Topics include air, water, and noise pollution; solid and liquid waste disposal; and the social, political, and economic implications of these issues. Readings, discussions, guest speakers, and field trips. This course is intended primarily for students majoring in the various options of environmental science. It does not satisfy specific science requirements for majors in the Division of Science.

ENVI.1100 Global Environmental Studies - Credits: 3

This course investigates how human activities impact the earth’s environment on a local, national, and global scale. Topics covered include the scientific method, population, fresh water resources, air and water pollution, climate change, energy, biodiversity, food security, solid waste management and sustainable living. Suitable as a Science elective for a degree in the College of Sciences.

ENVI.1110 Sustainable Solutions for People and the Planet - Credits: 3

This course explores some of the most challenging questions of our times: How can modern society thrive on a finite and changing planet? In what ways is our climate changing and what is causing those changes? How will human society be impacted: What could a transition to a sustainable, green, low-carbon economy consist of? We will explore these questions through a combination of simulations, serious games, and ‘systems thinking’ - building a skill set to think strategically about complex, dynamic problems. The course considers current events as they relate to climate change and sustainability and introduces students to real-world, interactive tools that allow them to explore scenarios and solutions for themselves.

ENVI.1120L Global Environmental Studies Lab - Credits: 1

This laboratory course will complement the material covered in the Global Environmental Studies Lecture. Topics include ecological footprints, nutrient cycling, water, and air quality, soil characteristics, ocean pollution, environmental justice, and climate change.

ENVI.1140 Natural Disasters - Credits: 3

The purpose of this course is to gain a deeper understanding of the science behind natural disasters. Each natural disaster will be examined from the perspective of Earth’s systems. Students will learn the best way to prepare themselves should a disaster strike.

ENVI.1140L Natural Disasters Laboratory - Credits: 1

This lab consists of hands-on activities and worksheet to better understand the science behind natural disasters.

ENVI.1150 Astronomy (Formerly 87.115) - Credits: 3

Offers an introduction to the study of astronomy including historical development, instruments, solar system dynamics, planetary evolution, stellar systems and stellar evolution. Several field trips are included. This course satisfies the Gen Ed science requirement, but not specific science requirements for majors in the Division of Science.

ENVI.1170L Astronomy Lab (Formerly 87.117) - Credits: 1

Intended to develop a deeper understanding of astronomy through an exposure to the methods and materials used in astronomical analysis. Corequisite: 87.115 I,II(0,2)1

ENVI.1200 Principles of Environmental Science - Credits: 3

In this course, we will approach Environmental Science from an interdisciplinary viewpoint and use quantitative approaches to understand the physical, chemical, and biological
environment and their interactions. A critical emphasis through this course will be on ecosystem services and how climate change, land use change, and pollution affect these. We will further review environmental law and policies and address concepts of sustainability and resource conservation.

ENVI.1990L Envi. Science 1000 level elec. - Credits: 1
Envi. Science 1000 level elec.

ENVI.2010 Earth Systems: Geosphere (Formerly 87.201) - Credits: 3
Earth Systems: Geosphere deals with the origin of the universe, solar systems and planet earth, the solid earth and processes at the earth’s surface, geological hazards, coastal processes, deep sea sediments and the climate record, and contamination of water and soil.

ENVI.2020 Earth Systems: Atmosphere and Oceans (Formerly 87.202) - Credits: 3
Earth Systems: Atmosphere and Oceans deals with the atmosphere, and oceans, as well as the important role they play within Earth’s vital systems. These interactions will address atmospheric structure, processes, and pollution. It will also address ocean-atmosphere exchange, ocean structure, processes, pollution, and coastal and deep sea sedimentation processes.

ENVI.2030L Earth Systems: Geosphere Laboratory (Formerly - Credits: 1
The Laboratory component Earth Systems: Geosphere requires the student to make measurements, analyze and plot data, draw conclusions from the data plots, characterize and identify earth materials, and interpret geospatial representations. These skills will follow lecture material and increase understanding through active learning.

ENVI.2040L Earth Systems: Atmosphere and Oceans Laboratory (Formerly 87.204) - Credits: 1
Earth Systems: Atmosphere and Oceans Lab is designed to complement the lecture material from ENVI.2020 - Earth Systems Atmosphere and Oceans. This course, along with the other Earth Systems courses and corresponding labs use a systems-based approach for the topic of Earth and Environmental Science. This laboratory will concentrate on the Atmosphere and Oceanography.

ENVI.2050 Earth Systems: Biosphere and Global Change - Credits: 3
Earth Systems: Biosphere and Global Change explores the origin and evolution of life on Earth, its history, and how life has interacted with Earth systems throughout its history. Students will become familiar with the biomes of the world, ecological processes within those biomes, the biological communities that inhabit them, and how ecological processes lead to evolution over time. Throughout the course, we will examine how human society interacts with the biosphere, including how global change is both generated by and responds to the interaction.

ENVI.2070L Earth Systems: Biosphere and Global Change Lab - Credits: 1
This lab is designed to complement the lecture material from ENVI.2050 - Earth Systems: Biosphere and Global Change. This course, along with the other Earth Systems courses and corresponding labs use a systems-based approach for the topic of Earth and Environmental Science. This laboratory will concentrate on the Biosphere and Global Environmental Change.

ENVI.2990L Envi. Science 2000 Level Elective - Credits: 1

ENVI.3010 GIS in Earth and Environmental Sciences (Formerly 87.301) - Credits: 3
This course introduces earth and environmental science students to applications of geographic information systems, emphasizing hands-on field experience in collecting spatial location data and in mapping environmental data using GIS software. Covers fundamentals of: geodesy; spherical and plane coordinate systems; spatial data concepts, including error, accuracy, and precision; location measurement technologies including GPS; vector and raster GIS data structures and file types, basic GIS operations, including georeferencing of raster files and editing of vector files; assembly of field data over a base map; analysis of spatial relationships using GIS tools; symbology and methods of map presentation.

ENVI.4000 Senior Seminar in Environmental Sciences - Credits: 1
The Senior Seminar in Environmental Sciences includes speaker presentations by invited external and internal faculty, as well as student presentations. The class includes interdisciplinary topics in Atmospheric Sciences, Geosciences, and Environmental Sciences. The goals are to improve oral communication skills and expand knowledge of stat-of-the-art research approaches and research themes.
ENVI.4100 Soil Science - Credits: 3
This class provides a fundamental understanding of the formation, structure, and functioning of soils. Topics include soil formation and history, soil chemistry and physics, soil endangerment and protection, and distribution and characteristics of soils across the world.

ENVI.4120L Soil Science Laboratory - Credits: 1
This lab is designed to complement the lecture material from ENVI.4100 - Soil Science. The lab includes field and laboratory measurements of soil structure and soil physical and chemical characteristics. As the outermost layer of the Earth's crust, soils are at the interface between earth, air, water, and life. Soils provide important ecosystem services and are critical for the sustenance of humanity.

ENVI.4150 Biogeochemical cycles - Credits: 3
This class will explore the origins, transport, and transformations of elements in the global environment. We will use quantitative approaches to understand physical, chemical, and biological controls on elemental cycles. Many of these elements cycle between the geosphere, atmosphere, hydrosphere, and biosphere, and quantifying exchanges and fluxes between compartments is a critical component of understanding their distribution. We will also emphasize microbial processes that are critical in shaping biogeochemical cycles.

ENVI.4160 Climate Change: Science, Communication, and Solutions (Formerly 81.416/BIOL.4160) - Credits: 3
Like many of the ‘grand challenges’ currently facing society, climate change is a complex problem that cuts across academic disciplines, including the physical sciences, biology, engineering, economics, political sciences, and behavioral psychology. In this course, we integrate recent research from many of these disciplines to explore the scientific basis of climate change, its impacts on the natural world and human society, and societal responses to it. Through interactive simulations, class discussions, lectures, current scientific literature, and student-led projects (such as video production and dynamic modeling), the goal of this course is to empower students to come to their own decisions about how society can address the climate change challenge.

ENVI.4170L Climate Change: Science, Communication, and Solutions Lab - Credits: 1
This course is designed to integrate closely with the lecture course, Climate Change: Science, Communication, and Solutions. Students will use interactive simulations, build models, and create media projects that explore climate change and sustainability. Topics include the physical climate system and carbon cycle, human energy systems, and climate policy and economics.

ENVI.4930 Internship: Environmental Studies (Formerly 87.493) - Credits: 1-3
Work experience with private or public employer. Written report and supervisor evaluation required. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Written & Oral Communication (WOC).

ENVI.4950 Honors Research: Environmental Studies (Formerly 87.495) - Credits: 3
An individual or team research project carried out by qualified students with the approval of and supervision by a faculty member. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Written & Oral Communication (WOC).

ENVI.4960 Practicum (Formerly 87.496) - Credits: 1-3
A program of on-campus and/or off-campus experiences developed by the student in consultation with a faculty member from the Department and, when appropriate, a member of the staff of an off-campus firm. May be repeated to a maximum of six credits. The practicum may not be substituted for a required course in the major.

ENVI.4970 Research: Environmental Studies - Credits: 3
An independent scientific research project carried out by a qualified senior under the supervision of a faculty member.

GEOL.1010 General Geology (Formerly 89.101) - Credits: 3
Presents a study of the earth with emphasis on earth materials, earth structure (crustal and internal), earth history, and the development of life. Designed for the general student.

GEOL.1030L General Geology Laboratory (Formerly 89.103) - Credits: 1
Topics covered include rock and mineral identification; interpretation of topographic and geologic maps; earthquakes and rock deformation; ground water, streams, wind, and glaciers and the sculpting of the Earth’s surface; and natural
hazards and their impacts to humans.

GEOL.1510 Earth and Life (Formerly 89.151) - Credits: 3

This course will trace the changes in both the Earth and a variety of organisms through an investigation of fossils, field sites, map interpretation, and basic earth science principles. The effects of physical change and geobiochemical processes on evolution will be stressed as will the effects of life on Earth. Students will gain an appreciation of the very special nature of the earth and its symbiotic life forms when seen against the background of other planets.

GEOL.1530L Earth and Life Laboratory (Formerly 89.153) - Credits: 1

This laboratory will concentrate on the identification of fossils, discrimination of fossils from sedimentary structures, and interpretation of ancient environments from lithology, fossils, and maps. A field trip is required.

GEOL.1990L Geology Lab 1000 level elective - Credits: 1
Geology Lab 1000 level elective

GEOL.2150 Forensic Geology (Formerly 89.215) - Credits: 3

This course deals with the application of geological and related principles to the solution of various types of crimes. The course will explore the use of evidence (rocks and minerals, soils, geochemistry, etc.) to identify the source and hence the potential perpetrator of the crime. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Quantitative Literacy (QL).

GEOL.2990L Geology Lab 2000 level elective - Credits: 1
Geology Lab 2000 level elective

GEOL.3010 Mineralogy and Crystallography (Formerly 89.301) - Credits: 3

This course will introduce the concepts of crystallography necessary to prepare the student to use the analytical equipment of Optical Mineralogy and X-ray Crystallography. It also contains topics on the physical properties and chemistry of minerals aimed at improving the student’s ability to identify mineral samples. A significant portion of the course will be devoted to an introduction to optical methods using oil immersion and thin section techniques.

GEOL.3030L Mineralogy And Crystallography Laboratory (Formerly 89.303) - Credits: 1

Techniques of crystallographic description. Megascopic and microscopic techniques of mineral identification.

GEOL.3040 Igneous & Metamorphic Petrology (Formerly 89.304) - Credits: 3

The origin and evolution of igneous and metamorphic rocks. Emphasis will be on physical and chemical processes, magma transport and crystallization, phase equilibria, development of metamorphic facies, open and closed system behavior, and the development of metamorphic fabric.

GEOL.3060L Igneous and Metamorphic Petrology Laboratory (Formerly 89.306) - Credits: 1

Identification and classification of igneous and metamorphic rocks. Emphasis is on thin section identification and use of rock textures and compositions as guides to petrogenesis.

GEOL.3070 Earth Materials I (Formerly 89.307) - Credits: 3

An introduction to the basic principles that control the arrangement of atoms in crystalline solids (minerals) and their physical and chemical properties. Topics include crystal chemistry, crystal symmetry, macroscopic mineral identification, and the use of polarizing light microscopy and X-ray diffraction to identify and characterize minerals.

GEOL.3080 Earth Materials II (Formerly 89.308) - Credits: 3

Origin and properties of igneous, metamorphic, and sedimentary rocks. The rock cycle is used as a unifying concept. The role of rock properties in environmental, economic, and engineering applications is considered.

GEOL.3090L Earth Materials I Laboratory (Formerly 89.309) - Credits: 1

Laboratory to accompany Earth Materials I lecture. Topics include crystal structures, crystal symmetry, hand-speciman identification of minerals, X-ray diffraction, and polarizing light microscopy.

GEOL.3100L Earth Materials II Lab (Formerly 89.310) - Credits: 1
Macroscopic and microscopic characterization and classification of rocks. Investigation of physical processes and spatial representation of rock and sediment distribution.

GEOL.3140 Hydrogeology (Formerly 89.314) - Credits: 3
This course investigates the science of water in a geologic setting with special emphasis on the distribution, movement, and chemistry of the water. The course will include the following topics: techniques for measuring elements in the hydrologic equation, accuracy of hydrologic measurement, statistical studies of floods, and study of groundwater for both steady-state and transient conditions.

GEOL.3150 Environmental Geochemistry (Formerly 89.315) - Credits: 3
Application of geochemical principles to environmental problems including air pollution and atmospheric processes, climate change, water chemistry and water-rock interactions, and the transport and dispersal of organic and inorganic pollutants. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Written & Oral Communication (WOC).

GEOL.3160 Geomorphology (Formerly 89.316) - Credits: 3
A study of the physical and chemical processes at work on the earth’s surface which result in the formation and development of surface features. Emphasis is placed on the mechanics of erosion (water, wind, ice, and waves) and the morphology and spatial distribution of the resultant landforms.

GEOL.3170L Environmental Geochemistry Lab - Credits: 1
Application of geochemical principles to environmental problems including air pollution and atmospheric processes, climate change, water chemistry and water-rock interaction, and the transport and dispersal of organic and inorganic pollutants. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Written & Oral Communication (WOC).

GEOL.3180L Geomorphology Laboratory (Formerly 89.318) - Credits: 1
Investigates landforms and surficial processes through an interpretation of maps and field work. Environmental applications of surficial processes are stressed.

GEOL.3190 Earth Surface Processes (Formerly 89.319) - Credits: 3
A study of the physical and chemical processes that create landforms on the Earth’s surface. Emphasis is placed on physical and chemical weathering, fluvial erosion, glacial processes, soil formation, mass movements, slope stability and tectonic geomorphology.

GEOL.3210L Earth Surface Processes Laboratory (Formerly 89.321) - Credits: 1
Hands-on investigation of landforms and surficial processes through interpretation and synthesis of maps, aerial photography and field data.

GEOL.3220 Structural Geology (Formerly 89.322) - Credits: 3
An analysis of crustal deformation through detailed study of geologic structures with emphasis upon the response of geologic materials to stress and strain. Field techniques, tectonic principles, and geometrical analysis are employed.

GEOL.3240L Structural Geology Laboratory (Formerly 89.324) - Credits: 1
A survey of the graphical techniques used to convert field measurement into the information needed in the construction of geologic maps, cross-sections, and crustal stress-strain histories.

GEOL.3250 Geology for Engineers (Formerly 89.325) - Credits: 3
This course will introduce basic geological principles with an emphasis on engineering applications. Topics covered include minerals and rocks and their properties, surface processes, earthquakes and rock deformation, dynamic processes that affect the earth’s surface, geological hazards and their mitigation, earth resources.

GEOL.3310 Earth History (Formerly 89.331) - Credits: 3
An introduction to the history of the Earth and its life over the last 4.6 billion years. Applications include geologic principles, earth material, depositional environments, stratigraphy, the geological timescale, plate tectonics, and evolutionary theory.

GEOL.3330L Earth History Laboratory (Formerly 89.333) - Credits: 1
This laboratory compliments Earth History lecture material. Exercises include stratigraphic methods, geologic maps and fossil identification.

**GEOL.3400 Geology of North America - Credits: 2**

This is a reading course that is paired with a summer field experience lab section (GEOL.3420L). This course will involve familiarization of the geology of a region in North America including, but not limited to State and National Parks, with a different regional focus each time the course is offered. Students will read and discuss papers on the region of geologic interest and will learn necessary skills (e.g., geologic mapping, sampling, geophysical methods, equipment use, safety, etc.) needed for the subsequent field experience.

**GEOL.3420L Geology of North America - field experience - Credits: 1**

Field experience is essential to geoscience education. This course will include a minimum of two weeks of intensive field work including note taking, mapping, analysis of geologic history and structures, geologic illustration, and report writing. Completion of this course will create a skill set that will be very beneficial to the geology professional. Additional fees may be required to cover transportation and lodging.

**GEOL.3520 Sedimentation And Stratigraphy (Formerly 89.352) - Credits: 3**

Principles and processes of sedimentation: erosion, mechanics of transport, diagenesis and lithification, models for sedimentary environments. Development of the stratigraphic record, relative and absolute time, and seismic stratigraphy.

**GEOL.3540L Sedimentation And Stratigraphy Laboratory (Formerly 89.354) - Credits: 1**

Determination of mass properties of sediments with emphasis on mechanical and statistical analysis, identification and description of sedimentary rocks, facies models and stratigraphic cross-sections.

**GEOL.4100 Geology of New England - Credits: 3**

New England has an ancient and diverse geologic history. This course covers the tectonic and sedimentary processes that formed the bedrock of New England and New York, the Pleistocene history of ice sheet erosion and deposition and the most recent period of human interactions with the landscape.

**GEOL.4130 Exploring the Solar System - Credits: 3**

we live in a remarkable era of robotic space exploration. In this course, we will walk through the formation of the Solar System and the comparative evolutions of the planets, moons, and other objects from a geological perspective, with special attention paid to the latest research and missions. We will also consider the prospects for life on other planetary bodies in our Solar System and in extrasolar planetary systems.

**GEOL.4560 Applied Geophysics (Formerly 89.456) - Credits: 3**

Application of geophysics to problems in geology and environmental science. Principles and techniques of gravity, magnetic, electrical, and seismic methods. Field projects and surveys.

**GEOL.4910 Directed Study: Geoscience (Formerly 89.491) - Credits: 1-3**

The student, through regular and frequent consultation with the instructor, undertakes independent study of a particular area of the geosciences.

**GEOL.4930 Internship: Environmental Geoscience (Formerly 89.493) - Credits: 1-3**

Work experience with private or public employer. Written report and supervisor evaluation required. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Written & Oral Communication (WOC).

**GEOL.4950 Honors Research: Geoscience (Formerly 89.495) - Credits: 3**

An independent scientific research project carried out by a qualified senior under the supervision of a faculty member. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Written & Oral Communication (WOC).

**GEOL.4970 Research: Geoscience - Credits: 3**

An independent scientific research project carried out by a qualified senior under the supervision of a faculty member.
## Suggested Degree Pathway for Mathematics - General Option

For students who entered fall 2015 and beyond.

### Freshman Year

#### Fall Semester

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<tr>
<td>MATH.3750</td>
<td>Senior Seminar I</td>
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### Junior Year

#### Fall Semester

<table>
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<tr>
<td>MATH.xxx</td>
<td>Analysis I</td>
<td>3</td>
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<tr>
<td>MATH.xxx</td>
<td>Prob / Statistics Elective</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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<tr>
<td>xxxx.xxxx</td>
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#### Spring Semester

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<tr>
<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>MATH.2220</td>
<td>Linear Algebra II</td>
<td>3</td>
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<tr>
<td>MATH.2xxx</td>
<td>Differential Equations (QL2)</td>
<td>3</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Science</td>
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<td>xxxx.xxxx</td>
<td>Science Lab</td>
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<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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<tr>
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<td>Social Sciences Persp. (SS)</td>
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MATH.3xxx [https://www.uml.edu/catalog/courses/MATH](https://www.uml.edu/catalog/courses/MATH) Math Elective 3
MATH.3xxx [https://www.uml.edu/catalog/courses/MATH](https://www.uml.edu/catalog/courses/MATH) Analysis II 3
xxxx.xxxx Social Sciences Persp. (SS) 3
xxxx.xxxx Science Elective 3
xxxx.xxxx Arts and Hum. Persp. (AH) 3
Total 1 6

**Senior Year**

**Fall Semester**

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<thead>
<tr>
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<tr>
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<td>Senior Seminar II (AIL), (IL), (WOC)</td>
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<tr>
<td>MATH.3xxx <a href="https://www.uml.edu/catalog/courses/MATH">https://www.uml.edu/catalog/courses/MATH</a></td>
<td>Math Elective</td>
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**Spring Semester**

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<td>MATH.xxxx <a href="https://www.uml.edu/catalog/courses/MATH">https://www.uml.edu/catalog/courses/MATH</a></td>
<td>Math Elective</td>
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<tr>
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</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
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</tr>
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**Total Minimum Credits = 120**

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_Last Updated: 5/11/2018_

**Suggested Degree Pathway for Mathematics - Applied Computational Mathematics Option**

**For students who entered fall 2015 and beyond.**

**Freshman Year**

**Fall Semester**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>MATH.1310 <a href="https://www.uml.edu/catalog/courses/MATH/1310">https://www.uml.edu/catalog/courses/MATH/1310</a></td>
<td>Calculus I (MATH)</td>
<td>4</td>
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<tr>
<td>COMP.1010 <a href="https://www.uml.edu/catalog/courses/COMP/1010">https://www.uml.edu/catalog/courses/COMP/1010</a></td>
<td>Computing I</td>
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<td>ENGL.1010 <a href="https://www.uml.edu/catalog/courses/ENGL/1010">https://www.uml.edu/catalog/courses/ENGL/1010</a>/HONR.1100 <a href="https://www.uml.edu/catalog/courses/HONR/1100">https://www.uml.edu/catalog/courses/HONR/1100</a></td>
<td>College Writing I (CW) / FYSH (CW)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Science (SCL)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Science Lab</td>
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### Spring Semester

<table>
<thead>
<tr>
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<th>Course Name</th>
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<td>MATH.1320 (<a href="https://www.uml.edu/catalog/courses/MATH/1320">https://www.uml.edu/catalog/courses/MATH/1320</a>)</td>
<td>Calculus II</td>
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<tr>
<td>MATH.3210 (<a href="https://www.uml.edu/catalog/courses/MATH/3210">https://www.uml.edu/catalog/courses/MATH/3210</a>)</td>
<td>Discrete Structures I</td>
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<td>ENGL.1020 (<a href="https://www.uml.edu/catalog/courses/ENGL/1020">https://www.uml.edu/catalog/courses/ENGL/1020</a>)</td>
<td>College Writing II (CW)</td>
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<td>Science (SCL)</td>
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<tr>
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### Fall Semester

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<tr>
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<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>MATH.2310 (<a href="https://www.uml.edu/catalog/courses/MATH/2310">https://www.uml.edu/catalog/courses/MATH/2310</a>)</td>
<td>Calculus III</td>
<td>4</td>
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<tr>
<td>MATH.2210 (<a href="https://www.uml.edu/catalog/courses/MATH/2210">https://www.uml.edu/catalog/courses/MATH/2210</a>)</td>
<td>Linear Algebra I</td>
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<td>xxxxx.xxxx</td>
<td>Science (STEM)</td>
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### Spring Semester

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<tr>
<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>MATH.2220 (<a href="https://www.uml.edu/catalog/courses/MATH/2220">https://www.uml.edu/catalog/courses/MATH/2220</a>)</td>
<td>Linear Algebra II</td>
<td>3</td>
</tr>
<tr>
<td>MATH.2xxx (<a href="https://www.uml.edu/catalog/courses/MATH">https://www.uml.edu/catalog/courses/MATH</a>)</td>
<td>Differential Equations (CPS), (QL)2</td>
<td>3</td>
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<tr>
<td>xxxxx.xxxx</td>
<td>Science</td>
<td>3</td>
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<tr>
<td>xxxxx.xxxx</td>
<td>Science Lab</td>
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<tr>
<td>xxxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
</tr>
<tr>
<td>xxxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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### Junior Year

### Fall Semester

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<th>Cr.</th>
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<td>MATH.3010 (<a href="https://www.uml.edu/catalog/courses/MATH/3010">https://www.uml.edu/catalog/courses/MATH/3010</a>)</td>
<td>Intro Applied Math I</td>
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<tr>
<td>MATH.xxxx (<a href="https://www.uml.edu/catalog/courses/MATH">https://www.uml.edu/catalog/courses/MATH</a>)</td>
<td>Analysis I</td>
<td>3</td>
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<tr>
<td>MATH.xxxx (<a href="https://www.uml.edu/catalog/courses/MATH">https://www.uml.edu/catalog/courses/MATH</a>)</td>
<td>Prob / Statistics Elective</td>
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<tr>
<td>xxxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
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<tr>
<td>xxxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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<td><strong>Total</strong></td>
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### Spring Semester

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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>MATH.3620 (<a href="https://www.uml.edu/catalog/courses/MATH/3620">https://www.uml.edu/catalog/courses/MATH/3620</a>)</td>
<td>Numerical Analysis I</td>
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<td><strong>Total</strong></td>
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### Senior Year

### Fall Semester

<table>
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<tr>
<th>Course#</th>
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<th>Cr.</th>
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<tbody>
<tr>
<td>MATH.4750 (<a href="https://www.uml.edu/catalog/courses/MATH/4750">https://www.uml.edu/catalog/courses/MATH/4750</a>)</td>
<td>Senior Seminar II (AIL), (IL), (WOC)</td>
<td>3</td>
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</table>
Mathematics students meet the Core Curriculum Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) Essential Learning Outcomes outside the major. Please see the DCA course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) and the SRE course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill these requirements.


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**Last Updated: 5/11/2018**
<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
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</thead>
<tbody>
<tr>
<td>MATH.2310</td>
<td>Calculus III</td>
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<tr>
<td>MATH.2210</td>
<td>Linear Algebra I</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Science (STEM)</td>
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**Sophomore Year**

**Fall Semester**

<table>
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<tr>
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<th>Course Name</th>
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<tbody>
<tr>
<td>MATH.2220</td>
<td>Linear Algebra II</td>
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<tr>
<td>MATH.2xxx</td>
<td>Differential Equations (CTPS), (QL)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Science</td>
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<tr>
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<td>Science Lab</td>
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**Spring Semester**

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<th>Course Name</th>
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<tbody>
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<td>MATH.3750</td>
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<td>MATH.4860</td>
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**Junior Year**

**Fall Semester**

<table>
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<tbody>
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**Spring Semester**

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<tr>
<td>MATH.5910</td>
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Math Elective 3
Free Elective 3
Free Elective 3
Free Elective 3
Total 1 5

Total Minimum Credits = 120

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Last Updated: 5/11/2018

Freshman Year

Fall Semester

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<tr>
<td>ENGL.1010</td>
<td>College Writing I/FYSH (CW)</td>
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<tr>
<td>MATH.1310</td>
<td>Calculus I (MATH)</td>
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<td>COMP.1010</td>
<td>Computing I</td>
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Spring Semester

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<tbody>
<tr>
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<td>COMP.1020</td>
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Sophomore Year

Fall Semester

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<th>Course Name</th>
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<tbody>
<tr>
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<td>Calculus III</td>
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<td>Linear Algebra I</td>
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<td>Computing III</td>
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### Spring Semester

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<tr>
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<th>Course Name</th>
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<tbody>
<tr>
<td>MATH.2220</td>
<td>Linear Algebra II</td>
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<tr>
<td>MATH.2xxx</td>
<td>Differential Equations (CTPS), (QL)</td>
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</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Free Elective</td>
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<tr>
<td>xxxx.xxxx</td>
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<tr>
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### Senior Year

#### Fall Semester

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<th>Course#</th>
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<tbody>
<tr>
<td>MATH.4750</td>
<td>Senior Seminar II (AIL), (IL), (WOC)</td>
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<td>Analysis I</td>
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<tr>
<td>xxxx.xxxx</td>
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#### Spring Semester

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<tr>
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<tbody>
<tr>
<td>MATH.3210</td>
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<td>MATH.xxxx</td>
<td>Prob/Statistics</td>
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<td>xxxx.xxxx</td>
<td>Science Elective (STEM)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)1</td>
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### Junior Year

#### Fall Semester

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<tbody>
<tr>
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<td>Discrete Structures I</td>
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</tr>
<tr>
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<td>Prob/Statistics</td>
<td>3</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Science Elective (STEM)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)1</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)1</td>
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### Spring Semester

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<tr>
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<th>Cr.</th>
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<tbody>
<tr>
<td>MATH.3220</td>
<td>Discrete Structures II</td>
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<tr>
<td>MATH.3620</td>
<td>Numerical Analysis</td>
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<tr>
<td>MATH.3750</td>
<td>Senior Seminar I</td>
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---

**Total Minimum Credits = 120**

1. Mathematics students meet the Core Curriculum Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) Essential Learning Outcomes outside the major. Please see the DCA course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) and the SRE course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill these requirements.

Differential Equations.

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Last Updated: 5/11/2018

Suggested Degree Pathway for Mathematics - Business Applications Option

For students who entered fall 2015 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
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<tbody>
<tr>
<td>ENGL.1010 (<a href="https://www.uml.edu/catalog/courses/ENGL/1010">https://www.uml.edu/catalog/courses/ENGL/1010</a>)</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
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<tr>
<td>xxxx.xxxx</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Science (SCL)</td>
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Spring Semester

<table>
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<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>MATH.1310 (<a href="https://www.uml.edu/catalog/courses/MATH/1310">https://www.uml.edu/catalog/courses/MATH/1310</a>)</td>
<td>Calculus II</td>
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<tr>
<td>xxxx.xxxx</td>
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Sophomore Year

Fall Semester

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<tbody>
<tr>
<td>MATH.2310 (<a href="https://www.uml.edu/catalog/courses/MATH/2310">https://www.uml.edu/catalog/courses/MATH/2310</a>)</td>
<td>Calculus III</td>
<td>4</td>
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<tr>
<td>MATH.2210 (<a href="https://www.uml.edu/catalog/courses/MATH/2210">https://www.uml.edu/catalog/courses/MATH/2210</a>)</td>
<td>Linear Algebra I</td>
<td>3</td>
</tr>
<tr>
<td>xxxx.xxxx</td>
<td>Science (STEM)</td>
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<tr>
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<td>Science Lab</td>
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Spring Semester

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<th>Course Name</th>
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<tbody>
<tr>
<td>MATH.2220 (<a href="https://www.uml.edu/catalog/courses/MATH/2220">https://www.uml.edu/catalog/courses/MATH/2220</a>)</td>
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</tr>
<tr>
<td>MATH.2xxx (<a href="https://www.uml.edu/catalog/courses/MATH">https://www.uml.edu/catalog/courses/MATH</a>)</td>
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<td>xxxx.xxxx</td>
<td>Science Lab</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
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Junior Year

Fall Semester

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<td>Course#</td>
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<tr>
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<tr>
<td>ECON.2010</td>
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<td>MATH.xxx</td>
<td>Prob/Statistics</td>
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<tr>
<td>xxxx.xxx</td>
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**Spring Semester**

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<th>Course Name</th>
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<td>MATH.3750</td>
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<td>MATH.xxx</td>
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2. Satisfied by MATH.2340 (Differential Equations, MATH.2360 (Engineering Differential Equations, or MATH.2440 (Honors Differential Equations).

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Suggested Degree Pathway for Mathematics - Bioinformatics Option

For students who entered fall 2015 and beyond.

**Freshman Year**

**Fall Semester**

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<tr>
<td>COMP.1010</td>
<td>Computing I</td>
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<td>CHEM.1210</td>
<td>Chemistry I</td>
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<td>CHEM.1230L</td>
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<tr>
<td>ENGL.1010</td>
<td>College Writing I</td>
<td>3</td>
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<td>FYSH (CW)</td>
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**Spring Semester**

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**Sophomore Year**

**Fall Semester**

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<td>BIOL.1110</td>
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**Spring Semester**

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<td>MATH.2220</td>
<td>Linear Algebra II</td>
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<tr>
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<td>Differential Equations (CTPS), (QL)</td>
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<td>Arts and Hum. Persp. (AH)</td>
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**Junior Year**

**Fall Semester**

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<th>Course Name</th>
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<tbody>
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<td>Discrete Structures I</td>
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</tr>
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<td>MATH.xxxx</td>
<td>Prob / Statistics</td>
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### Spring Semester

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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
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<tr>
<td>MATH.3220</td>
<td>Discrete Structures II</td>
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<tr>
<td>MATH.3620</td>
<td>Numerical Analysis I</td>
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<td>MATH.3750</td>
<td>Senior Seminar I</td>
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<td>xxxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
<td>3</td>
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<td>Arts and Hum. Persp. (AH)</td>
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### Senior Year

#### Fall Semester

<table>
<thead>
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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>MATH.4750</td>
<td>Senior Seminar II (AIL, IL, WOC)</td>
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<td>MATH.xxxx</td>
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<td>Math Elective</td>
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<tr>
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<td>Bio / Chem Elective</td>
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#### Spring Semester

<table>
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<tbody>
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<td>xxxxx.xxxx</td>
<td>Bio / Chem Elective</td>
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<td>xxxxx.xxxx</td>
<td>Free Elective</td>
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</table>

**Total Minimum Credits = 120, Credits Science = 74; GPA Math = 2.0, Overall = 2.0.**

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### Last Updated: 5/11/2018
Suggested Degree Pathway for Mathematics - Teaching Option

For students who entered fall 2015 and beyond.

Freshman Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
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<tbody>
<tr>
<td><strong>Course#</strong></td>
</tr>
<tr>
<td>ENGL.1010 (<a href="https://www.uml.edu/catalog/courses/ENGL/1010">https://www.uml.edu/catalog/courses/ENGL/1010</a>)</td>
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<th>Spring Semester</th>
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Sophomore Year

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Junior Year

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<td>MATH.xxxx (<a href="https://www.uml.edu/catalog/courses/MATH">https://www.uml.edu/catalog/courses/MATH</a>)</td>
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<tr>
<td>MATH.xxxx (<a href="https://www.uml.edu/catalog/courses/MATH">https://www.uml.edu/catalog/courses/MATH</a>)</td>
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### Spring Semester

<table>
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<tr>
<td>MATH.3750 (<a href="https://www.uml.edu/catalog/courses/MATH/3750">https://www.uml.edu/catalog/courses/MATH/3750</a>)</td>
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<tr>
<td>MATH.xxxx (<a href="https://www.uml.edu/catalog/courses/MATH">https://www.uml.edu/catalog/courses/MATH</a>)</td>
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<tr>
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</table>

### Total Minimum Credits = 120

1. Mathematics students meet the Core Curriculum Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) Essential Learning Outcomes outside the major. Please see the DCA course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) and the SRE course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill these requirements.


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Current UMass Lowell students should use their Advisement Report in SIS (http://www.uml.edu/Enrollment/SiS/default.aspx). If you need assistance, please contact your advisor.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

_Last Updated: 5/11/2018_

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### Senior Year

#### Fall Semester

<table>
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<th>Course Name</th>
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<tbody>
<tr>
<td>MATH.4200 (<a href="https://www.uml.edu/catalog/courses/MA">https://www.uml.edu/catalog/courses/MA</a> TH/4200)</td>
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<td>MATH.4750 (<a href="https://www.uml.edu/catalog/courses/MA">https://www.uml.edu/catalog/courses/MA</a> TH/4750)</td>
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### Spring Semester

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<th>Course Name</th>
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Suggested Degree Pathway for the Bachelor of Arts in Mathematics
For students who entered fall 2015 and beyond.

**Freshman Year**

**Fall Semester**

<table>
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<th>Course Name</th>
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<tr>
<td>MATH.1310</td>
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<tr>
<td>ENGL.1010</td>
<td>College Writing I (CW) / FYSH (CW)</td>
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<tr>
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<td>Social Sciences Persp. (SS)1</td>
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**Spring Semester**

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<td>MATH.1320</td>
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<tr>
<td>MATH.3210</td>
<td>Discrete Structures I</td>
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<tr>
<td>ENGL.1020</td>
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**Sophomore Year**

**Fall Semester**

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<td>MATH.2210</td>
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**Spring Semester**

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<td>MATH.xxxx</td>
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**Junior Year**

**Fall Semester**

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<td>MATH.xxxx</td>
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**Spring Semester**

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<tbody>
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<td>MATH.xxxx</td>
<td>Analysis II</td>
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MATH.xxxx  
Math Elective 3

xxxx.xxxx  
Concentration Elective 3

xxxx.xxxx  
STEM Persp. (STEM) 3

xxxx.xxxx  
Arts and Hum. Persp. (AH) 3

Total 16

Senior Year

Fall Semester

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<th>Course #</th>
<th>Course Name</th>
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<tr>
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| xxxx.xxxx    | Concentration Elective                      | 3    |
| xxxx.xxxx    | Concentration Elective                      | 3    |
| xxxx.xxxx    | Free Elective                               | 3    |

Total 15

Spring Semester

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<th>Course #</th>
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| xxxx.xxxx    | Concentration Elective                    | 3    |
| xxxx.xxxx    | Concentration Elective                    | 3    |
| xxxx.xxxx    | Free Elective                             | 3    |

Total 15

Total Minimum Credits = 120

Mathematics students meet the Core Curriculum Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) Essential Learning Outcomes outside the major. Please see the DCA course listing and the SRE course listing for a full list of classes that fulfill these requirements.

2Satisfied by MATH.2340  
Differential Equations, MATH.2360  
Engineering Differential Equations, or MATH.2440  
Honors Differential Equations.

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Current UMass Lowell students should use their Advisement Report in SIS. If you need assistance, please contact your advisor.

Restriction on off-campus study:

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Last Updated: 5/11/2018
MATH.1020 Freshman Seminar in Mathematics
(Formerly 92.102) - Credits: 1
This course is designed to orient undergraduate math majors to the university and to their chosen field. Students will learn about the mathematics program, the mathematics faculty and their research interests, careers in math-related areas, internship opportunities, and university resources.

MATH.1070 Elementary Math for Teaching: Numbers and Operations (Formerly 92.107) - Credits: 3
The Number and Operations course for elementary and middle school teachers examines the three main categories in the Number and Operations strand of Principles and Standards of School Mathematics (NCTM) -- Understanding numbers, representations, relationships, and number systems; the meanings of operations and relationships among those operations; and reasonable estimation and fluent computation. No credit in Science or Engineering.

MATH.1080 Elementary Math for Teaching: Algebra and Data Analysis - Credits: 3
This course seeks to support students in furthering their understanding of elementary mathematics concepts. The goal is for students to not only pass the MTEL for elementary mathematics, but to lay the groundwork for graduate work in elementary mathematics education. Specifically, we use an integrated approach to algebra that draws on real-world data to the extent possible. To this end, learners will gain experience in selecting and developing a number of data representations, organizing data, looking for patterns in the data and, finally, using words, symbolic notation, graphs and tables to generalize those patterns. No credit in Science or Engineering.

MATH.1110 Quantitative Reasoning (Formerly 92.111) - Credits: 3
An introduction to the mathematics concepts and skills important in modern society, even for non-technical pursuits. The course will emphasize conceptual understanding as well as a facility in performing elementary computations. Topics to be examined will include types of reasoning, problem-solving methods, techniques of estimation, algebraic essentials, and the nature of probability and statistics. No credit in Science or Engineering.

MATH.1110SI SI for Quantitative Reasoning & Introduction to Statistics (Formerly 92.111SI/92.2830SI) - Credits: 2
This course provides supplemental instruction in mathematics to students whose Elementary Algebra Accuplacer exam scores indicate the need for such instruction. The credits in this course can not be used to satisfy the credits required for graduation, but may be used to satisfy the credits required for full time student status.

MATH.1115 Fundamentals of Algebra (Formerly 90.111) - Credits: 3
Intended for students with little or no background in basic algebra or whose background is not current. Topics covered include: the real number system, factoring fractions, linear equations, functions, graphs, systems of equations, and the quadratic equation. Students will not receive credit for this course toward any degree program at the University of Massachusetts Lowell.

MATH.1210 Management Precalculus (Formerly 92.121) - Credits: 3
Review of algebra. The Real Numbers, inequalities and intervals on the number line, factoring, radical notation, properties of exponents, scientific notation, and operations on rational expressions. Function definition and graph of linear/nonlinear functions such as quadratic, cubic, absolute value, piecewise-defined, rational, and power function. Additional topics with functions included such as transformations of graphs and symmetry, composite functions, one-to-one and inverse functions. Solving linear and quadratic equations algebraically and graphically. Solving systems of equations in two variables algebraically and graphically. Modeling systems of equations in three variables and solving them analytically and with matrices using TI-84 implementation. Modeling with linear as well as quadratic and power functions with the aid of a graphing calculator and Excel spread sheets. Business applications are included.

MATH.1210SI Management Pre-Calculus Supplemental Instruction (Formerly 92.121SI) - Credits: 1
Taken simultaneously with MATH.1210, this 1-credit course offers students taking MATH.1210 supplemental instructions to foster a greater opportunity for successful completion of Management Precalculus. The course credit cannot be used to satisfy the credits required for graduation, but may be used to satisfy credits required for full time student status.

MATH.1212 Management Calculus (Formerly 92.122) - Credits: 3
Review of difference quotient, least squares modeling, limit of difference quotient, differential calculus: derivatives, differentials, higher-order derivatives, implicit differentiation,
relative and absolute maxima and minima of functions, and applications of derivatives to business and economics. Integrals and applications to business. No credit in Science or Engineering.

MATH.1220SI Management Calculus Supplemental Instruction (Formerly 92.122SI) - Credits: 1

Taken simultaneously with MATH.1220, this 1-credit course offers students taking MATH.1220 supplemental instructions to foster a greater opportunity for successful completion of Management Calculus. The course credit cannot be used to satisfy the credits required for graduation, but may be used to satisfy credits required for full time student status.

MATH.1230 Precalculus Mathematics II (Formerly 92.123) - Credits: 3

A continuation of Math 1200. Covers exponential and logarithmic functions, trigonometric and inverse trigonometric functions, and trigonometric identities.

MATH.1270 Preparation for Calculus (Formerly 92.127) - Credits: 4

A review of precalculus (algebra and trigonometry) together with development of problem solving skills. No credit in Science or Engineering.

MATH.1280 Calculus IA (Formerly 92.128) - Credits: 4

Provides a review of pre-calculus algebra and trigonometry integrated with the first half of Calculus I: limits, continuity, derivatives, basic derivative formulas, chain rule, implicit differentiation. Students are expected to have taken pre-calculus and trigonometry in order to be successful in this course.

MATH.1280SI Calculus IA Supplemental Instruction (Formerly 92.128SI) - Credits: 1

Taken simultaneously with MATH.1280, this 1-credit course offers students retaking MATH.1280 supplemental instructions to foster a greater opportunity for successful completion of Calculus IA. The course credit cannot be used to satisfy the credits required for graduation, but may be used to satisfy credits required for full time student status.

MATH.1290 Calculus IB (Formerly 92.129) - Credits: 4

Provides a review of pre-calculus, algebra and trigonometry integrated with the second half of Calculus I. Inverse trig functions and their derivative, logarithmic functions and their derivative, related rates, L’Hospital’s Rule, optimization problems, curve sketching, linearization, Newton’s Method, hyperbolic functions and their derivative, antiderivatives. Completion of this course is equivalent to MATH.131 0 Calculus I.

MATH.1290SI Calculus IB Supplemental Instruction (Formerly 92.129SI) - Credits: 1

Taken simultaneously with MATH.1290, this 1-credit course offers students retaking MATH.1290 supplemental instructions to foster a greater opportunity for successful completion of Calculus IA. The course credit cannot be used to satisfy the credits required for graduation, but may be used to satisfy credits required for full time student status.

MATH.1310 Calculus I (Formerly 92.131) - Credits: 4

Serves as a first course in calculus. Functions, limits, continuity, derivatives, rules for differentiation of algebraic and transcendental function; chain rule, implicit differentiation, related rate problems, linearization, applied optimization, and curve sketching. Introduction to area and integration. Students are expected to have taken pre-calculus and trigonometry in order to be successful in this course.

MATH.1320 Calculus II (Formerly 92.132) - Credits: 4

Serves as a continuation of Calculus I. Integration and techniques of integration including the substitution method, integration by parts, trigonometric integrals, trigonometric substitution, integration of rational functions by partial fractions, numerical integration, and improper integrals. Volumes using cross-sections, the disk method, the washer method and the shell method. Arc length and surface area. Infinite series, power series, Maclaurin and Taylor series. Polar coordinates and areas and lengths in polar coordinates.

MATH.1380 Calculus for the Life Sciences I (Formerly 92.138) - Credits: 4

This is a single variable calculus course with applications to the life sciences. Review of basic algebra, trigonometry, functions and graphs. Limits and derivatives, including differentiation rules, curve sketching and optimization problems. Implicit differentiation. Study of exponential and logarithmic functions motivated by growth, decay and logistic modes. Introduction to integration, techniques, applications and the fundamental theorem.

MATH.1390 Calculus for the Life Sciences II (Formerly 92.139) - Credits: 4

MATH.1410 Honors Calculus I (Formerly 92.141) - Credits: 4
This course covers the same topics as MATH.1310 Calculus I, but in an enriched environment.

MATH.1420 Honors Calculus II (Formerly 92.142) - Credits: 4
This course covers the same topics as MATH.1320 Calculus II, but in an enriched environment.

MATH.1510 Explorations in Mathematics (Formerly 92.151) - Credits: 3
This course is not so much about the mathematics of formulas, equations, rules and errors, as about mathematics that can be experienced: counted, drawn, seen, created; quite simply: played with. Officially, we will encounter concepts of combinatorics, geometry, number theory and Boolean logic. Unofficially, we will experiment with puzzles and patterns and develop as much mathematics from them as we can. Prerequisites: high school mathematics and willingness to explore. No credit in science or engineering. This course satisfies the Quantitative Reasoning requirement.

MATH.2100 Functions and Modeling (Formerly 92.210) - Credits: 3
Engage in lab-based activities designed to strengthen their problem-solving skills and expand knowledge of the topics in secondary mathematics, focusing especially on topics from precalculus and the transition to calculus. Explore a variety of contexts that can be modeled using families of functions. Topics include conic sections, parametric equations and polar equations. Multiple representations, transformations, data analysis techniques and interconnections among geometry, probability and algebra. Quantitative approaches and building relationships between discrete and continuous reasoning will be recurrent themes.

MATH.2190 Discrete Structures I (Formerly 92.321)
and MATH.3210) - Credits: 3
Presents propositional logic, combinatorics, methods of proof, mathematical systems, algebra of sets, matrix algebra, relations and functions, recursion and generating functions, applications to computer science, and graph theory.

MATH.2210 Linear Algebra I (Formerly 92.221) - Credits: 3
Elementary set theory and solution sets of systems of linear equations. An introduction to proofs and the axiomatic methods through a study of the vector space axioms. Linear analytic geometry. Linear dependence and independence, subspaces, basis. Inner products. Matrix algebra. Applications of the above will also be discussed.

MATH.2220 Linear Algebra II (Formerly 92.222) - Credits: 3
Linear transformations. Linear operators, change of basis, inner product and the diagonalization problem. Quadratic forms. Convex sets and geometric programming, input/output models for an economy, Markov chains, other applications of linear algebra.

MATH.2270 Elementary Math for Teaching: Geometry and Measurement (Formerly 92.227) - Credits: 3
This is a mathematics content course which covers the geometry/measurement strands of the Massachusetts Curriculum Frameworks in Mathematics at a collegiate level. The goal is not only to prepare students for the elementary mathematics MTEL, but to lay the groundwork for graduate work in elementary mathematics education. The course centers around "Big Ideas" such as Equivalence, Proportionality, Transformations; and Shapes &Solids. No credit in Science or Engineering.

MATH.2310 Calculus III (Formerly 92.231) - Credits: 4
Extends the concepts of Calculus I and II that deal with functions of a single variable to multi-variable functions, vector-valued functions and vector fields. Vectors and vector-valued functions, the dot and cross products, curves in space and the calculus of vector-valued functions. Multi-variable functions, limits, continuity, and differentiation. Partial derivatives, directional derivatives, the gradient, Lagrange multipliers and optimization. Double and triple integrals in Cartesian, polar and spherical coordinates. Vector fields and the fundamental theorems of vector calculus developed, line and surface integrals, Green’s theorem, Stokes’s theorem, and...
the divergence theorem.

MATH.2320L Math Lab I (Formerly 92.232) - Credits: 1

An introduction to mathematics related software. Topics from Calculus & Differential Equations will be explored using a symbolic package like Maple. The course will also introduce LaTeX, the standard for typesetting mathematics.

MATH.2340 Differential Equations (Formerly 92.234) - Credits: 3


MATH.2360 Engineering Differential Equations (Formerly 92.236) - Credits: 3

Introduction to differential equations with an emphasis on engineering applications. Topics include first-order equations, higher-order linear equations with constant coefficients, and systems of first-order equations. Applications of each topic are introduced and qualitative, analytical, and numerical solution techniques are studied. Laplace transform methods are discussed. The software package MATLAB is used throughout the course for both analytical and numerical calculations.

MATH.2410 Honors Calculus III (Formerly 92.241) - Credits: 4

Covers the same topics as MATH.2310 Calculus II, but in an enriched environment.

MATH.2440 Honors Differential Equations (Formerly 92.244) - Credits: 3

Introduction to differential equations. Topics include first-order equations, second-order and higher-order linear equations, systems of first-order linear equations with constant coefficients, and Laplace transforms.

MATH.2720 Introduction to Programming with MATLAB (Formerly 92.272) - Credits: 3

This course will introduce basic programming concepts using MATLAB as the programming environment. Topics include an introduction to MATLAB, array manipulation, graphics, script files, data input and output, relational and logical operators, conditional statements, loops, and iterative procedures. Additional topics will be discussed as time permits. Additional topics will be chosen from the following: finding roots of nonlinear equations, random number generation, Markov processes, simple statistics, interpolation, and the basics of Fourier analysis.

MATH.2830 Introduction to Statistics (Formerly 92.283) - Credits: 3

An introduction to descriptive statistics, graphing and data analysis, probability laws, discrete and continuous probability distributions, correlation and regression, inferential statistics. No credit in Sciences (except Biology and EEAS) or Engineering. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

MATH.2830SI SI for Quantitative Reasoning & Introduction to Statistics (Formerly 92.111SI/92.2830SI) - Credits: 2

This course provides supplemental instruction in mathematics to students whose Elementary Algebra Accuplacer exam scores indicate the need for such instruction. The credits in this course can not be used to satisfy the credits required for graduation, but may be used to satisfy the credits required for full time student status.

MATH.3010 Introduction to Applied Mathematics I (Formerly 92.301) - Credits: 3

Discusses vector analysis, Green's Theorem, Divergence Theorem, Stokes' Theorem, Fourier series, integrals, and partial differential equations of physics and engineering.

MATH.3020 Introduction to Applied Mathematics II (Formerly 92.302) - Credits: 3


MATH.3220 Discrete Structures II (Formerly 92.322) - Credits: 3

Examines graph theory, trees, algebraic systems, Boolean algebra, groups, monoids, automata, machines, rings and fields, applications to coding theory, logic design, and sorting.

MATH.3230 Introduction to Proofs - Credits: 3
This course will focus on reading and writing mathematics. Students will learn how to analyze and interpret mathematical statements and understand the reasoning behind these statements. They will also learn how to convey mathematical ideas and write proofs using precise language, correct logic, and other important elements.

MATH.3300 Symbolic Logic (Formerly 92.330) - Credits: 3
An introduction to symbolic logic. Symbolic logic provides a framework of formal reasoning with applications in mathematics, cognitive science, computer science and philosophy. Topics include propositional logic, boolean algebras and rings, first-order logic and systems of deduction. Time permitting, we will touch on Tarski's notion of model, and the completeness and incompleteness theorems of Godel.

MATH.3600 Mathematic Structure for Computer Engineers (Formerly 92.360) - Credits: 3

MATH.3620 Numerical Analysis I (Formerly 92.362) - Credits: 3
Focuses on the theory and application of numerical techniques including error analysis. Also discusses solution of linear, nonlinear and differential equations, interpolation, numerical integration, and curve fitting. Computer solutions are emphasized.

MATH.3630 Intro to Data Analysis (Formerly 92.363) - Credits: 3
Computer analysis of data derived from research conducted in physical, social, and life sciences. Data preparation. Data modification, file manipulation, and descriptive statistics using SPSS. Programming ability is not required. No credit in Science or Engineering.

MATH.3750 Senior Seminar I (Formerly 92.375) - Credits: 1
Student works with an advisor to develop a proposal for a senior project that will be carried out as part of MATH.4750 Senior Seminar II. Generally taken during the spring of the junior year. Prerequisite: Permission of instructor.

MATH.3810 Mathematical Physics (Formerly 92.381) - Credits: 3
Intended for students having completed 2 full years of physics and math, this course is designed to develop competency in the applied mathematical skills required of junior and senior level physics majors. Covering topics involving infinite series, power series, complex numbers, and linear algebra along with vector and Fourier analysis, students will be trained with the rigor required to solve a wide range of applications in the physical sciences. Physics majors only.

MATH.3850 Applied Statistics (Formerly 92.385) - Credits: 3
Introduction to experimental design, data analysis and formal statistical procedures from an applied point of view.

MATH.3860 Probability and Statistics I (Formerly 92.386) - Credits: 3
Provides a one-semester course in probability and statistics with applications in the engineering sciences. Probability of events, discrete and continuous random variables cumulative distribution, moment generatory functions, chi-square distribution, density functions, distributions. Introduction to estimation, hypothesis testing, regression and correlation. No credit for both MATH.3860 and MATH.4070, Math majors should take MATH.4070.

MATH.4030 Mathematical Analysis (Formerly 92.403) - Credits: 3
The real numbers, completeness, sequences of real numbers, functions, continuity, uniform continuity, differentiability, the Riemann integral, series or real numbers, sequences and series of functions, uniform convergence, power series.

MATH.4070 Probability and Mathematical Statistics I (Formerly 92.407) - Credits: 3
Addresses the topics of probability, random variables, discrete and continuous densities, expectation and variance, special distributions (binomial, Poisson, normal, etc.), moment generating functions, joint and conditional distributions, transformations of variables, sampling, and the central limit theorem.

MATH.4100 Computers and Calculators in the Classroom (Formerly 92.410) - Credits: 3
This course explores the roles of mainframes, PC’s and hand calculators in instruction, examine some of the available
software and consider their use in a variety of areas of secondary mathematics, such as algebra, geometry (Euclidean and analytic), probability and statistics and introductory calculus. No credit in Science or Engineering.

MATH.4110 Complex Variables I (Formerly 92.411/511) - Credits: 3

A first course in theory of analytic functions of one complex variable: complex differentiability and the Cauchy-Riemann equations, Cauchy Integral Theorem and Cauchy Integral Formula, Taylor and Laurent series, zeroes of analytic functions and uniqueness, the maximum modulus principle, isolated singularities and residues. Applications.

MATH.4130 Number Theory (Formerly 92.413) - Credits: 3

Studies congruencies and the Chinese Remainder Theorem, Primitive roots, quadratic reciprocity, approximation properties of continued fractions, Pell’s equation. Recent application of number theory such as primality testing, cryptography, and random number generation will also be covered.

MATH.4190 Mathematica - Credits: 3

A project-based course starting with an introduction to the basic features of Mathematica. A project that allows the student to focus on certain features in more detail is required and occupies the second half of the course.

MATH.4200 Mathematical Problem Solving (Formerly 92.420/520) - Credits: 3

Focuses on: mathematical resources, ability to use heuristics, the student’s beliefs about the use of mathematics to solve problems, and the student’s self-confidence as a problem solver. Effective strategies for incorporating problem solving in the curriculum will also be discussed.

MATH.4210 Abstract Algebra I (Formerly 92.421/521) - Credits: 3

Elementary group theory, groups, cosets, normal subgroups, quotient groups, isomorphisms, homomorphisms, applications.

MATH.4270 Geometry (Formerly 92.427/527) - Credits: 3

This course is designed for current and prospective geometry teachers. In addition to the development of Euclidean geometry, students will become familiar with geometry applications in Geometer’s Sketchpad software, and to a lesser degree with other geometry software applications including Geogebra, and Cabri. There will be an introduction to spherical and hyperbolic geometry and triangle measurements will be computed for each. Calculus based derivations of area and volume for surfaces and solids will be generated and related to Euclidean geometry topics.

MATH.4350 History of Mathematics (Formerly 92.435/535) - Credits: 3

Examines ancient numeral systems, Babylonian and Egyptian mathematics, Pythagorean mathematics, duplication, trisection, and quadrature, Euclid’s elements and Greek mathematics after Euclid, Hindu and Arabian mathematics, European mathematics from 500 to 1600, origins of modern mathematics, analytic geometry, the history of calculus. Also covers the transition to the twentieth century and contemporary perspectives.

MATH.4450 Partial Differential Equations (Formerly 92.445) - Credits: 3


MATH.4480 Mathematics of Signal Processing (Formerly 92.448) - Credits: 3


MATH.4500 Mathematical Modeling (Formerly 92.450) - Credits: 3

Applications of mathematics to real life problems. Topics include dimensional analysis, population dynamics wave and heat propagation, traffic flow.

MATH.4540 Computational Mathematics (Last Term 2009 Spring)(Formerly 92.454) - Credits: 3

This course serves as an introduction to the theory and applications of numerical techniques. The course emphasizes an understanding of why numerical methods work and their limitations. Topics include Taylor series, interpolation, curve
fitting, numerical differentiation and integration, numerical solution of systems of equations, and numerical solution of boundary value problems. Scientific programming languages are used to illustrate numerical computations.

MATH.4660 Stat Program Using SAS (Formerly 92.466) - Credits: 3

An introduction to creation and manipulation of databases and statistical analysis using SAS software. SAS is widely used in the pharmaceutical industry, medical research and other areas. Cannot be used as a Math Elective.

MATH.4750 Senior Seminar II (Formerly 92.475) - Credits: 3

Undergraduate seminar on advanced mathematical topics. Students are required to develop an understanding of an advanced subject beyond the scope of an existing course or synthesize two or more different areas form their curriculum. Students are required to participate in the seminar, present their results to the Department and write a substantial thesis in their topic area. Essential course elements include library research, original research, and both verbal and written exposition. The first semester is a graduation requirement for majors in mathematics.

MATH.4760 Senior Seminar III (Formerly 92.476) - Credits: 3

An optional second semester seminar to allow for continuation of study initiated in Senior Seminar I.

MATH.4860 Probability and Math Statistics II (Formerly 92.486) - Credits: 3


MATH.4900 Selected Topics (Formerly 92.490) - Credits: 1-3

Individual study for the student desiring more advanced or more specialized work in algebra. May be repeated for a total of six semester credits. Course may not be substituted for scheduled offerings.

MATH.4940 Directed Study in Statistics (Formerly 92.494) - Credits: 3

Individual study for the student desiring more advanced or more specialized work in Statistics. May be repeated for a total of six semester credits. Course may not be substituted for scheduled offerings. Prerequisite: Permission of Department Chair.

MATH.4960 Mathematics Practicum (Formerly 92.496) - Credits: 1-3

Unpaid internship in the Department of Mathematical Sciences. This allows students to receive up to 3 (free elective) credits while working on an approved project. Students who have a position and who wish to take advantage of this Practicum should see the department Internship Coordinator.
Physics & Applied Physics Department

Mission Statement

Establishing the foundation of physical insight for emerging technologies in every student, the Department of Physics engages bachelor’s, masters and doctoral level students in state-of-the-art research and academic curriculum in preparation for professional careers in science.

Overview/Description

The University of Massachusetts Lowell physics program is designed to introduce the student to both fundamental and applied aspects of physics leading to a wide range of career options after graduation. Some of our graduates seek employment after receiving the Baccalaureate degree, while others continue on to graduate study aiming for a research career. The employer for a present-day physics graduate may be an educational institution, a small business, an industrial firm, a government laboratory or a non-profit research center.

Physics majors at the University of Massachusetts Lowell have the opportunity to become involved and discover first-hand what scientific research is all about. Research projects can be undertaken both during the regular academic year, as well as during the summer months and other semester breaks. In most cases, the student earns a stipend during the process, and benefit from working with physics faculty who are regularly engaged in a variety of research programs in subatomic physics, astrophysics, nanoscience, photonics, terahertz technology, radiological and medical physics.

Upon entering the program, incoming students are assigned a faculty advisor, who guides the student throughout his or her undergraduate career at the University. The advisor is available at any time to discuss the academic concerns of the student, and helps the student plan a program of study. Available programs of study include the Standard program and Radiological Health Physics option, as well as programs meant to prepare the student for graduate studies or a teaching career.

For additional information, visit the Department of Physics & Applied Physics website.

Majors

The Department of Physics & Applied Physics offers a Bachelor of Science degree with a major in Physics and a Bachelor of Science degree with a major in Engineering Physics.

The major has three options:

- General Option
- Astronomy and Astrophysics Option
- Radiological Health Physics Option

General Option

The General option provides students with a launching pad for a wide range of career choices, from academic appointments in universities to technical positions in industry, from research in national laboratories to science policy in government. It superimposes technical elective courses chosen by the student and his/her academic advisor on a general physics foundation of the kernel courses. The special non-physics electives may be in any of the engineering fields, computer science, mathematics, biology or chemistry. Students pursuing this course of study develop a broad and solid grounding in physics (with 60 credits of physics coursework required for graduation), and concurrently acquire a background in related scientific disciplines. Research opportunities in many subfields of physics provide students with the necessary training to either pursue graduate studies to explore deeper into the world of physics or branch out into interdisciplinary fields as their passion leads them.

Astronomy and Astrophysics Option

Astronomy and Astrophysics focuses on studies of celestial objects and phenomena beyond our planet earth, using techniques of observational astronomy, computational modeling, rocket-launched instruments and satellite observations. This option will prepare students specifically interested in pursuing careers in this field. Specialty courses include optical system design, scientific computing, computerized data-acquisition, image processing and statistical data analysis. Currently, there are 8 courses relevant to the Astronomy and Astrophysics option. Students interested in this option will take 4 of those courses as physics electives as part of the Physics degree requirements, and be able to take cross-disciplinary special electives in earth and atmospheric sciences, computer science, math, chemistry and engineering.

Radiological Health Physics Option

Radiological Health Physics involves the study of the effects of radiation and radioactivity on life processes. It also can be called radiation protection science and is particularly involved with the effects of radiation on the human body and the control of such radiation. A graduate of this curriculum would enter the profession of health physics, which is devoted to the protection of man and the environment from the harmful effects of radiation, while at the same time making it possible for our advancing civilization to enjoy all of the benefits resulting from uses of radiation.

View all the complete Degree Pathways
ENGINEERING PHYSICS MAJOR

The Engineering Physics degree is designed for students whose interests and career objectives span both physics and engineering. It is aimed at filling an increasing need of a nimble workforce trained for success in the technological world of today, where the traditional disciplinary lines between science and engineering are being continually blurred. It prepares students for professional careers where advanced rigorous math skills, experience in computer modeling, a high level of critical and independent thinking and familiarity with engineering principles are required, including the research and development in emerging technologies.

The major has two options:

- Mechanical Engineering Option
- Electrical and Computer Engineering Option

Mechanical Engineering Option

The Mechanical Engineering option includes about a quarter of the required courses and two-thirds of the elective courses to be from Mechanical Engineering, in addition to core, math and chemistry courses common to both Physics and Engineering Physics degree pathways. These include Statics, Strength of Materials, Materials Science for Engineers, Fluid Mechanics and Heat Transfer. The option provides the flexibility to continue on to graduate degrees in either Mechanical Engineering or Physics.

Electrical and Computer Engineering Option

The Electrical and Computer Engineering option includes about a quarter of the required courses and two-thirds of the elective courses to be from Electrical and Computer Engineering, in addition to core, math and chemistry courses common to both Physics and Engineering Physics degree pathways. These include Application Programming, two semesters of Circuit Theory and basic Circuits Labs, and Logic Design. The option provides the flexibility to continue on to graduate degrees in either Electrical and Computer Engineering or Physics.

View all the complete Degree Pathways.

Minor

The Department of Physics & Applied Physics offers a minor in Physics.

A student who has a basic background in physics and mathematics may be able to take more advanced physics courses. The goal of the Physics minor program is to provide recognition for students in other majors who wish to enhance their understanding and mastery of a broader range of subjects than is provided in their major field alone.

The Physics minor will establish the physics background needed to enter interdisciplinary fields such as biophysics, medical physics, or material science. In addition, Physics minor would be especially useful for students majoring in Biology, Chemistry, Mathematics, Earth Sciences, Engineering or Computer Science.

A minor in Physics consists of 21 credits. All course prerequisites and co-requisites must be satisfied.

Required Courses

- PHYS.1410
- PHYS.1610
- PHYS.1410L
- PHYS.1610L
Suggested Degree Pathway for Physics - General Option

For students who entered fall 2013 to spring 2015.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
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<tbody>
<tr>
<td>PHYS.1610</td>
<td>Physics I (H)</td>
<td>4</td>
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<tr>
<td>PHYS.1610L</td>
<td>Physics I Lab (H)</td>
<td>2</td>
</tr>
<tr>
<td>ENGL.1010</td>
<td>(Gen. Ed.) College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>MATH.1310</td>
<td>Calculus I</td>
<td>4</td>
</tr>
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<td>xxxx.xxxx</td>
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Spring Semester

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<tbody>
<tr>
<td>PHYS.1120</td>
<td>Freshman Physics Seminar</td>
<td>1</td>
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<tr>
<td>PHYS.1640</td>
<td>Physics II (H)</td>
<td>4</td>
</tr>
<tr>
<td>PHYS.1640L</td>
<td>Physics II Lab (H)</td>
<td>2</td>
</tr>
<tr>
<td>ENGL.1020</td>
<td>(Gen. Ed.) College Writing II</td>
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<td>MATH.1320</td>
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Sophomore Year

Fall Semester

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<tbody>
<tr>
<td>PHYS.2690</td>
<td>Physics III (H)</td>
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<tr>
<td>PHYS.2690L</td>
<td>Physics of Material &amp; Devices</td>
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<tr>
<td>CHEM.1210</td>
<td>Chemistry I</td>
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<td>CHEM.1230L</td>
<td>Chemistry I Lab</td>
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### Spring Semester

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<tr>
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<th>Course Name</th>
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<tbody>
<tr>
<td>PHYS.2100</td>
<td>Intro. Modern Physics</td>
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<tr>
<td>PHYS.2620L</td>
<td>Prin. Lab Automation</td>
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</tr>
<tr>
<td>CHEM.1220</td>
<td>Chemistry II</td>
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<td>CHEM.1240L</td>
<td>Chemistry II Lab</td>
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<td>MATH.2340</td>
<td>Differential Equations</td>
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### Senior Year

#### Fall Semester

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<tr>
<td>PHYS.4130</td>
<td>Mechanics</td>
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<tr>
<td>PHYS.4210</td>
<td>Statistical Thermodynamics</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Physics special elective</td>
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<td>xxxx.xxxx</td>
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#### Spring Semester

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<tr>
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<td>Special Elective2</td>
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### Junior Year

#### Fall Semester

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<tbody>
<tr>
<td>PHYS.3530</td>
<td>Electromagnetism I</td>
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</tr>
<tr>
<td>PHYS.3930L</td>
<td>Adv. Exper. Physics I</td>
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<tr>
<td>PHYS.3810</td>
<td>Math Physics I</td>
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<td>xxxx.xxxx</td>
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#### Spring Semester

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<th>Course Name</th>
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<tbody>
<tr>
<td>PHYS.4350</td>
<td>Intro. to Quantum Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS.3380</td>
<td>Physical Optics and Waves</td>
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**Total Minimum Credits = 120**

Consult the General Education [website](https://www.uml.edu/Academics/undergraduate-programs/core-curriculum/Gened/default.aspx) for General Education requirements. See your Faculty Advisor to determine which courses you should take to fulfill the Gen. Ed. Diversity (D) and Ethics (E) categories. These courses may be taken in any sequence.

1. number of specified physics credits
2. must be an elective from outside the Physics Dept.
Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last Updated: 10/17/2017

Suggested Degree Pathway for Physics - Radiological Health Option

For students who entered fall 2013 to spring 2015.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tr>
<td>PHYS.1610 (<a href="https://www.uml.edu/catalog/courses/PHYS/1610">https://www.uml.edu/catalog/courses/PHYS/1610</a>)</td>
<td>Physics I (H)</td>
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<td>PHYS.1610L (<a href="https://www.uml.edu/catalog/courses/PHYS/1610L">https://www.uml.edu/catalog/courses/PHYS/1610L</a>)</td>
<td>Physics I Lab (H)</td>
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<tr>
<td>ENGL.1010 (<a href="https://www.uml.edu/catalog/courses/ENGL/1010">https://www.uml.edu/catalog/courses/ENGL/1010</a>)</td>
<td>(Gen. Ed.) College Writing I</td>
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<tr>
<td>MATH.1310 (<a href="https://www.uml.edu/catalog/courses/MATH/H/1310">https://www.uml.edu/catalog/courses/MATH/H/1310</a>)</td>
<td>Calculus I</td>
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<td><strong>Total</strong></td>
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Spring Semester

<table>
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<tr>
<th>Course#</th>
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<th>Cr.</th>
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<tbody>
<tr>
<td>PHYS.1120 (<a href="https://www.uml.edu/catalog/courses/PHYS/1120">https://www.uml.edu/catalog/courses/PHYS/1120</a>)</td>
<td>Freshman Physics Seminar</td>
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<tr>
<td>PHYS.1640 (<a href="https://www.uml.edu/catalog/courses/PHYS/1640">https://www.uml.edu/catalog/courses/PHYS/1640</a>)</td>
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Sophomore Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS.2690 (<a href="https://www.uml.edu/catalog/courses/PHYS/2690">https://www.uml.edu/catalog/courses/PHYS/2690</a>)</td>
<td>Physics III (H)</td>
<td>4</td>
</tr>
<tr>
<td>CHEM.1210 (<a href="https://www.uml.edu/catalog/courses/CHEM/1210">https://www.uml.edu/catalog/courses/CHEM/1210</a>)</td>
<td>Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM.1230L (<a href="https://www.uml.edu/catalog/courses/CHEM/1230L">https://www.uml.edu/catalog/courses/CHEM/1230L</a>)</td>
<td>Chemistry I Lab</td>
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<td>MATH.2310 (<a href="https://www.uml.edu/catalog/courses/MATH/H/2310">https://www.uml.edu/catalog/courses/MATH/H/2310</a>)</td>
<td>Calculus III</td>
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Spring Semester

<table>
<thead>
<tr>
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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>PHYS.2100 (<a href="https://www.uml.edu/catalog/courses/PHYS/2100">https://www.uml.edu/catalog/courses/PHYS/2100</a>)</td>
<td>Intro. Modern Physics</td>
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<td>Differential Equations</td>
<td>3</td>
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<td>CHEM.1220 (<a href="https://www.uml.edu/catalog/courses/CHEM/1220">https://www.uml.edu/catalog/courses/CHEM/1220</a>)</td>
<td>Chemistry II</td>
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<td>Chemistry II Lab</td>
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<tr>
<td>PHYS.2620L (<a href="https://www.uml.edu/catalog/courses/PHYS/2620L">https://www.uml.edu/catalog/courses/PHYS/2620L</a>)</td>
<td>Princ. Lab Automation</td>
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<tr>
<td>PHYS.2040 (<a href="https://www.uml.edu/catalog/courses/PHYS/2040">https://www.uml.edu/catalog/courses/PHYS/2040</a>)</td>
<td>Intro to Radiological Science</td>
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### Junior Year

#### Fall Semester

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<tr>
<td>PHYS.4810</td>
<td>Math Methods of Rad. Sci.</td>
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<td>MATH.3860</td>
<td>Probability and Statistics</td>
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<tr>
<td>BIOL.1110</td>
<td>Principles of Biology I</td>
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<tr>
<td>PHYS.4060</td>
<td>Nuclear Instrumentation</td>
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<td>BIOL.1170L</td>
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#### Spring Semester

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<tr>
<td>BIOL.1120</td>
<td>Principles of Biology II</td>
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<tr>
<td>BIOL.2520</td>
<td>Physiology</td>
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<td>Physiology Lab</td>
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### Senior Year

#### Fall Semester

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<tr>
<td>PHYS.2010L</td>
<td>Health Physics Internship I</td>
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</table>

### Total Minimum Credits = 120

Consult the General Education website for General Education requirements. See your Faculty Advisor to determine which courses you should take to fulfill the Gen. Ed. Diversity (D) and Ethics (E) requirements.

1Number of specified physics credits.
2May substitute HSCI.1010 & HSCI.1040 Human Anatomy & Physiology I &II (8 credits for 5).

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy.
Suggested Degree Pathway for Physics - Photonics Option

For students who entered Fall 2013 to Spring 2015.

Note: no more students are being accepted into this option as of fall 2016.

### Freshman Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>PHYS.1610</td>
<td>Physics I (H)</td>
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<td>Physics I Lab (H)</td>
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<td>ENGL.1010</td>
<td>(Gen. Ed.) College Writing I</td>
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<td>MATH.1310</td>
<td>Calculus I</td>
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<td>xxxx.xxxx</td>
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<tbody>
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<td>Physics II (H)</td>
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<td>Physics II Lab (H)</td>
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<tr>
<td>ENGL.1020</td>
<td>(Gen. Ed.) College Writing II</td>
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### Sophomore Year

#### Fall Semester

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<th>Course Name</th>
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<td>Physics of Material &amp; Devices</td>
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<td>CHEM.1210</td>
<td>Chemistry I</td>
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</tr>
<tr>
<td>CHEM.1230L</td>
<td>Chemistry I Lab</td>
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<tr>
<td>MATH.2310</td>
<td>Calculus III</td>
<td>4</td>
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<td>15(71)</td>
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#### Spring Semester

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<thead>
<tr>
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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
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<td>3</td>
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<td>Prin. Lab Automation</td>
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<td>CHEM.1220</td>
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<td>CHEM.1240L</td>
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<td>MATH.2340</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
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<td>xxxx.xxxx</td>
<td>(Gen. Ed.) SS</td>
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### Junior Year

#### Fall Semester

<table>
<thead>
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<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>PHYS.3530</td>
<td>Electromagnetism I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS.3810</td>
<td>Math Physics I</td>
<td>3</td>
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<tr>
<td>Total</td>
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<td>17(71)</td>
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</table>
## Suggested Degree Pathway for Physics - General Option

**For students who entered fall 2015 and beyond.**

### Freshman Year

**Fall Semester**

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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</thead>
<tbody>
<tr>
<td>PHYS.4400</td>
<td>Image Processing w/Lab</td>
<td>4</td>
</tr>
<tr>
<td>PHYS.4540</td>
<td>Physics Capstone</td>
<td>3</td>
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### Spring Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>xxxx.xxxx</td>
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</table>

### Total Credits: 15

### Senior Year

**Fall Semester**

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<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>PHYS.4130</td>
<td>Mechanics</td>
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</tr>
<tr>
<td>PHYS.4210</td>
<td>Statistical Thermodynamics</td>
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</tr>
<tr>
<td>PHYS.4390</td>
<td>Electro-Optics w/ Lab</td>
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</table>

| xxxx.xxxx        | (Gen. Ed.) AH               | 3   |

### Total Credits: 13

**Spring Semester**

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>PHYS.4540</td>
<td>Physics Capstone</td>
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<tr>
<td>xxxx.xxxx</td>
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<tr>
<td>xxxx.xxxx</td>
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</tbody>
</table>

### Total Credits: 15

### Total Minimum Credits = 120

Consult the [General Education](https://www.uml.edu/Academics/undergraduate-programs/core-curriculum/Gened/default.aspx) website for General Education requirements. See your Faculty Advisor to determine which courses you should take to fulfill the Gen. Ed. Diversity (D) and Ethics (E) categories. General Education courses may be taken in any sequence.

### Number of specified physics credits

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be [formally approved](https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the [catalog policy](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

*Last Updated: 10/17/2017*
### Sophomore Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>PHYS.2690</td>
<td>Honors Physics III</td>
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<tr>
<td>PHYS.2610L</td>
<td>Physics of Material &amp; Devices</td>
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<tr>
<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
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<tr>
<td>CHEM.1230L</td>
<td>Chemistry I Lab (SCL)</td>
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<td>MATH.2310</td>
<td>Calculus III</td>
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#### Spring Semester

<table>
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<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>PHYS.2100</td>
<td>Intro. Modern Physics</td>
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<td>PHYS.2620L</td>
<td>Principles of Lab Automation</td>
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<td>CHEM.1220</td>
<td>Chemistry II (SCL)</td>
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<tr>
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<td>Chemistry II Lab (SCL)</td>
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### Junior Year

#### Fall Semester

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<th>Cr.</th>
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<tbody>
<tr>
<td>PHYS.3530</td>
<td>Electromagnetism</td>
<td>3</td>
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<tr>
<td>PHYS.4130</td>
<td>Mechanics</td>
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#### Spring Semester

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<tbody>
<tr>
<td>PHYS.4350</td>
<td>Intro Quantum Mech. I</td>
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<td>PHYS.3380</td>
<td>Optics and Waves</td>
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<td>PHYS.3930L</td>
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Senior Year

Fall Semester

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<th>Cr.</th>
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<tbody>
<tr>
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<td>PHYS.xxxx</td>
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Spring Semester

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<tbody>
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</table>

Total Minimum Credits = 120

1Number of specified physics credits.

2Must be an elective from outside the Physics Dept.

3The Core Curriculum Essential Learning Outcomes for Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) are fulfilled outside this major. See the DCA course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) and the SRE course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill these requirements.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.


Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last Updated: 11/05/2021

Suggested Degree Pathway for Physics - Radiological Health Physics Option

For students who entered fall 2015 to spring 2018.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>PHYS.1610</td>
<td>Honors Physics I</td>
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<td>PHYS.1610L</td>
<td>Honors Physics I Lab</td>
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<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
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<tr>
<td>MATH.1310</td>
<td>Calculus I (MATH)</td>
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### Spring Semester

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### Sophomore Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>PHYS.2690</td>
<td>Honors Physics III</td>
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<td>CHEM.1210</td>
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<td><a href="https://www.uml.edu/catalog/courses/CHEM/1210">https://www.uml.edu/catalog/courses/CHEM/1210</a></td>
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#### Spring Semester

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### Junior Year

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<tr>
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<tr>
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#### Spring Semester

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### Senior Year

#### Fall Semester

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<td>PHYS.4530</td>
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#### Spring Semester

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<tbody>
<tr>
<td>PHYS.4020L</td>
<td>Radiation Safety &amp; Control II</td>
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<tr>
<td>PHYS.4620</td>
<td>Radiation Biology</td>
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<td>PHYS.4240</td>
<td>Environmental Health Physics</td>
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<td>13</td>
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</table>

**Total Minimum Credits = 124**

1. Number of specified physics credits.
2. The Core Curriculum Essential Learning Outcomes for Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) are fulfilled outside the Physics major. See the [DCA course listing](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) and the [SRE course listing](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill these requirements.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the [Core Curriculum](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SiS ([https://www.uml.edu/Enrollment/SiS/default.aspx](https://www.uml.edu/Enrollment/SiS/default.aspx)). If you need assistance, please contact your adviser.

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**Last Updated: 4/08/2019**

### Suggested Degree Pathway for Physics - Radiological Health Physics Option

**For students who entered fall 2018 and beyond.**

#### Freshman Year

**Fall Semester**

- [Course#](https://www.uml.edu/catalog/courses/PHYS/4010)
- [Course#](https://www.uml.edu/catalog/courses/PHYS/4530)
- [Course#](https://www.uml.edu/catalog/courses/PHYS/2010)

- [Course#](https://www.uml.edu/catalog/courses/PHYS/4020L)
- [Course#](https://www.uml.edu/catalog/courses/PHYS/4620)
- [Course#](https://www.uml.edu/catalog/courses/PHYS/4240)
### Spring Semester

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<td>PHYS.1120</td>
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<td>PHYS.1640</td>
<td>Honors Physics II</td>
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<tr>
<td>PHYS.1640L</td>
<td>Honors Physics II Lab</td>
<td>2</td>
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<tr>
<td>ENGL.1020</td>
<td>College Writing II / FYSH (CW)</td>
<td>3</td>
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<tr>
<td>MATH.1330</td>
<td>Calculus I (MATH)</td>
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### Sophomore Year

#### Fall Semester

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<tr>
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<td>Physics of Material &amp; Devices</td>
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### Junior Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>PHYS.4810</td>
<td>Math Methods of Rad. Science</td>
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<td>PHYS.4060</td>
<td>Nuclear Instrumentation (CTPS), (QL)</td>
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<td>BIOL.1110</td>
<td>Principles of Biology I</td>
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<td>BIOL.1170L</td>
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</table>
## Total Minimum Credits = 124

1. Number of specified physics credits.
2. The Core Curriculum Essential Learning Outcomes for Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) are fulfilled outside this major. See the DCA course listing and the SRE course listing for a full list of classes that fulfill these requirements.
3. Choose from the following:
   - PHYS.4240
     Environmental Health Physics
   - PHYS.4410
     Radiochemistry
   - RADI.5750
     Certification Preparation in Radiological Sciences

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

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Last Updated: 11/05/2021

Suggested Degree Pathway for Physics - Astronomy and Astrophysics Option

For students who entered fall 2021 and beyond.

### Freshman Year

#### Fall Semester

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<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>PHYS.1610</td>
<td>Honors Physics I</td>
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<tr>
<td>PHYS.1610L</td>
<td>Honors Physics I Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
<td>3</td>
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<tr>
<td>MATH.1310</td>
<td>Calculus I (MATH)</td>
<td>4</td>
</tr>
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<td>xxxxxxx</td>
<td>Social Sciences Persp. (SS)</td>
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<td><strong>Total</strong></td>
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#### Spring Semester

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<tr>
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<td>Honors Physics Lab II</td>
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<td>Calculus II (STEM)</td>
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### Sophomore Year

#### Fall Semester

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<td>PHYS.2610L</td>
<td>The Physics of Materials and Devices</td>
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<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
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<td>CHEM.1230L</td>
<td>Chemistry I Laboratory (SCL)</td>
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#### Spring Semester

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<td>Introductory Modern Physics</td>
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<td>PHYS.2620L</td>
<td>Principles in Laboratory Automation</td>
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<td>CHEM.1220</td>
<td>Chemistry II (SCL)</td>
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<td>CHEM.1240L</td>
<td>Chemistry II Laboratory (SCL)</td>
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<td>MATH.2340</td>
<td>Differential Equations / Engineering Differential Equations</td>
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<td>MATH.2360</td>
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### Junior Year

#### Fall Semester

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<td>PHYS.4130</td>
<td>Mechanics</td>
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<td>Mathematical Physics</td>
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#### Spring Semester

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<tr>
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<td>PHYS.3380</td>
<td>Optics and Waves</td>
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<td>Advanced Experimental Physics Laboratory I (CTPS), (QL)</td>
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<td>PHYS.3820</td>
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### Senior Year

#### Fall Semester

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<td>Astronomy Elective4</td>
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**Total Minimum Credits = 120**

1Number of specified physics credits.

2Special Electives:
- Special Electives must be courses from outside the Physics Department.
- Courses below the lowest-level required course in the Physics major cannot be used as Special Electives. For example, no MATH course below Calculus I is acceptable.
- Any combination of 10 credits that meets the above two conditions is acceptable.

3The Arts and Humanities (AH) and Social Sciences (SS) perspectives are subsets of the Breadth of Knowledge (BoK) requirements in the Core Curriculum. The Diversity and Cultural Awareness (DCA) and Social Responsibility and Ethics (SRE) are met outside this major. See the DCA course list.
archive/current/Undergraduate.pdf) and SRE course list (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a catalog of classes satisfying these requirements.

Please Note: Use the Class Search tool (https://www.uml.edu/student-dashboard/#class-search/filters) to identify AH and SS courses that simultaneously satisfy the DCA or SRE requirement.

Core Curriculum courses may be taken in any sequence.

Refer to the Core Curriculum policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for complete details. Please meet with your college-based professional advisor and/or faculty advisor to determine how best to satisfy the Core Curriculum requirements.

4 Astronomy Electives:

Twelve (12) credits of upper-level physics electives must be completed from the following list of approved Astronomy courses.

- PHYS.3050 (https://www.uml.edu/catalog/courses/PHYS/3050) Exoplanets
- PHYS.3370 (https://www.uml.edu/catalog/courses/PHYS/3370) Geometric Optics
- PHYS.3830 (https://www.uml.edu/catalog/courses/PHYS/3830) Astronomy & Astrophysics
- PHYS.3840 (https://www.uml.edu/catalog/courses/PHYS/3840) Observational Astronomy
- PHYS.4170 (https://www.uml.edu/catalog/courses/PHYS/4170) Space Science Mission Design
- PHYS.4560 (https://www.uml.edu/catalog/courses/PHYS/4560) Radiative Processes in Astrophysics
- PHYS.4640 (https://www.uml.edu/catalog/courses/PHYS/4640) Particle Astrophysics
- PHYS.4690 (https://www.uml.edu/catalog/courses/PHYS/4690) Plasma Physics


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Last Updated: 4/22/2021

Suggested Degree Pathway for Engineering Physics - Mechanical Engineering Option

For students who entered fall 2022 and beyond.

Freshman Year

Fall Semester

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<tbody>
<tr>
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<tr>
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<td>Honors Physics I</td>
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<td>PHYS.1610L</td>
<td>Honors Physics I Laboratory</td>
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<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
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<tr>
<td>MATH.1310</td>
<td>Calculus I (MATH)</td>
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<td>xxxx.xxxx</td>
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Spring Semester

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### Sophomore Year

#### Fall Semester

<table>
<thead>
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<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>PHYS.2690</td>
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<tr>
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<td>CHEM.1230L</td>
<td>Chemistry I Laboratory (SCL)</td>
<td>1</td>
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<tr>
<td>MATH.2310</td>
<td>Calculus III</td>
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<tr>
<td>ENGN.2060</td>
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#### Spring Semester

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<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>CHEM.1220</td>
<td>Chemistry II (SCL)</td>
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<tr>
<td>CHEM.1240L</td>
<td>Chemistry II Laboratory (SCL)</td>
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<tr>
<td>MATH.2340</td>
<td>Differential Equations</td>
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### Junior Year

#### Fall Semester

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<tr>
<th>Course#</th>
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<tbody>
<tr>
<td>PHYS.3530</td>
<td>Electromagnetism I / Engineering Electromagnetics I</td>
<td>3</td>
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<tr>
<td>PHYS.3810</td>
<td>Mathematical Physics I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS.4130</td>
<td>Mechanics</td>
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<tr>
<td>PHIL.3340</td>
<td>Engineering and Ethics (AH), (SRE)</td>
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<tr>
<td>MECH.xxxx</td>
<td>Mechanical Engineering Elective</td>
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#### Spring Semester

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<th>Course#</th>
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<tbody>
<tr>
<td>MECH.3810</td>
<td>Fluid Mechanics</td>
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<tr>
<td>PHYS.3820</td>
<td>Mathematical Physics II</td>
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<tr>
<td>PHYS.4350</td>
<td>Introductory Quantum Mechanics I</td>
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<td>PHYS.xxxx</td>
<td>Physics Elective</td>
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Senior Year

Fall Semester

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<th>Course#</th>
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<tbody>
<tr>
<td>MECH.3820</td>
<td>Heat Transfer</td>
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<td>MECH.xxxx</td>
<td>Mechanical Engineering Elective</td>
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<td>PHYS.xxxx</td>
<td>Physics Elective</td>
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<td>xxxx.xxxx</td>
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Spring Semester

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<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>PHYS.3930L</td>
<td>Advanced Experimental Physics Laboratory I (CTPS), (QL)</td>
<td>2</td>
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<tr>
<td>PHYS.4540</td>
<td>Physics Capstone (WOC), (AIL), (IL)</td>
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<td>PHYS.xxxx</td>
<td>Physics Elective</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Arts and Hum. Persp. (AH)</td>
<td>3</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences Persp. (SS)</td>
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Total Minimum Credits = 120

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SiS. If you need assistance, please contact your adviser.

Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved prior to enrollment. See the catalog policy for details.

Last Updated: 11/05/2021

Suggested Degree Pathway for Engineering Physics - Electrical & Computer Engineering Option

For students who entered fall 2022 and beyond.

Freshman Year

Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>PHYS.1120</td>
<td>Freshman Physics Seminar</td>
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<tr>
<td>PHYS.1610</td>
<td>Honors Physics I</td>
<td>4</td>
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<tr>
<td>PHYS.1610L</td>
<td>Honors Physics I Laboratory</td>
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<tr>
<td>ENGL.1010</td>
<td>College Writing I / FYSH (CW)</td>
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<tr>
<td>MATH.1310</td>
<td>Calculus I (MATH)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Social Sciences</td>
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The Core Curriculum Essential Learning outcome for Diversity and Cultural Awareness is met outside this major. See the DCA course list for a catalog of classes satisfying this requirement.
<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
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<tr>
<td>PHYS.1120</td>
<td>Freshman Physics Seminar</td>
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<tr>
<td>PHYS.1640</td>
<td>Honors Physics II</td>
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<tr>
<td>PHYS.1640L</td>
<td>Honors Physics II Lab</td>
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<td>ENGL.1020</td>
<td>College Writing II (CW)</td>
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<td>MATH.1320</td>
<td>Calculus II (STEM)</td>
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**Spring Semester**

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<tr>
<td>PHYS.1640L</td>
<td>Honors Physics II Lab</td>
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<td>ENGL.1020</td>
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<td>MATH.1320</td>
<td>Calculus II (STEM)</td>
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<tr>
<td>Physics</td>
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**Sophomore Year**

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<tr>
<td>PHYS.2690</td>
<td>Honors Physics III</td>
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<tr>
<td>CHEM.1210</td>
<td>Chemistry I (SCL)</td>
<td>3</td>
</tr>
<tr>
<td>CHEM.1230L</td>
<td>Chemistry I Laboratory (SCL)</td>
<td>1</td>
</tr>
<tr>
<td>MATH.2310</td>
<td>Calculus III</td>
<td>4</td>
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<tr>
<td>PHYS.2610L</td>
<td>The Physics of Materials and Devices</td>
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**Fall Semester**

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<tr>
<th>Course#</th>
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<tbody>
<tr>
<td>EECE.2010</td>
<td>Circuit Theory I</td>
<td>3</td>
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<tr>
<td>EECE.2070</td>
<td>Basic Electrical Engineering Laboratory I</td>
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<tr>
<td>EECE.2650</td>
<td>Logic Design</td>
<td>3</td>
</tr>
<tr>
<td>PHYS.3530</td>
<td>Electromagnetism I</td>
<td>3</td>
</tr>
<tr>
<td>EECE.3600</td>
<td>Engineering Electromagnetics I</td>
<td>3</td>
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<tr>
<td>PHYS.3810</td>
<td>Mathematical Physics I</td>
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**Spring Semester**

<table>
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<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>EECE.2020</td>
<td>Circuit Theory II</td>
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</table>
Total Minimum Credits = 121

The Core Curriculum Essential Learning outcome for Diversity and Cultural Awareness (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) (DCA) is met outside this major. See the DCA course list (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a catalog of classes satisfying this requirement.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.


Restriction on off-campus study:

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last Updated: 11/8/2021
PHYS.1010 Introductory Physics (Formerly 95.101) - Credits: 3

A survey course for students majoring in sound recording technology. Topics covered include: one and two dimensional motion, Newton’s Laws of dynamics, statics, circular motion, work and energy, linear and angular momentum, electrostatics, electric and potential fields, magnetic fields, vibrations, waves, sound, Faraday’s Law and AC circuits.

PHYS.1010L Introductory Experimental Physics (Formerly 96.101) - Credits: 1

Experimental physics with topics correlated with the corequisite lecture course.

PHYS.1030 General Physics I (Formerly 95.103) - Credits: 3

Serves as the first semester of a one-year course which surveys the field of physics at a non-calculus level. Topics include force and motion, vectors, gravity, energy and momentum, heat and thermodynamics, and oscillations, waves and sound. Although the course emphasizes conceptual understanding, a functional knowledge of algebra and geometry is essential.

PHYS.1030L General Physics I Lab (Formerly 96.103) - Credits: 1

Presents the first semester of a one-year course which surveys the field of experimental physics with topics correlated to the corequisite lecture course.

PHYS.1040 General Physics II (Formerly 95.104) - Credits: 3

Provides a continuation of PHYS.1030 Topics include electricity and magnetism, geometrical and physical optics, atoms, and nuclei.

PHYS.1040L General Physics II Lab (Formerly 96.104) - Credits: 1

Serves as a continuation of 96.103 with topics correlated with the corequisite lecture course.

PHYS.1050L Sounds of Music (Formerly 96.105) - Credits: 3

Examines the physical process that makes musical sounds from acoustic instruments. Hands-on laboratory experiences explore how the vibrations of strings, air columns, membranes, plate and bars are transformed into musical sounds, how these propagate and are transformed by the listening space, and how these are received by ears and perceived by the brain. In addition harmonic series, the mean-tempered scale, the use of decibels, sonic interference and diffraction are explained.

PHYS.1120 Freshman Physics Seminar (Formerly 95.112) - Credits: 0-1

An introduction to the scientific methods of physics and the exploration of research opportunities for undergraduates.

PHYS.1210 Exploring the Universe (Formerly 95.121) - Credits: 3

Addresses topics that include: Planet Earth, its structure, plate tectonics, greenhouse effect, ozone layer, craters and dinosaurs; our satellite Moon; other planets; our star Sun and its energy source; other stars, the HR diagram and stellar evolution, white dwarfs, neutron stars, supernovae, black holes; our galaxy, the Milky Way, its structure; other galaxies; the universe, its structures and expansion; evolution of galaxies, quasars, cosmology, the Big Bang and Unification of the forces of nature. Satisfies Gen Ed science requirements for non-science majors. Does not satisfy science requirements for Science majors but may be used as a free elective by Science majors.

PHYS.1210L Exploring the Universe Laboratory (Formerly 96.121) - Credits: 1

Provides laboratory exercises to illustrate the basic principles and measurement techniques of astronomy. Quantitative techniques, properties of angles, modeling the earth-sun system, comparative planetology, the constellations, the inverse square law, blackbody radiation and spectra, the Hertzsprung-Russell diagram, distances to the stars, the Andromeda galaxy, cosmology. Satisfies Gen Ed science requirements for non-science majors. Does not satisfy science requirements for Science majors but may be used as a free elective by Science majors.

PHYS.1310 Technical Physics I (Formerly 99.131) - Credits: 3

Presents material in both the class and laboratory format. Topics include: vectors; one- and two- dimensional motion; Newton's laws of motion; translational and rotational equilibrium; work and energy; linear momentum; and circular motion and gravitation. Two additional Friday night classes are required.

PHYS.1320 Technical Physics II (Formerly 99.132) - Credits: 3
Covers material in both the class and laboratory format. Rotational dynamics; mechanical vibrations and waves; sound; solids and fluids; thermal physics; heat and law of thermodynamics will be discussed. One session per week. Two additional Friday night classes are required.

PHYS.1410 Physics I (Formerly 95.141) - Credits: 3
First semester of a two-semester sequence for science and engineering majors. Mechanics including vectors, kinematics in one and two dimensions, Newton’s laws of dynamics, work and energy, energy conservation, linear momentum conservation, rotational kinematics and dynamics, Newton’s Universal Law of Gravitation, oscillatory motion and mechanical waves.

PHYS.1410L Physics I Lab (Formerly 96.141) - Credits: 1
Serves as an introductory course on methods and techniques of experimentation in physics with experiments in mechanics selected to support the concepts of the corequisite lecture course.

PHYS.1410SI Supplemental Instruction for Physics I - Navitas Only (Formerly 95.141SI) - Credits: 1
Supplemental Instruction for Physics I - Navitas Students Only. Credits do not count toward degree requirements.

PHYS.1440 Physics II (Formerly 95.144) - Credits: 3
Continuation of 95.141, Physics I. Electricity and magnetism including Coulomb’s Law, electric field, Gauss’ Law, electric potential, Ohm’s law, DC circuits with resistors, magnetic field, Ampere’s Law, Faraday’s Law, inductance, Maxwell’s equations, and electromagnetic waves. Optics including Wave Optics (interference, diffraction) and Ray Optics (reflection, refraction, dispersion, ray tracing).

PHYS.1440L Physics II Lab (Formerly 96.144) - Credits: 1
Serves as a continuation of 96.141 with experiments in optics, electricity and magnetism, and modern physics to support the concepts of the corequisite lecture course.

PHYS.1610 Honors Physics I (Formerly 95.161) - Credits: 4
Introductory mechanics at a more challenging level and the first semester of a sequence for physics majors. Mechanics of particles in one dimension, kinematics, forces, dynamics; particles in two and three dimensions, vectors, curvilinear and oscillatory motion; conservation principles, work, energy, linear momentum, collisions; rotational mechanics, angular momentum, torque and static equilibrium; gravitation and planetary orbits; wave motion, transverse and longitudinal, standing waves.

PHYS.1610L Honors Physics I Laboratory (Formerly 96.161) - Credits: 2
An introductory laboratory course at the honors level on the methods and techniques of experimental physics. Lectures on measurement uncertainties and error analysis are included and experiments are selected principally in mechanics.

PHYS.1640 Honors Physics II (Formerly 95.164) - Credits: 4
Geometrical optics, reflection, refraction, flat and curved mirrors, thin lenses; physical optics, interference and diffraction; electrostatics, charge, electric forces, fields and flux, electric potential, capacitance and field energy; electric charge in motion, currents, DC and RC circuits; magnetic fields, forces on moving charges, magnetic field of an electric current, electromagnetic induction, inductance, changing currents, AC circuits; electromagnetic radiation; the limits of classical electromagnetic theory.

PHYS.1640L Honors Physics Lab II (Formerly 96.164) - Credits: 2
A continuation of 96.161 with experiments selected principally in optics, electricity and magnetism.

PHYS.2040 Introduction to Radiological Sciences (Formerly 95.204) - Credits: 3
This course is designed to introduce students to the working practices encountered in health physics. This is accomplished through field trips to local facilities that use radioactive materials, laboratory exercises, and class discussions. This class exposes the student to basic health physics procedures, vocabulary, and equipment.

PHYS.2100 Introductory Modern Physics (Formerly 95.210) - Credits: 3

PHYS.2010L Health Physics Internship I (Formerly 96.201) - Credits: 3
Applied work experience as a health physics technician at a government laboratory or a radiation facility of some industry, hospital, or education and research institution.
Special theory of relativity, experimental basis of quantum theory, structure of the atom, wave properties of matter, quantum theory, hydrogen atom, atomic nucleus, nuclear interactions and applications, and semiconductors.

**PHYS.2450 Physical Properties of Matter (Formerly 95.245) - Credits: 3**

Fluid statics, dynamics of fluids, properties of solids, advanced topics in waves and vibrations, temperature and heat flow, kinetic theory of gases, thermodynamics, and the limits of classical physics.

**PHYS.2450L Physics III Lab (Formerly 96.245) - Credits: 1**

Experiments are selected principally in properties of solids, vibrations, waves, heat, and thermodynamics.

**PHYS.2610L The Physics of Materials and Devices (Formerly 96.261) - Credits: 3**

Investigating the phenomenology of materials involve sensing devices in which electrical signals must be evaluated. Observing physical phenomena with an electrical sensing device enables one to calibrate the dynamics of the electrical signal associated with the changes in the physical phenomenology observed with that device. Applications in these laboratory-based measurement techniques include the Wheatstone bridge, current/voltage device characterization, the operational amplifier as an active filter, stress &strain, Newton's law of cooling, Stefan/Boltzman's law and the ideal gas law.

**PHYS.2620L Principles in Laboratory Automation (Formerly 96.262) - Credits: 3**

This is an introduction to the principles of automating today’s research laboratory. A foundation of the Labview-based software and hardware tools required to conduct computer-controlled experiments will be presented, demonstrated and then used to acquire, display and analyze data on some typical physical phenomena. Students will be fully involved in designing the control and acquisition software as well as setting up the experimental hardware. Applications of the automated acquisition environment include AC characterization of RC and LRC circuits, the use of thermistors and thermocouples along with acquiring the temperature dependent resistivity of high Tc super conductors.

**PHYS.2690 Honors Physics III (Formerly 95.269) - Credits: 4**

Statics and dynamics of fluids, pressure, viscosity, Archimedes and Bernoulli principles, mechanical properties of solids, stress and strain, shear, electric and magnetic properties of materials, para- dia- and ferromagnetism, electro-mechanical and magneto-mechanical effects, hysteresis, advanced topics in waves and vibrations, damping, resonance in mechanical and AC oscillators, thermodynamics, Maxwell’s velocity distribution, blackbody radiation, and the limits of classical physics, introduction to special relativity.

**PHYS.2800 Introduction to Space Weather - Credits: 3**

"Space weather" is a multi-disciplinary field of science studying the conditions on the Sun and in the solar wind, magnetosphere, ionosphere, and thermosphere that can influence the performance and reliability of space-born and ground-based technological systems and can endanger human life or health. Space weather depends on the behavior of the Sun, the nature of Earth’s magnetic field and atmosphere, and our location in the Solar system. In this course for science and engineering students, the phenomenology of the solar-terrestrial relationship is introduced and basic physics describing this interaction is explored.

**PHYS.3010L Health Physics Internship II (Formerly 96.301) - Credits: 1-3**

**PHYS.3020L Health Physics Internship II (Formerly 96.302) - Credits: 3**

**PHYS.3040 Vibration and Sound (Formerly 95.304) - Credits: 3**

The course serves to integrate the various sub-topics of physics that undergraduate majors have experienced by exploring the physical processes of vibrations of lumped and continuous electrical mechanical and acoustic systems: the damped harmonic oscillator in electrical and mechanical form, the flexible string in tension and the coaxial cable with differing end conditions, vibrations of bars, membranes and plates, plane waves of sound, standing waves, radiation and scattering. Throughout reference is made to analogous process in the quantum mechanical domain. Closely coordinated with the recitations is the co-requisite laboratory course, which provides concrete experience with the phenomena discussed in the recitations.

**PHYS.3040L Vibration and Sound Lab (Formerly 96.304) - Credits: 1**

A series of four directed four-hour experiments and one student directed experiment all of which are coordinated with Vibration and Sound 95.304. Emphasis is on non-intrusive measurement techniques; choosing, evaluating and applying appropriate transducers and structuring data processing and display in measurements of transfer functions. Impedances and
modal structures for the system studied analytically in the companion course.

**PHYS.3050 Exoplanets - Credits: 3**

Beginning with the history of exoplanet research, observational techniques (transits, radial velocity, microlensing, direct imaging), and observations of exoplanet atmospheres via transmission spectra, the course will survey this rapidly developing field and focus on its theoretical foundations, including planet formation and dynamics, planetary atmospheres, planet habitability and astrobiology, star-planet interaction, and space weather on exoplanets.

**PHYS.3080 Physics with Computers I (Formerly 95.308) - Credits: 3**

**PHYS.3160 Science and Technology in an Impoverished World (Formerly 95.316) - Credits: 3**

Intended for junior-level science and engineering majors, this is a one-semester 3-credit course focused on the impact of science and technology in poverty stricken regions of the world. Students will be challenged to consider the implementation of past and present technologies for solving resource shortages, evaluate and strengths and limitations of these solutions while developing alternatives to address future barriers to positive change. Encouraged to work toward these issues, students will:

1. Pursue and evaluate topics in science and technology through the skills of inquiry, research, critical thinking and problem solving.
2. Demonstrate the knowledge for quantitative and qualitative analysis of problems in science and technology.
3. Analyze and interpret issues in interdisciplinary areas of science and engineering developing a level of comfort with solving unfamiliar problems using acquired knowledge and skills.

**PHYS.3370 Geometrical Optics (Formerly 95.337) - Credits: 3**

Properties of light, plane surfaces and prisms, thin and thick lenses, mirrors and stops, matrix methods applied to Gaussian (paraxial) optics, Lagrange-Helmholtz invariant, primary and chromatic aberrations, ray tracing and Abbe's sine condition, basic optical instruments including cameras, telescopes, and microscopes.

**PHYS.3380 Optics and Waves (Formerly 95.338) - Credits: 3**

Wave nature of light, mathematics of wave motion, electromagnetic theory of light propagation, reflection and refraction, Fresnel coefficients, polarization, interference, Young's experiment, fringe visibility and coherence, various interferometers, Newton's ring and applications, Fraunhofer diffraction by single and multiple apertures and diffraction gratings.

**PHYS.3530 Electromagnetism I (Formerly 95.353/553) - Credits: 3**

The theory of electromagnetic fields using vector analysis: electrostatic fields and potentials in vacuum, conductors, and dielectric media, magnetic effects of steady currents in nonmagnetic media, magnetic induction and time varying currents and fields. (offered as 95.553 for graduate credit)

**PHYS.3540 Electromagnetism II (Formerly 95.354.554) - Credits: 3**

Magnetic materials, electric multipoles, solutions to Laplace's equation, boundary conditions, image charge problems, Maxwell's equations; propagation of electromagnetic waves in vacuum, conductors and dielectrics; reflection and refraction of electromagnetic waves; radiation from dipoles and antennas. (offered as 95.554 for graduate credit).

**PHYS.3810 Mathematical Physics I (Formerly 95.381) - Credits: 3**

Intended for students having completed 2 full years of physics and math, this course is designed to develop competency in the applied mathematical skills required of junior and senior level physics majors. Covering topics involving infinite series, power series, complex numbers, and linear algebra along with vector and Fourier analysis, students will be trained with the rigor required to solve a wide range of applications in the physical sciences.

**PHYS.3820 Mathematical Physics II (Formerly 95.382) - Credits: 3**

Expanding on the skills mastered in 95.381 Mathematical Physics I, this course is designed to continue developing competency in the applied mathematics required of junior and senior level physics majors. Intended for students having completed at least 2 years of physics and math, topics covered will involve ordinary, differential equations, calculus of variations, tensor analysis, special functions, series solutions of differential equations, partial differential equations, and complex variables as well as probability and statistics. Students will be trained with the rigor required to solve a wide range of applications in the physical sciences.

**PHYS.3830 Astronomy and Astrophysics I (Formerly 95.383) - Credits: 3**

This course is designed for an interdisciplinary general undergraduate (upperclassmen) audience. Fundamentals of
astronomy and astromechanics, introductory survey of astrophysics and the solar system (i.e. planetary astronomy).

PHYS.3840 Observational Astronomy - Credits: 3

The course provides project-based practical experience in observational astronomy. Guided by faculty, students will make their own astronomical investigations using telescopes, cameras, and spectrographs. Participants will become trained and certified to use the university observatory. Observations may include stars, planets, galaxies, the sun, and phenomena of tropical interest. Skills will be developed in image processing, data visualization, controlling telescopes/instruments, obtaining data remotely, and communication of results to peers.

PHYS.3930L Advanced Experimental Physics Laboratory I (Formerly 96.393) - Credits: 2

Some of the most significant experiments in the history of physics are revisited. Form measuring the universal gravity constant to observing the quantization of light and matter, this laboratory course challenges students' experimental skills and tests their understanding of fundamental concepts. Preparing high quality lab reports and presentations is emphasized.

PHYS.3940L Advanced Physics Lab II (Formerly 96.394) - Credits: 2

A continuation of 96.393 with experiments selected mainly from condensed matter and nuclear physics. Opportunities for independent work by permission of the instructor.

PHYS.4010 Radiation Safety and Control I (Formerly 95.401) - Credits: 4

Introduction to radiation protection, including radiation sources, radiation dose and dose measurement, radiation exposure, radiation protection techniques, monitoring methods and instruments, contamination control and waste storage, facility design, hazards analysis, and applied health physics techniques for the safe handling and control of radioactive material including laboratory. (offered as RADI.5010L for graduate credit)

PHYS.4020L Radiation Safety and Control II (Formerly 95.420/98.502) - Credits: 3-4

This course provides a continuation of the theoretical and practical aspects of radiation protection provided in Radiation Safety and Control I (98.501). Topics include the statistical analyses and data reduction techniques that are used to analyze radiation measurements pertaining to the field of radiation protection. Laboratory sessions on alpha and gamma radiation measurements and air sampling will reinforce class lectures. Students also will experience applied radiation protection and dose assessment through a contamination control exercise that involves the use of protective clothing and respiratory protection.

PHYS.4060 Nuclear Instrumentation (Formerly 96.406) - Credits: 3

This course provides the operating principles and applications of nuclear radiation detection systems, including detector theory, electronic signal processing, and measurement and data reduction techniques. The systems covered include gas-filled detectors (ion chambers, proportional counters, and Geiger-Mueller counters), inorganic and organic scintillators, and high-purity germanium detectors, for the detection of alpha, beta, gamma, and neutron radiation. This course also covers hypothesis testing, detection limits, and detector dead time (offered as 98.506 for graduate credit).

PHYS.4090 Nuclear Instrumentation (Formerly 96.409) - Credits: 3

This course provides the operating principles and applications of nuclear radiation detection systems, including detector theory, electronic signal processing, and measurement and data reduction techniques. The systems covered include gas-filled detectors (ion chambers, proportional counters, and Geiger_Mueller counters), inorganic and organic scintillators, and high-purity germanium detectors, for the detection of alpha, beta, gamma, and neutron radiation. This course also covers hypothesis testing, detection limits, and detector dead time. This course is adapted for Nuclear Engineering and Medical Physics majors. (offered as 98.509 for graduate credit).

PHYS.4110 Physics Perspectives (Formerly 95.411) - Credits: 1

Discussions on the role of the professional physicist in society.

PHYS.4110L Senior Research In Radiological Sciences (Formerly 96.411) - Credits: 3

A research problem related to the field of radiation protection is investigated by the student under the direction of faculty and staff of the Nuclear Center. The student will present a seminar on this research project. Areas of research may include radiation shielding, radiation detection and measurement, radiation survey and monitoring, radiation biology, radiation chemistry, radiobiology, radiochemistry, radiocology, natural radioactivity, fallout, analyses and measurement of radioactivity and radiation levels associated with the operation of reactors and accelerators, and radioactive aerosols.
PHYS.4130 Mechanics (Formerly 95.413/513) - Credits: 3

PHYS.4170 Space Science Mission Design (Formerly 95.417/517) - Credits: 3
This one-semester, 3-credit course intended for junior level science and engineering majors, is centered around the conceptual design of a spaceflight mission. In this project-based and team-based class, students will apply their science and technical knowledge to develop a spacecraft and mission concept tailored to answer a specific science question. Students will perform quantitative trade studies consistent with real-life constraints such as cost, schedule, manufacturability, team-expertise, operational environment, mission lifetime, etc. Students will 1) learn the fundamentals of key subsystems involved in a space flight mission and 2) apply their skills of inquiry, research, critical thinking to design a complete space science mission to solve a real-world problem while working within a multidisciplinary team.

PHYS.4210 Statistical Thermodynamics (Formerly 95.421/521) - Credits: 3
An integrated study of the thermodynamics and statistical mechanics, review of the experimental foundations and historical development of classical thermodynamics; probability and statistical methods of studying macroscopic systems; atomic basis of the laws of thermodynamics and microscopic definitions of thermodynamics quantities using the method of ensembles; entropy and related quantities; TdS equations, Maxwell relations, equation of state, and applications: canonical and grand canonical ensembles; phase transitions; quantum statistics; application to radiation, magnetism, specific heats. (offered as 95.521 for graduate credit)

PHYS.4240 Environmental Health Physics (Formerly 98.524 & 94.424) - Credits: 3
Natural and man-made sources of environmental radioactivity and radiation; environmental transport in air, water, and soil; exposure pathways; environmental standards and regulations; environmental monitoring and surveys (MARSSIM); contaminated site characterization, and site remediation; environmental radiological impact of industry, accidents, and natural and man-made disasters.

PHYS.4360 Introductory Quantum Mechanics II (Formerly 95.436) - Credits: 3
The three dimensional Schroedinger equation, the deuteron nucleus, angular momentum, spin, the hydrogen atom, spin-orbit interaction, Zeeman effect, Pauli exclusion principle, atomic structure, multi-electron atoms, the Fermi gas, X-rays. (offered as 95.536 for graduate credit)

PHYS.4390 Electro-Optics (Formerly 95.439/539) - Credits: 3
Optical properties of materials, including dispersion, absorption, reflection and refraction at the boundary of two media. Crystal optics and induced birefringence and optical activity. Polarization states and Jones matrices. Applications to electro-optic devices. Experiments and projects involving the study of optical sources and detectors, spectroscopy, polarization, birefringence, pockels' effect, optical fibers, and optical communication. (offered as 95.539 for graduate credit)

PHYS.4410 Radiochemistry (Formerly 95.441) - Credits: 3
This course stresses analytical techniques applicable to identification and quantification of radionuclides in various sample types. Considerable time will be spent on review of general chemistry and inorganic analytical chemistry. The theories and applications of various separation techniques including precipitation, solvent extraction, ion exchange chromatography, and electrodeposition will be discussed with emphasis on separation of radioactive species. Additional material to be covered includes instrumental techniques for analysis of radioactive species, radiotracer and isotope dilution techniques, neutron activation analysis, and sample preparation.

PHYS.4530L Health Physics Capstone (Formerly 95.453) - Credits: 3
This course will provide the B.S. candidate in Physics (Radiological Health Physics option) with an undergraduate capstone experience through basic independent research, including critical thinking, problem solving, report writing, and presentation skills.

PHYS.4531L Optics Project (Formerly 96.453) - Credits: 3

PHYS.4540 Physics Capstone (Formerly 95.454) - Credits: 3
This course will provide the graduating physics major with a capstone experience through an exposure to the rudiments of
independent research; incorporating critical thinking, problem-solving, report-writing, and presentation skills learnt in the course of the undergraduate curriculum. Prerequisite: Senior Status.

**PHYS.4560 Radiative Processes in Astrophysics** (Formerly 95.456/556) - Credits: 3

Our knowledge of the universe beyond the Solar System is derived almost entirely from our interpretation of the radiation we receive from the universe; Our knowledge of the Earth’s upper atmosphere and the atmospheres of other solar system objects is heavily dependent on observations of electromagnetic radiation. To understand the atmospheres of Earth and other planets, stars, galaxies and the universe, we need to understand the processes which produce electromagnetic radiation, and how radiation interacts with matter and propagates through space. This course describes the basic processes which create and alter such electromagnetic radiation before it’s detected here in the Solar System. The course will consist of a combination of lectures, problem sets and class discussion sessions. The lectures will be expanded from the material in the text and will include additional material on the astrophysical and planetary context of radiative processes, drawn primarily from the following list of references. The discussion sessions will often be based on recent problem sets - regular participation of students in class discussions is expected.

**PHYS.4610 Nuclear Physics I** (Formerly 95.461/561) - Credits: 3

Nuclear properties including size, mass, binding energy, electromagnetic moments, parity and statistics; nuclear shell model, collective structure, deformed shell model, radioactive decay law and the Bateman equations, radioactive dating, counting statistics, energy resolution, coincidence measurements and time resolution, lifetime measurements; nuclear barrier penetration; angular momentum, Coulomb barrier, alpha decay and systematics, fission. (offered as 95.561 for graduate credit).

**PHYS.4620 Radiation Biology** (Formerly 95.462) - Credits: 3

Effects of ionizing radiation on cellular, molecular and organ systems levels of biological organization; Study of x-rays, gamma rays, accelerator beams, and neutrons in interaction with living systems; Cohesive treatment of radiation biophysics with applications in health physics and radiation oncology. (offered as 98.562 for graduate credit)

**PHYS.4630 Computational Methods in Physics** - Credits: 3

A practical overview of advanced computational methods currently used in physics research using kinetic, fluid, and spectral approaches, as well as other practical applications that physics researchers may encounter, such as high-performance computing and grid construction. The course will focus on hands-on experience with coding the algorithms of finite differences, finite volume, finite elements, Monte Carlo, particle in cell, and spectral methods, and will provide the students with tools to develop and use scientific numerical models.

**PHYS.4640 Particle Astrophysics** (Formerly 95.464/564) - Credits: 3


**PHYS.4690 Plasma Physics** - Credits: 3

Introduction to plasma physics, focusing on the fundamental physics principles aimed at upper level undergraduate and graduate students in physics and engineering. Material covered in the course includes single particle motion in a magnetic field, particle drift, adiabatic invariants, kinetic theory moments, fluid approximation of plasma & magnetohydrodynamics, waves in plasma, shocks, resistivity, plasma instabilities, plasma kinetic theory, plasma applications, and computational plasma physics.

**PHYS.4720 Solid State Physics** (Formerly 95.472/572) - Credits: 3

Crystal structures, x-ray diffraction, crystal binding, lattice vibrations, free electron and band models of metals. (offered as
95.572 for graduate credit).

PHYS.4770 Solid State Electronic and Optoelectronic Devices (Formerly 95.477/577) - Credits: 3

This course is an introduction to solid state electronic and optoelectronic devices for undergraduate science students (i.e. biology, chemistry, mechanical engineering, electrical engineering, physics, etc.) graduate students just entering a scientific endeavor which utilizes solid state devices, and practical engineers and scientists whose understanding of modern electronics and optoelectronics needs updating. The course is organized to bring students with a background in sophomore physics to a level of understanding which will allow them to read much of the current literature on new devices and applications. The course will cover fundamental crystal properties, atoms and electrons, energy bands and charge carriers, excess carriers, junctions and p-n junction diodes (includes photodiodes and light-emitting diodes). Three or four practical demonstrations will also be performed with the analysis of the generated data assigned as homework. (offered as 95.577 for graduate credit)

PHYS.4810 Mathematical Methods of Radiological Sciences (Formerly 95.481) - Credits: 3

An applied course emphasizing the mathematical skills used in radiological sciences/health physics fields, including special techniques used in radiation physics, radiation dosimetry, and radiation shielding. Computer applications will be emphasized. (offered as 98.581 for graduate credit)

PHYS.4820 Numerical Methods of Radiological Sciences (Formerly 95.482) - Credits: 3

Advanced mathematical treatment of topics covered in 98.481 with extensive application of computer techniques to problem solutions applicable to Radiological Sciences and Protection. (offered as 98.582 for graduate credit)

PHYS.4950L Special Research Problems I (Formerly 96.495) - Credits: 3

Special problems in physics assigned to the individual student with emphasis on modern research methods and preparation of results for publication.

PHYS.4960L Special Research Problems II (Formerly 96.496) - Credits: 3

A continuation of 96.495 for a second semester.

PHYS.4970L Senior Thesis in Physics (Formerly
SCIE.1500 Exploring the Sciences - Credits: 1

The seminar is designed to help undeclared science students make an informed and sound decision regarding their choice of major. The course surveys the different disciplines and curriculum options within the College of Sciences as well as their associated career paths. Students will engage in personal assessments and develop career planning and decision-making skills to better guide their selection of a specific major. The course also provides an introduction to various academic success strategies and an overview of campus resources.

SCIE.1990L Intercollegiate Sciences Lab 1000 level elective. - Credits: 1

SCIE.2100 Professional Development Seminar (Formerly 82.210) - Credits: 1

The Professional Development Seminar is designed to provide students with the necessary structure, resources, and support to successfully secure and engage in their first cooperative education experience. Through a variety of teaching methodologies and assignments, students will prepare to engage in the job search process through resume writing, strategic interviewing, professional networking and through learning professional behavior and presentation skills. Course open to undergraduates who have previously applied and been accepted to participate in the Professional Co-op Program. Enrollment is by Instructor permission only. For more information on applying to the Professional Co-op Program, see https://www.uml.edu/student-services/Career-Services/Cooperative-Education/Forms-Handbooks.aspx. Pre-Req: Permission of Instructor.

SCIE.2200 Integrated Sciences: Biology, Ecology, and Earth - Credits: 3

SCIE.2200 is one of two required science courses for BA Ed Elementary Education majors. This course introduces future educators to the basic concepts and applications in Biology, Ecology, and Earth Sciences. Lectures, inquiry-based activities, and laboratory sessions are closely integrated. Students become skilled in scientific practices, including generating and testing hypotheses, and gathering and analyzing data.

SCIE.2400 Integrated Sciences: Astronomy, Physics, and Tech - Credits: 4

This is one of two required science course for BA Ed Elementary Education majors. This course introduces future educators to the basic concepts and applications of Physics, Chemistry, Astronomy, and Engineering Technology. Lectures, inquiry-based activities, and laboratory sessions are closely integrated. The course explicitly addresses laboratory skills, tools, and the use of technology in the application of content.

Students become skilled in scientific practices, including generating and testing hypotheses, and gathering and analyzing data.

SCIE.3100 Co-op Assessment 1 (Formerly 82.310) - Credits: 1

The primary goal of this seminar is to assist students in the overall assessment of their overall cooperative education experience. Through facilitated small group discussion, individual consultation and hands on practice, students will have an opportunity to identify and articulate their technical and professional skills, and explore how these skills and their co-op employment might be translated and leveraged into future work environments and their academic program at UML.

SCIE.3200 Co-op Assessment I (6 months) - Credits: 2

This seminar is designed to support and assist students in the assessment of their 6 month cooperative education experience. Students will reflect of their extended time in a work environment, the impact of their experience on their planning, and how organizational culture, personal interests and values can inform their subsequent decisions for career development. Through facilitated small group discussions, individual consultation and hands on practice, students will have the opportunity to identify and articulate their technical and professional skills.

SCIE.4100 Co-op Assessment 2 (Formerly 82.410) - Credits: 1

This seminar is designed to support and assist students in the continued assessment of their cooperative education experience. Through a deepening of their work in Co-op Assessment 1, students will review their overall performance in the cooperative education program, while continuing to demonstrate their technical and professional skills through written work and public presentations to multiple audiences. It is expected that students will clearly define their future academic and career goals, enhance their professional networks, and develop a future plan to support aspirations related to their major.

SCIE.4200 Co-op Assessment 2 (6 months) - Credits: 2

This seminar is designed to support and assist students in the assessment of their second cooperative education work experience that was for a 6 month cycle. Students will reflect on their extended time in this second work environment, and how their two different co-op work experiences impacts their
subsequent decisions for career development. Students will review their overall performance in the cooperative education program, and demonstrate their technical and professional skills through written work and public presentations to multiple audiences.
RADI.1010 Radiation and Life (Formerly 99.101) -  
Credits: 3  
This course will provide students with an understanding of the nature, sources, uses, and biological effects of natural and man-made radiations. Radiations discussed include non-ionizing radiations such as ultraviolet and microwave as well as the ionizing radiations produced by radon in homes and radio nuclides released from nuclear power plants. Students will have a better understanding of the risks and benefits of radiation in the modern world. Satisfies Gen Ed science requirements for non-science majors. Does not satisfy science requirements for Science majors but may be used as a free elective by Science majors.

RADI.1020L Radiation and Life Laboratory (Formerly 99.102) - Credits: 1  
This laboratory course which is suitable for non-science majors will provide the student with an opportunity for some hands-on experience with modern equipment used to identify and quantify levels of radioactivity in the environment. Students will measure radiation from a variety of sources and will determine concentrations of radionuclides in several environmental samples including making measurements of the radon levels in the air of their own homes. Students will also study the effects of ionizing radiation on the germination and growth rate of exposed seeds. Satisfies Gen Ed science requirements for non-science majors. Does not satisfy science requirements for Science majors but may be used as a free elective by Science majors.

RADI.1330 Technical Physics III (Formerly 99.133) -  
Credits: 3  
Presents material in both the class and laboratory format. Reflection, refraction, mirrors, lenses, wave optics, optical instruments, Coulomb’s law, magnetic force, quantum physics, atomic physics and nuclear physics will each be addressed. One session per week. Two additional Friday night classes are required.

RADI.4810 Mathematical Methods of Radiological Sciences (Formerly 98.481/581) - Credits: 3  
This course provides an overview of applied mathematical concepts that are useful in radiological sciences and protection, including special techniques for radiation physics, radiation dosimetry, and radiation shielding, with emphasis on computer applications.
EDUC.1000 Teaching in the Inclusive Classroom, Part I - Credits: 2
This course introduces students to what it means to teach in an inclusive elementary classroom. Students will be introduced to designing standards-based lesson plans and measurable learning outcomes. Additionally, they will begin to learn the importance of both formative and summative assessment. Students will learn and practice classroom management techniques to create a safe and effective learning community. Students will also be introduced to effective strategies for differentiation of instruction to make learning accessible to all students.

EDUC.1100 Introduction to teaching in Inclusive Classrooms - Credits: 3
The course provides teachers candidates with an introduction to planning lessons and the opportunity to teach small groups of students in a partner elementary school. Additionally, teacher candidates will begin to use technology that will assist them in managing their own classroom. Teacher candidates will be expected to demonstrate commitment, professionalism, and appropriate dispositions for working with diverse learners.

EDUC.1500 Teaching in the Inclusive Classroom, Part 2 - Credits: 2
This course is a continuation of the Part I course. Students will continue to explore and practice teaching in an inclusive elementary classroom. They will work on refining curriculum development skills including designing a unit and standards-based lesson plans with clearly-aligned assessments and measurable learning outcomes. Students will refine and practice classroom management techniques to create a safe and effective learning community that promotes democratic practices and is an example of a culturally responsive classroom. Students will also be practice and refine effective strategies for differentiation of instruction to make learning accessible to all students.

EDUC.1600 Technology and Digital Literacy in the Classroom - Credits: 3
This course allows students to explore the wide-range of educational technologies, including technology for teaching, as well as technology of learning. Students will explore educational technology standards for teaching and learning, have a chance to try out many types of technologies, and see how these technologies are being used in classroom.

EDUC.2000 Foundations of Reading - Credits: 3
This course focuses on the psychological bases of reading process, stages in development of reading ability and the sequence of reading skill acquisition. Topics covered will include the nature of oral language development, the reading process, and the relationship between reading, writing, speaking, listening, visualizing and visually representing. Students will study models of literacy instruction, and the theoretical and practical reasons undergirding those models. The use of diagnostic strategies for knowing the learners’ literacy performance and strategies for remediation will be examined. The format of the course will be primarily lecture, discussion, small group activities and presentations.

EDUC.2030 Multicultural Children’s Literature in the Classroom - Credits: 3
This course can be applied to the education minor. The purpose of this course focuses on the development of a critical lens that examines the cultural authenticity of multicultural children’s literature and the impact of cultural, ethnic, linguistic, gender, (dis)ability, social class, and religious diversity in children’s literature on the teaching and learning of young children with diverse backgrounds. Students in this course will also learn about the notion of "culturally sustaining pedagogy" through the use of multicultural children’s literature to understand and support children who have been traditionally underrepresented in elementary classrooms.

EDUC.2040 Coaching Young Adolescents - Credits: 3
This course is designed to better prepare future coaches who will be coaching young adolescents in schools, clubs, communities and other sporting environments.

EDUC.2050 Connecting Local and Global Issues in Education - Credits: 3
This educational minor course explores how we prepare students to thrive in a world of volatility, uncertainty, and complexity. Does the traditional view of what students need to know and be able to do by graduation provide the competencies needed to navigate that world? What to graduates need to be successful in a world we cannot even envision, in jobs that have yet to be created? This hybrid course is an elective.

EDUC.2060 Inclusion in Education and Society - Credits: 3
This course focuses on the how students with disabilities are included in education and society. The course offers multiple perspectives, strategies and readings to consider how inclusive schools and societies that provide supportive, context-appropriate conditions for learning can lead to more positive outcomes for all students and community members. Within the context of special education, students will be introduced to different types of disabilities and services that can be provided.
in schools, communities and in society to ensure effective inclusion of people with disabilities. This course may be taken for the education minor.

EDUC.2100 Introduction to Moderate Disabilities - Credits: 3

This foundational course consists of two major components. The first provides candidates with a comprehensive examination of special education laws and legislation and the characteristics of students with moderate disabilities. The second component provides an overview of instructional models that have empirical support for their effectiveness in teaching students with moderate disabilities. Candidates also gain exposure to IEP writing and lesson planning.

EDUC.2200 Education Assessment of Students with Moderate Disabilities - Credits: 3

This course is designed to provide candidates with a framework for understanding the process of assessing students with moderate, high-incidence disabilities. Candidates focus on all aspects of the evaluation process from the point of pre-referral to identification and re-evaluation, with an emphasis on administering, scoring, interpreting, and reporting on formal and informal educational assessments. Emphasis is on the interpretation of assessment data for the purposes of making eligibility decisions and establishing individualized Education Program annual goals, objectives, instructional strategies, and placement decisions.

EDUC.2500 Teaching Elementary Social Studies in the Inclusive - Credits: 3

Teaching Elementary Social Studies prepares teacher candidates to help the younger learner gain knowledge about past and present human experiences as well as to develop the skills necessary to process and apply information. It also prepares the younger learner to develop democratic values and attitudes by providing opportunities for social participation.

EDUC.2990 Education 2000 level elective (Formerly 01.299) - Credits: 3

Education 2000 level elective.

EDUC.3000 Understanding Family and Community Engagement - Credits: 3

This course is designed to introduce undergraduate students to key concepts of family and community engagement. Students will utilize readings, discussions, and hands-on activities to examine their understanding of the role that families and communities play in the educational lives of students. They will learn community-based relational approaches and design on family or community engagement strategy to utilize in their classrooms. The course will also explore how social networks and school structures impact the development of meaningful relationship between teachers, families, and community members.

EDUC.3010 Early Literacy Community Experience I (Formerly 02.301) - Credits: 3

This is Part One of a two semester course that focuses on experiential learning associated with the Jumpstart Program. The course provides students in the education minor with the necessary skills for working with children in early childhood community agencies. Topics based on the National Association for the Education of Young Children (NAEYC) Standards which include child development, family and community, assessment, teaching and learning, literacy development, and professionalism will be the focus of the course.

EDUC.3020 Early Literacy Community Experience II (Formerly 02.302) - Credits: 3

This is Part Two of a two semester course that enhances the experiential learning of students in the education minor participating in the Jumpstart Program. Building on the knowledge base of the first semester, the course allows students to deepen their understanding of the social, emotional and behavioral needs of children in early childhood settings and reflect on how they have integrated what they learned during the experience.

EDUC.3050 Directed Study - Credits: 1-3

This directed study option is available for UG students who are interested in exploring an educational topic that is not in the educational minor and/or furthering their knowledge and skills about a topic that has been introduced in the educational minor. Students in the directed study will work extensively with one instructor who has a depth of knowledge and experience in this specific topic. With the guidance of the instructor, they will develop and submit a study plan with a final project (concrete deliverable that meet the rigor of a -- credit course).

EDUC.3200 Methods of Teaching Students with Moderate Disabilities - Credits: 3

This course focuses on practices to support teaching and learning of students with persistent academic and behavior difficulties. Consisting of four interrelated components, core topics addressed in the course include: (1) Effective classroom management to enhance appropriate behavior, prevent problem behavior, and support students at-risk for and with behavior difficulties; (2) Evidence-based instructional design
principles, explicit teaching procedures, and interventions for improving access to the general curriculum and specifically for promoting student capacity for decoding, vocabulary use, fluency, and comprehension; (3) Assistive technology use to support instruction and accessibility; and (4) Collaboration with colleagues and families.

EDUC.3400 Mathematics and Problem Solving in the Inclusive E - Credits: 3

There is a renewed focus in creating math learning environments in the elementary classroom where students are continuously involved in problem solving. In fact, one of the main goals in elementary math is to provide children with the experiences and support to use a variety of strategies to solve real-world problems. This course will help preservice teachers understand how children with different strengths learn math so they can develop, create, implement, and assess lessons and units that align with the Massachusetts Math Common Core State Standards.

EDUC.3500 Language and Writing Development - Credits: 3

This course focuses on the theories of language development and the relationship of language learning to the development of writing. Major themes of the course include theoretical frameworks, instructional, and curricular issues underpinning of language and writing development of young children and the need of designing language and writing instruction sensitive to the diverse backgrounds of children. Students will examine the major aspects of language and writing development such as cognition, texts, context, culture, and gender, etc. Specifically, students will examine important issues related to assessment and instruction in the teaching of writing.

EDUC.3600 Teaching Science through Inquiry in the inclusive - Credits: 3

In this course, students will do what scientists do: have a chance to ask and answer questions about the world around us, collect data in a variety of ways and use data to help investigate the world. Students will explore how carefully coaching children to learn the skills that scientists use can build their developing science literacy. Students will work in pairs and, with a mentor teacher in a local school, plan, implement, and assess a science unit. Using high-quality science kits, teaching pairs will focus on a different set of science teaching skills each week. The course instructor and mentor teacher will observe and provide verbal and written feedback each week. Must take 1 undergraduate laboratory science course.

EDUC.3710 Educational Psychology (Formerly 01.371) - Credits: 3

An introduction to the study of human learning, this course covers topics such as efficiency in learning, testing, the psychology of learning, and theories of learning. For undergraduates only.

EDUC.3730 Teaching and Learning with Technology (Formerly 01.373) - Credits: 3

Explore the wide-range of educational technologies, including technology for teaching, as well as technology of learning. We’ll examine educational technology standards for teaching and learning, try out and apply many types of technologies and see how these technologies are being used in educational settings. Finally, you’ll be trained and tested as a Google Level 1 Educator.

EDUC.3840 Language, Literacy and Culture (Formerly 01.384) - Credits: 3

The course examines the role that socio-cultural and socio-political contexts play in children’s literacy development, with particular focus on English Language Learners (ELLs). The course is designed to help students understand the complex and dynamic worlds of diverse learners represented in twenty-first century classrooms. Students will learn new and effective approaches to teaching and learning that provides struggling learners, especially English Language Learners a fair and equitable chance to succeed in the learning contexts.

EDUC.3910 Understanding Education (Formerly 01.391) - Credits: 3

The aim of the course is to assist students to build knowledge about educational structures and roles in diverse settings as they consider how education could figure as a calling. Using a broad range of inquiry methodologies and technologies, students will explore areas of self-selected interest in formal educational settings (K-12 or higher education) or informal educational settings (community or health settings, policy, etc.). These explorations will culminate in case presentations in the form of digital stories, in which students will share their findings and discuss future goals in the area of education.

EDUC.3950 Special Topics in Education - Credits: 3

This course focuses on the exploration of thematic or issue-oriented or timely topics of interest in education and society. The precise topics and methods of each section will vary. Barring duplication of topic, the course may be repeated for credit.

EDUC.4000 Sheltered English Instruction - Credits: 3

This course will prepare students with the knowledge and skills to effectively shelter content instruction to ensure that English
Learners (ELs) can access grade level curricula, succeed academically and "contribute their multilingual and multicultural resources as participants and future leaders in the 21st century global economy" (MA DESE, 2016). This is a service-learning course. Students will be required to spend 15 hours in schools supporting the instruction of ELs and incorporating the skills and strategies that they learn in this course. This course has three overarching goals that are directly aligned with the MA DESE approved course.

EDUC.4010 Exploring Teaching (Formerly 01.401) - Credits: 3

This course is for third and fourth year undergraduates who are considering teaching as a career. Focusing on students, teachers, classrooms and schools, the course will provide an overview of the historical, philosophical, legal and societal influences that shape education today. Field work in an elementary, middle or high school will be an integral component of the course.

EDUC.4030 Understanding Child Development in a Diverse Society (Formerly 01.503) - Credits: 3

Examines the major theoretical frameworks of child development and how cultural differences affect development and learning. Focus is on helping students make responsive and culturally relevant pedagogical decisions.

EDUC.4050 Children with Disabilities in the Classroom (Formerly 01.505) - Credits: 3

This course examines the nature of cognitive emotional, developmental, sensory, and physical disabilities that compromise student capacity to make adequate academic progress without special intervention. Legal and ethical responsibilities of the educator in inclusive classroom settings and as an active member of a multidisciplinary learning team are emphasized.

EDUC.4100 Pre-practicum - Credits: 2

The pre-practicum focuses on what it means to be a teacher, as well as the content, dispositions and skills necessary to succeed in the teaching profession. Throughout the pre-practicum, learning about the teaching comes through a variety of opportunities: (1) Structured and focused observations in schools of different demographics; (2) Teaching experiences; (3) Participation in professional seminars on diverse educational topics; (4) Engagement with different types of school professionals around educational topics; (5) Reflection on coursework with a field experience component that bridges the gap between academic knowledge and practitioner knowledge.

EDUC.4110 Elementary Education Practicum and Seminar - Credits: 9

The Elementary Education Practicum is a culminating supervised field experience for Teacher Candidates. During this experience, the Teacher Candidates, with guidance and support from the Supervising Practitioner and the Program Supervisor, gradually work towards full-time teaching responsibility in the Supervising Practitioner’s classroom in a general education classroom. Beginning on the first day of classes and continuing through the last day of classes for the semester, Teacher Candidates will attend their practicum site all day, every day, following the calendar of the practicum site. They will mirror the expectations of their Supervising Practitioner. Successful completion of the Elementary Practicum includes meeting all expectations as described by the Department of Elementary and Secondary Education (DESE). The field experience is accompanied by a weekly seminar.

EDUC.4120 Special Education Practicum and Seminar - Credits: 9

The Special Education Practicum is a culminating supervised field experience for Teacher Candidates. During this experience, the Teacher Candidates, with guidance and support from the Supervising Practitioner and the Program Supervisor, gradually work towards full-time teaching responsibility by mirroring the responsibilities of the Supervising Practitioner. Beginning on the first day of classes and continuing through the last day of classes for the semester, Teacher Candidates will attend their practicum site all day, every day, following the calendar of the practicum site. They will mirror the expectations of their Supervising Practitioner. Successful completion of the Special Education Practicum includes meeting all expectations as described by the Department of Elementary and Secondary Education (DESE). The field experience is accompanied by a weekly seminar.

EDUC.4200 Elementary Education Practicum I - Credits: 3

This is the first practicum undertaken by teacher candidates and represents the first 100 hours of their required 300 hour practicum. Teacher candidates will spend on day each week for a full semester, working in a regular classroom setting. During the 100 hours, they will be supervised by a Supervising Practitioner and Program Supervisor.

EDUC.4300 Elementary Education Practicum II - Credits: 6

Elementary Education Practicum II is a continuation of practicum I in the same setting and requires completion of 200 hours of teaching in a Massachusetts Public School under the
supervision of a school-based Supervising Practitioner and a university Program Supervisor. The teacher candidate must assume responsibility for teaching for a minimum of 100 hours during the practicum. Candidates are required to attend a bi-weekly seminar at the Graduate School of Education throughout the practicum and successfully complete the Candidate Assessment of Performance (CAP).

EDUC.4400 Special Education Practicum - Credits: 6

The Special Education Practicum is required for a teaching license in special education at the PreK-8 level. The practicum requires 300 hours working, under the direction of the special education teacher (supervising practitioner) and a university program supervisor. The teacher candidate must assume responsibility for teaching for a minimum of 100 hours during the practicum. Candidates are required to attend a bi-weekly seminar at the Graduate School of Education throughout the practicum and successfully complete the Candidate Assessment of Performance (CAP).

EDUC.4410 Teach Reading/English Bilingual Student (Formerly 02.441) - Credits: 3

EDUC.4430 Methods of Teaching (Formerly 02.443) - Credits: 3

Examines the methods of teaching students with moderate disabilities. Topics include curriculum (including the Massachusetts frameworks), IEPs, and instructional modifications appropriate for students with special needs.

EDUC.4500 Clinical Seminar - Credits: 2

The clinical seminar occurs in conjunction with the elementary and special education practicum. Each seminar session addresses a different section of the Candidate Assessment of Performance (CAP) required for teacher licensure in the Commonwealth of Massachusetts. The seminar also provides the opportunity for teacher candidates to share experiences with peers and faculty. The seminar prepares candidates for their first teaching interviews by providing the services of the Universitys career services who will focus on resume and cover letter writing and by creating opportunities for mock interviews with partner district principals, assistant principals and special education directors.

UTCH.1010 STEP 1: Inquiry Approaches to Teaching (Formerly UTL.101) - Credits: 1

This course provides students with an introduction to teaching in order for them to explore a career as a middle or high school math or science teacher. During the courses, students pairs teach math and/or science lessons in a local elementary school classroom and receive feedback from a mentor teacher. Additionally, students are introduced to the theory and practice that is necessary to design and deliver excellent instruction. This course is the first step for those students interested in exploring the STEM TEACHING MINOR with UTeach UMass Lowell.

UTCH.1020 STEP 2: Inquiry Based Lesson Design (Formerly UTL.102) - Credits: 1

Students who are exploring teaching as a career become familiar with the middle school setting by observing and discussing the middle school environment, and by teaching several lessons in a middle school classroom. They build upon and practice lesson design skills that were developed in Step 1 and also become familiar with excellent science and mathematics curricula for the middle school setting.

UTCH.1030 Exploring Teaching and Learning in STEM - Credits: 3

This is an experiential learning course that also allows students to explore teaching and learning in a STEM content area. Students plan and teach inquiry-based science, math, technology, or engineering lessons, collect data on students' learning, and determine how they could make adjustments to improve the learning gains of students in a middle school classroom.

UTCH.2010 Knowing and Learning in Math and Science (Formerly UTL.201) - Credits: 3

The course starts by imparting the understanding that there is a science to learning and by having students examine ideas of what it means for an individual to know or understand something. This course focuses on several essential questions which enable students to explore how knowing and learning are structured with specific emphasis on mathematics and science. Students will come to understand what it means to know something, how we can understand student thinking and how theories of learning inform instructional decisions; in particular students will explore the idea that learning is a social activity. Students are prompted to reflect on their own ways of looking at various ideas and concepts and to consider alternative perspectives. Students will conduct an analysis of reasoning processes through a clinical interview process, one-on-one with learners engaging in problem solving. This course is required for the STEM TEACHING MINOR.

UTCH.2020 Interactions and Equity (Formerly UTL.202) - Credits: 3

This course examines the organization of instructional settings that maximize learning for all. Students will examine gender issues, cultural issues, bilingual education and learning
disabilities as they impact learner success. A major portion of the course is a field experience in which students interview high school teachers, observe a high school classroom, then teach three lessons. The purpose of these experiences is to ensure that students recognize the diversity of students and their specific learning needs. This course is required for STEM TEACHING MINOR.

UTCH.2040 Perspectives on Mathematics and Science (Formerly UTL.204) - Credits: 3

This course examines the history and philosophy of mathematics and science. Students will explore a selection of topics and episodes in the history of science and mathematics recognizing that many gains in knowledge have emerged through struggle, and in spite of resistance from cultural, religious and social structures. Students will learn that ideas in science and mathematics are dynamic and that disagreement can often lead to major breakthroughs. Students must think critically about how K-12 STEM education texts portray the history and philosophy of science and mathematics. This course is required for the STEM TEACHING MINOR.

UTCH.3010 Project-Based Instruction (Formerly UTL.301) - Credits: 3

This is a key component of the Minor as it engages students in designing, implementing and employing a project-based curriculum. Students will observe project-based learning in high schools, before creating and leading their own field-based unit. The unit must incorporate major components of project-based learning, namely collaboration, formulating questions, making predictions, designing investigations, collecting and analyzing data, making products and sharing ideas. This course is required for the STEM TEACHING MINOR.

UTCH.3020 Research Methods (Formerly UTL.302) - Credits: 3

The goal of this course is to provide students with an understanding of and the ability to use tools that scientists use to solve problems. Students will also learn how scientists communicate their findings and engage in peer-review. Students design and carry out four independent inquiries, which they write up and present in the manner that is common in the scientific community. Students will work in multidisciplinary teams. The course is divided between class and lab sessions, but is primarily lab-based. The topics of the class sessions are: Curiosity and Scientific Inquiry, Experimental Design and Analysis, Statistics, Modeling, Presenting Scientific Information. Students conduct their inquiries, incorporate statistics to interpret their results and present their scientific work orally. This course is required for the STEM TEACHING MINOR.

UTCH.4010 Practicum (Formerly UTL.401) - Credits: 6

This is the culminating experience to the STEM Teaching Minor and must be taken for initial teacher licensure. Students are required to spend a minimum of 12 weeks (full time) teaching a STEM subject in a middle or high school classroom and attend a weekly practicum seminar. Candidates are required to have (I) completed the STEM Teaching minor, (II) passed both of the required MTEL examinations and (III) maintained a minimum overall GPA of 2.7. For MATH, Science and Engineering student in the STEM Teaching minor.

UTCH.4410 Teaching Emergent Bilingual Students (Formerly 02.541 & UTL.441) - Credits: 3

The purpose of this course is to prepare new secondary teacher candidates with the knowledge and skills to effectively shelter their content instruction, so that the growing population of English learners (ELs) in PK-12 schools can achieve academic success, and contribute their multilingual and multicultural resources. The course will provide aspiring teachers with practical research-based methods, strategies, and protocols to integrate subject area content, language, and literacy. Successful completion of this course provides SEI (Sheltered English Immersion) endorsement, which is required for teaching in the Commonwealth of Massachusetts. This is a service learning course.

UTCH.4910 Directed Study (Formerly UTL.491) - Credits: 1-9
Suggested Degree Pathway for Business Administration - Accounting Concentration

For students who entered spring 2021 and beyond.

Freshman Year

Fall Semester

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Spring Semester

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Sophomore Year

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Spring Semester

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<td>FINA.3010</td>
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<td>POMS.2010</td>
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Junior Year

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### Senior Year

#### Fall Semester

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<td>ACCT.4310 (<a href="https://www.uml.edu/catalog/courses/ACCT/4310">https://www.uml.edu/catalog/courses/ACCT/4310</a>)</td>
<td>Federal Income Taxes (IL)</td>
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<td>MGMT.3800 (<a href="https://www.uml.edu/catalog/courses/MGMT/3800">https://www.uml.edu/catalog/courses/MGMT/3800</a>)</td>
<td>Business Ethics (SRE)</td>
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### Spring Semester

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<td>Auditing</td>
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<td>ACCT.4010 (<a href="https://www.uml.edu/catalog/courses/ACCT/4010">https://www.uml.edu/catalog/courses/ACCT/4010</a>)</td>
<td>Advanced Financial Accounting (CTPS), (AIL)</td>
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**Total Minimum Credits = 122**

1. Either course satisfies the Capstone requirement.

2. The Core Curriculum Diversity and Cultural Awareness (DCA) Essential Learning Outcome is met outside the major. Students are encouraged to select an AH or SS course that meets this degree requirement. Please see the DCA course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill these requirements.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the CoreCurriculum (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS (https://www.uml.edu/Enrollment/SiS/default.aspx). If you need assistance, please contact your adviser.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf) prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

*Last updated: 10/29/2020*
ACCT.2010 Accounting/Financial (Formerly ACCT/60.201) - Credits: 3
Presents a comprehensive, detailed exposure to basic accounting theory. Beginning with the accounting equation, students are introduced to the accounting cycle, preparation of the statement of financial position and the income statement, accounting for assets, liabilities, and stockholders’ equity of the firm, and cash flow and financial statement analysis.

ACCT.2020 Accounting/Managerial (Formerly ACCT/60.202) - Credits: 3
Examines the use of accounting systems for managerial decision-making. Budgeting, forecasting, and cost accumulation systems, which relate to manufacturing systems, will be studied.

ACCT.2030 Fundamentals of Accounting - Credits: 3
This course presents an intensive introduction to critical Financial and Managerial Accounting tools, techniques, and concepts. The course provides a comprehensive exposure to basic accounting theory and the use of accounting for managerial decision-making. Topics include the accounting equation, the accounting cycle, preparation of the financial statements, cost accumulation, cost behavior, and cost-volume-profit analysis.

ACCT.3010 Intermediate Accounting I (Formerly ACCT/60.301) - Credits: 3
Examines the generally accepted accounting principles relating to the preparation of financial statements. The student will study, in depth, the valuation and disclosure problems associated with the assets of the enterprise. The accounting framework and pronouncements of the Financial Accounting Standards Board are emphasized.

ACCT.3020 Intermediate Accounting II (Formerly ACCT/60.302) - Credits: 3
Presents the in-depth study of the valuation and disclosure issues associated with corporate liabilities and stockholders’ equity. Emphasis is placed on the statements of the Financial Accounting Standards Board.

ACCT.3030 Accounting Information Systems (Formerly ACCT/60.303) - Credits: 3
Presents accounting as a system designed to meet the needs of external and internal users. Accounting information system concepts are emphasized. Topics include accounting transaction cycles, internal controls, and systems development processes.

ACCT.3099 Accounting Boot Camp - Credits: 1
This intensive accounting course is designed to prepare students for the rigors of the upper-level coursework of the accounting concentration by enhancing their foundation knowledge of financial accounting. The course emphasizes the accounting cycle, and covers the topics like accounts receivable, inventory, and revenue as deemed necessary. Students will also have the opportunity to network with accounting practitioners as an introduction to the professional world of accounting.

ACCT.3100 Corporate Financial Reporting I - Credits: 3
Corporate Financial Reporting I examines the Financial Accounting Standards Board’s regulations that make up generally accepted accounting principles relating to the preparation of external financial statements. The student will study, in depth, the accounting cycle, preparation of the Balance Sheet and Income Statement, and the standards/pronouncements governing cash, accounts receivable, notes receivable, and inventory as well as revenue recognition. The student will also begin to understand how data analytics tools are used by accountants.

ACCT.3100L Corporate Financial Reporting I Lab - Credits: 1
This course gives you additional practice in the concepts covered in ACCT.3100, Corporate Financial Reporting I.

ACCT.3200 Corporate Financial Reporting II - Credits: 3
This course is the second of three corporate financial reporting courses. This course provides the student with the breadth, depth and application of the accounting standards and regulations. The course covers accounting theory and practices associated with financial reporting issues of PPE, intangible assets, investments, liabilities, bonds, leases, and income taxes.

ACCT.3200L Corporate Financial Reporting II Lab - Credits: 1
This course gives you additional practice in the concepts covered in ACCT.3200, Corporate Financial Reporting II.

ACCT.3210 Cost Accounting (Formerly ACCT/60.321) - Credits: 3
An examination of the manufacturing function from the view
of the cost accountant. Managerial control of the elements of product costs will be studied with an emphasis on cost accumulation systems both historical and estimated. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

**ACCT.3300 Corporate Financial Reporting III** - Credits: 3

This course is the third of three corporate financial reporting courses. This course presents the in-depth study of the valuation and disclosure problems associated with Pension (a part of corporate liabilities) and stockholders' equity. After completion of this course, a CAPSTONE project is ready to be completed. Emphasis is placed on the pronouncements of the Financial Accounting Standards Board.

**ACCT.4010 Advanced Financial Accounting I** (Formerly ACCT/60.401) - Credits: 3

Explores issues in accounting for large, multinational business entities. Consolidation, mergers, home office/branch accounting, international accounting topics, partnership and nonprofit organizations are also examined. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Critical Thinking &Problem Solving (CTPS).

**ACCT.4210 Auditing** (Formerly ACCT/60.421) - Credits: 3

An examination of the purposes of financial statement audits. The following topics will be examined in depth: auditing standards, professional ethics, legal responsibilities, internal control, audit evidence, financial statement disclosures and audit reports.

**ACCT.4310 Federal Income Taxes** (Formerly ACCT/60.431) - Credits: 3

Deals with the basic rules and regulations of the Internal Revenue Code as it affects the individual and the corporation. An understanding of the code is developed through lectures, assigned readings, research, and the solution to a wide variety of problems. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

**ACCT.4790 Accounting Internship** (Formerly ACCT/60.479) - Credits: 1-3

Arrangements must be made with department internship coordinator.

**ACCT.4800 Special Topics in Accounting/Internal Audit** - Credits: 3

Special Topics in Accounting introduces students to the activities of an internal auditor and the role of internal auditing in organizations. It explains why internal auditors have such a great understanding of all aspects of the organization for which they work, such as: governance, sales &marketing, management oversight, human resources, supply chain, accounting, finance, compliance, information technology and general operations. Students will learn the basics of business processes; understanding business objectives, risk and controls as well as the steps required to plan, conduct, and report internal audit activities. The course will include a hands-on case study of performing an internal audit and/or consulting project.

**ACCT.4991 Independent Studies** (Formerly ACCT/60.499) - Credits: 1-3

An opportunity for students to carry out individualized study relating to the field of accounting under the supervision of a member of the accounting faculty.
BUSI.1500 Business 101 (formerly 66.017, MGMT 150, BUSI 150) - Credits: 3

This course will provide a foundational understanding of business, the various types of business organization, the key functional areas of business and how these functional areas are interconnected. Crucial skills such as use of technology, team-building, information literacy and communication will be emphasized. In addition, the course will provide an overview of contemporary business issues such as ethics and globalization. A major course goal is to enable students to gain a basic understanding of career opportunities particularly in relation to the areas of specialization within the Manning School of Business undergraduate curriculum.

BUSI.2100 Professional Development Seminar (Formerly BUSI 210) - Credits: 1

The Professional Development Seminar is designed to provide students with the necessary structure, resources, and support to successfully secure and engage in their first cooperative education experience. Through a variety of teaching methodologies and assignments, students will prepare to engage in the job search process through resume writing, strategic interviewing, professional networking and through learning professional behavior and presentation skills. Course open to undergraduates who have previously applied and been accepted to participate in the Professional Co-op Program. Enrollment is by Instructor permission only. For more information on applying to the Professional Co-op Program, see https://www.uml.edu/student-services/Career-Services/Cooperative-Education/Forms-Handbooks.aspx. Pre-Req: Permission of Instructor.

BUSI.3100 Co-op Assessment 1 (Formerly BUSI 310) - Credits: 2

The primary goal of this seminar is to assist students in the overall assessment of their overall cooperative education experience. Through facilitated small group discussion, individual consultation and hands on practice, students will have an opportunity to identify and articulate their technical and professional skills, and explore how these skills and their co-op employment might be translated and leveraged into future work environments and their academic program at UML.

BUSI.3200 Co-op Assessment I (6 months) - Credits: 3

This seminar is designed to support and assist students in the assessment of their 6 month cooperative education experience. Students will reflect on their extended time in a work environment, the impact of their experience on their planning, and how organizational culture, personal interests and values can inform their subsequent decisions for career development. Through facilitated small group discussions, individual consultation and hands on practice, students will have the opportunity to identify and articulate their technical and professional skills.

BUSI.4100 Co-op Assessment 2 (Formerly BUSI 410) - Credits: 2

This seminar is designed to support and assist students in the continued assessment of their cooperative education experience. Through a deepening of their work in Co-op Assessment 1, students will review their overall performance in the cooperative education program, while continuing to demonstrate their technical and professional skills through written work and public presentations to multiple audiences. It is expected that students will clearly define their future academic and career goals, enhance their professional networks, and develop a future plan to support aspirations related to their major.

BUSI.4200 Co-op Assessment 2 (6 months) - Credits: 3

This seminar is designed to support and assist students in the assessment of their second cooperative education work experience that was for a 6 month cycle. Students will reflect on their extended time in this second work environment, and how their two different co-op work experiences impacts their subsequent decisions for career development. Students will review their overall performance in the cooperative education program, and demonstrate their technical and professional skills through written work and public presentations to multiple audiences.

BUSI.4800 Current Topics in Business - Credits: 3

Topics of current interest in Business. Subject matter to be announced in advance. For a current semester course title, please log on to SIS, the Student Information System. Please see "notes" for the class to see the full description for individual topics.

BUSI.4890 Internship in Business Administration - Credits: 3

The Internship in Business provides three academic credits that count as a Manning elective for working in a business related position that integrates more than one business discipline with a minimum of 11 hours per week for a single semester. After developing a proposal in cooperation with their employer, students obtain the permission of the internship coordinator to enroll in the course. Students then perform their designated work duties during the semester, and also write a reflective
term paper which describes their work experience and relates it to their academic work in the other courses taken at UML. The grading of the internship course is based upon the evaluation from the employer and course deliverable determined by the internship coordinator.
Degree Pathway for the Bachelor of Science in Business Administration, Finance Concentration, 2021, Spring

For students who entered spring 2021 and beyond.

Freshman Year

**Fall Semester**

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**Spring Semester**

<table>
<thead>
<tr>
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<th>Course Name</th>
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<tbody>
<tr>
<td>ACCT.2010</td>
<td>Accounting/Financial</td>
<td>3</td>
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<tr>
<td>ECON.2110</td>
<td>Statistics I</td>
<td>3</td>
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<tr>
<td>MKTG.2100</td>
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Sophomore Year

**Fall Semester**

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<tbody>
<tr>
<td>ENTR.1500</td>
<td>Introduction to Entrepreneurship</td>
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<td>MATH.1210</td>
<td>Management Precalculus (STEM)</td>
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Junior Year

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<tr>
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<tr>
<td>FINA.3210</td>
<td>Investments &amp; Portfolio Analysis (IL), (CTPS)</td>
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<tr>
<td>FINA.3310</td>
<td>Principles of Corporate Finance (AIL)</td>
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<tr>
<td>FINA.3110</td>
<td>Financial Statement Analysis</td>
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<td>xxxxx.xxxx</td>
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<tr>
<td>FINA.4410</td>
<td>Financial Derivatives</td>
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<td>MGMT.3800</td>
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<td>xxxxx.xxxx</td>
<td>Manning or Non-Manning Elective</td>
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<tr>
<td>xxxxx.xxxx</td>
<td>Manning or Non-Manning Elective (3000/4000 level)</td>
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**Total Minimum Credits = 122**

1. Either course satisfies the Capstone requirement.

2. The Core Curriculum Diversity and Cultural Awareness (DCA) Essential Learning Outcome is met outside the major. Students are encouraged to select an AH or SS course that meets this degree requirement. Please see the DCA course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill these requirements.

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**Restriction on off-campus study:**

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prior to enrollment. See the catalog policy for details.

Last updated: 11/03/2020
FINA.2000 Personal Finance - Credits: 3
This course emphasizes the development of individually focused financial information and a comprehensive financial plan designed to enable the individual to manage his or her financial affairs. The course also integrates personal goals, such as buying a home, retirement, investing, and insurance needs, to help assure that the financial plan incorporates the major decision stages an individual will face.

FINA.2210 Intro to Investments (Formerly FINA 221/61.300) - Credits: 3
This course provides the background and skills for financial decisions that individuals need to make during their entire life. Topics will include the financial aspects of career planning, budgeting and consumer credit, the purchasing and financing decisions related to housing and other major expenditures, long-term saving and investing, insurance, and retirement planning. Although the course has no formal prerequisites, it assumes that students have some familiarity with basic high school algebra.

FINA.3010 Financial Management (Formerly FINA/61.301) - Credits: 3
Principles of financial management, including working and fixed capital, sources of funds, financial statements, financial planning and capital structure.

FINA.3030 Introduction to Financial Modeling - Credits: 3
This course consists of modeling exercises that will require students to work on computers in each session. Students will learn how to apply the methods of financial analysis and to conduct time trend analysis, scenario analysis, regression analysis, and optimization using spreadsheet and/or commonly-used statistical software.

FINA.3110 Introduction to Financial Statement Analysis (Formerly FINA/61.303) - Credits: 3
The techniques of financial analysis in depth. Topics covered include cash management, credit scoring, receivables monitoring, inventory management, financial statements analysis and forecasting, financial distress prediction, mergers and acquisitions techniques and other selected topics.

FINA.3210 Investment and Portfolio Analysis (Formerly FINA 321/61.304) - Credits: 3
This course is a survey of investments for business students. Topics include the investment environment, markets and instruments, securities trading, market indexes, risk, diversification, the capital asset pricing model, market efficiency, introductory valuation of bonds stocks options and futures, mutual funds, behavioral finance, and strategies for individual investors. Meets Core Curriculum Essential Learning Outcome for Critical Thinking &Problem Solving (CTPS) and Information Literacy (IL).

FINA.3310 Principles of Corporate Finance (Formerly FINA 331/61.431) - Credits: 3
Advanced study of the principles of financial analysis. Covers topics such as acquisition of long-term assets, capital budgeting models, and the analysis of mutually exclusive projects.

FINA.3320 Credit Risk Analysis (Formerly 61.332) - Credits: 3
This course introduces students to credit risk analysis approaches used by commercial banks to evaluate loan applications. Topics covered include understanding customer business and company life cycle, cash flow analysis using loan applicant financial statements, loan structuring, tax issues, and loan documentation. The course uses a combination of lecture and cases, with emphasis on the use of spreadsheets for case analysis.

FINA.4110 Financial Institutions And Markets (Formerly FINA 411) - Credits: 3
This course will focus on the Institutions that facilitate the flow of money, examine the types of instruments used globally, and provide an understanding of some of the regulation and oversight required to ensure stability. In addition, the course reviews determinants and structure of interest rates and bond prices and examines some of the risks incurred by financial institutions such as interest rate risk and credit risk.

FINA.4210 Introduction to Financial Risk Management - Credits: 3
This course will review the basic concepts of risk measurement and risk management. We will review the nature of risk and the various dimensions of risk that an effective risk management program must address. The principal focus in the latter part of the course will be on risk management in the financial services industry. We will survey some of the practices and tools current in this industry along with their strengths and shortcomings. We will also review how firms organize their risk management functions and, importantly, the impact of the principal regulatory regimes on the risk management practice.

FINA.4220 Portfolio and Security Analysis (Formerly
FINA 422/61.421) - Credits: 3
Advanced course on investment theory and applications. Topics covered include stock market behavior, portfolio and capital market theories, and securities analysis.

FINA.4230 Student Managed Fund (Formerly FINA 423/61.434) - Credits: 3
A course focused on application of investment theory. Topics covered include stock market behavior and securities analysis.

FINA.4320 Intermediate Corporate Finance (Formerly FINA 432/61.433) - Credits: 3
This course builds on financial decision-making concepts covered in the Corporate Finance course. Some of the topics covered in the course include financial restructuring, mergers and acquisitions, different forms of debt and equity financing, leasing, and real options.

FINA.4410 Introduction to Financial Derivatives (Formerly FINA 441) - Credits: 3
This course is an introduction to financial derivatives. The primary emphases are the valuation and practical application of these instruments for both hedging and speculation. Topics include the characteristics of options, forward contracts, futures, and swaps; arbitrage and the valuation of derivatives; creating value and profit diagrams; and the structure of the derivatives markets. Ethical and economic issues associated with the use of derivatives as reported in the current financial press will also be covered.

FINA.4550 Financial Regulation, Compliance, and Ethics - Credits: 3
This course will provide: 1.) an introduction to ethical standards held to be best practices in the financial services industry; 2.) a survey of some of the major regulatory regimes within which this global industry operates; and, 3.) exposure to principles and procedures for establishing and maintaining and effective compliance regime consistent with good ethical practice and regulatory compliance. The course will rely heavily upon examination of real-world examples in the application of the principles surveyed.

FINA.4890 Internship In Finance (Formerly FINA 489/61.489) - Credits: 3
Opportunity for students to earn academic credit through the integration of professional on-the-job experience and related academic work. Project jointly supervised by a faculty member and representative of the employing organization.

FINA.4910 International Finance (Formerly FINA 491) - Credits: 3
Financial aspects of international business operations. Evaluation of risks associated with multinational operation and managerial decision making under conditions of financial uncertainty.

FINA.4970 Independent Study Finance (Formerly FINA 497/61.499) - Credits: 1-6
An opportunity for students to carry out individualized study relating to the field of finance under the supervision of a member of the faculty.

FINA.4980 Special Topics in Finance (Formerly FINA 498/61.479) - Credits: 3
This course introduces Python programming to students using examples from finance. The necessary finance/mathematics information will be introduced as necessary to complete exercises that include creating algorithms for financial models for valuing stocks and bonds and evaluating the risk and return characteristics of individual assets and portfolios. It does not require any previous programming knowledge.
# Suggested Degree Pathway for Business Administration - International Business Concentration

For students who entered spring 2021 and beyond.

## Freshman Year

### Fall Semester

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<td>Co-Req. Science Lab (SCL)</td>
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**Total**: 16

### Spring Semester

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<tbody>
<tr>
<td>ECON.2020</td>
<td>Principles of Microeconomics (SS)</td>
<td>3</td>
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<td>ENTR.1500</td>
<td>Professional Communications (WOC)</td>
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<td>MIST.2010</td>
<td>History Elective (AH)</td>
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**Total**: 15

## Sophomore Year

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**Total**: 15

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**Total**: 16

## Junior Year

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<tr>
<td>MKTG.4120</td>
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<td>MGMT.4350</td>
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<tr>
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### Total Minimum Credits = 122

1International Business Electives (3000/4000 level):

- LGST.3660
  - International Law
- ECON.4030
  - International Trade Theory
- ENTR.4100
  - Global Entrepreneurship and Innovation
- MGMT.4550
  - International Import and Export Management
- Approved International Experience or Study Abroad Program

2Either course satisfies the Capstone requirement; note that only MGMT.4900 satisfies the Core ELO for CTPS.
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_Last updated: 11/03/2020_

### Suggested Degree Pathway for Business Administration - Management Concentration

**For students who entered spring 2021 and beyond.**

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### Junior Year

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<tbody>
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<td>Organizational Behavior</td>
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<td>POMS.3010</td>
<td>Operations Management</td>
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### Senior Year

#### Fall Semester

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<tr>
<td>MGMT.3800</td>
<td>Business Ethics (SRE)</td>
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<td>MGMT.4150</td>
<td>Managing Teams and Projects</td>
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<td>MGMT.xxxx</td>
<td>Management Elective/Managerial Quality Control</td>
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#### Spring Semester

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<td>MGMT.4900</td>
<td>Strategic Management / Entrepreneurship Strategy Implementation</td>
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<tr>
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</table>
Total Minimum Credits = 122
1Either course satisfies the Capstone requirement.

2The Core Curriculum Diversity and Cultural Awareness (DCA) Essential Learning Outcome is met outside the major. Students are encouraged to select an AH or SS course that meets this degree requirement. Please see the DCA course listing [link] for a full list of classes that fulfill these requirements.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum [link] policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS [link]. If you need assistance, please contact your adviser.

Restriction on off-campus study:

Be advised that any course taken at another institution must be

formally approved [link] prior to enrollment. See the

catalog policy [link] for details.

Last updated: 11/04/2020
MGMT.1010 First-Year Management Seminar - 2  
(Formerly MGMT/66.101) - Credits: 1

The purpose of the First-Year Management - 2 (FYMS - 2) is to deepen students' understanding and appreciation of the functional areas within the College of Management along with their understanding of themselves as learners in the College. This will be accomplished through the administration of self-assessment tools such as the Myers Briggs Type Indicator (MBTI), participation in an online business simulation addressing the business functional areas and through participation on in-class and virtual teams.

MGMT.1CO-OP Curricula Practical Training  
(Formerly 66.1CO-OP) - Credits: 0-1

Curricula Practical Training. "Variable credit course, student chooses appropriate amount of credits when registering."

MGMT.3010 Organizational Behavior (Formerly MGMT/66.301) - Credits: 3

Examination of individuals, groups, and organizations from a behavioral and structural perspective. Topics include employee motivation and satisfaction, communication, power and politics, the dynamics of groups and teams, conflict management, and organizational design and change.

MGMT.3100 Human Resources Management  
(Formerly MGMT/66.310) - Credits: 3

Current issues in the management of human resources. Recruitment, selection, work force training and development, reward systems, employee health and safety, legal issues, managing diversity, performance evaluation, and human resource planning.

MGMT.3800 Business Ethics (Formerly BUSI 380/3800) - Credits: 3

This course will explore the intersection between business leadership and ethics in various context. It provides the opportunity for students to explore complex issues in societal and professional contexts while engaging in probing conversations with classmates.

MGMT.4100 Negotiation Strategy and Process  
(Formerly MGMT/66.410) - Credits: 3

Analysis and application of the key factors that shape and characterize different negotiation situations; the analytical skill to diagnose potential areas of difference and select appropriate strategies to address them; the interpersonal skills to tactically manage the specific communication and decision-making behaviors during the actual bargaining; and the ability to recognize how one's own personality, value system and perceptions affect the choice of tactics and behavior.

MGMT.4150 Managing Teams and Projects  
(Formerly MGMT/66.415) - Credits: 3

Provides students with the knowledge and skills to effectively manage in the more flexible, team-oriented environments increasingly found in contemporary organizations. Emphasis on the dynamics of groups and how they are transformed into productive teams; strategies for systematic goal setting; building team structure; using the team as a basis for problem-solving; facilitating team processes. The course focuses on today's smaller, "self-renewing" organizations, as well as on more traditional work group settings.

MGMT.4200 Leadership Processes (Formerly MGMT/66.420) - Credits: 3

Examines leadership as a dynamic influence process in organizations. The role of leader characteristics and styles, matching leadership behavior and situations, issues in power and politics, empowerment and participation, conditions for leadership effectiveness. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

MGMT.4250 Business Process Management - Credits: 3

Business Process Management (BPM) addresses the foundational concepts, tools and methods involved in the identification, design, redesign, and measurement of key business processes. The goal of BPM is to eliminate non-value added steps in business activities (e.g., reducing cycle times and costs), Thus improving organizational efficiencies and productivity, and providing more quality products to customers in a timelier manner. Business interrelated processes that span horizontally across functional boundaries and, in a global economy, are often connected across geographies. Students will learn the difference between a vertical functional view and horizontal process view; what process ownership entails; and what specific activities are required for successful BPM implementation. Both quantitative approaches are covered.

MGMT.4300 Managing Change - Credits: 3

The ability to execute appropriate and timely change is often a key measure of success for individuals and organizations. This course helps students develop skills to innovate, lead and successfully implement sustainable change at the individual, group and organizational levels. Students acquire capabilities as change agents, including identifying change opportunities,
objectives and potential pitfalls to navigate change throughout their careers. Relevant change management experience is cultivated through individual and group exercises and projects. Specific issues addressed include problem diagnosis, gaining and leveraging influence, managing resistance to change, and evaluating organizational factors such as culture, structure and incentives that influence behavior in change contexts.

MGMT.4350 International Management (Formerly MGMT/66.435) - Credits: 3

Comparison of management concepts, systems and practices in different societies, and institutional settings. The impact of economic, social, political, and cultural variables on management styles, processes and organizational structures.

MGMT.4400 International Business (Formerly MGMT/66.440) - Credits: 3

Ninety-five percent of the world’s customers, 80 percent of the world’s fastest-growing markets are outside the United States. Thus, it is not surprising that business has become global. Therefore, learning about international business and its unique challenges are an important part of a business education. The course will first address the concept of globalization, the international business environment, and the foreign national business environment, including the variety of cultures and different economic, political, and legal systems around the world. The course will then focus on international business management, including how to analyze global business opportunities, create a strategy and choose entry modes, and how to market, operate, and manage international companies. We will consider a wide variety of regions and countries, and industries and companies of all sizes including recent successful global start-ups.

MGMT.4450 Contemporary Management Development (Formerly MGMT/66.445) - Credits: 3

Provides students the opportunity to develop the skills and capabilities needed to select, gather, synthesize and use new information to enhance their professional growth and development.

MGMT.4500 Managing Diversity in Organizations (Formerly MGMT/66.450) - Credits: 3

This course explores the opportunities and challenges of working within an increasingly diverse workforce. Examines the knowledge and skills that employees and managers must develop to diagnose and address diversity-related conflicts and dilemmas and to leverage differences and commonalities as a catalyst for organizational learning and effectiveness. Special attention is paid to the effect of gender, socioeconomic, and racial diversity on individuals, work groups, and the organization as a whole.

MGMT.4550 International Import/Export Management - Credits: 3

International trade and globalization has grown significantly over the last century, and importing and exporting of goods and services has become increasingly complex. This comprehensive course emphasizes real-world applications of international trade concepts and processes. Strategies and guidelines for how to successfully manage and control regulatory compliance issues in business is addressed. Topics covered include organizing your compliance department, international trade terminology, procedures and documentation, regulatory controls and licenses, classification and valuation, country of origin, trade agreements, and global customs considerations.

MGMT.4800 Current Topics in Management (Formerly MGMT/66.480) - Credits: 3

Topics of current interest in management. Subject matter to be announced in advance. For a current semester course title, please log on to SIS, the Student Information System. Please see "notes" for the class to see the full description for individual topics.

MGMT.4890 Internship In Management (Formerly MGMT/66.489) - Credits: 3

Opportunity for students to earn academic credit through the integration of professional work experience with related academic work. Project jointly supervised by a faculty member and representative of the employing organization.

MGMT.4900 Strategic Management (Formerly MGMT/66.490) - Credits: 3

An integration of knowledge in the various functional areas of management toward solution of problems affecting the character and success of the total enterprise. Corporate strategy and its implementation via appropriate policies.

MGMT.4910 Independent Study in Management (Formerly MGMT/66.491) - Credits: 1-6

An opportunity for the student to carry out individualized study relating to the field of management under the supervision of a member of the faculty.
Suggested Degree Pathway for Business Administration - Marketing Concentration

For students who entered spring 2021 and beyond.

**Freshman Year**

**Fall Semester**

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<tr>
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<td>ECON.2010</td>
<td>Principles of Microeconomics (SS)</td>
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<tr>
<td>ENTR.1500</td>
<td>Introduction to Entrepreneurship</td>
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<td>MATH.1210</td>
<td>Management Precalculus (STEM)</td>
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**Spring Semester**

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<td>ECON.2110</td>
<td>Statistics I</td>
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<td>MKTG.2100</td>
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**Sophomore Year**

**Fall Semester**

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<td>Introduction to Business Analytics</td>
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**Spring Semester**

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### Spring Semester

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### Senior Year

#### Fall Semester

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### Spring Semester

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<td>MGMT.4900</td>
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**Total Minimum Credits = 122**

1Either course satisfies the Capstone requirement.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

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**Restriction on off-campus study:**

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_Last updated: 11/05/2020_
ENTR.1000 The Freshmen Difference Maker Seminar (Formerly BUSI.1000) - Credits: 1

This seminar is designed to provide Business students with an opportunity to explore how their business school education can make a difference in the world through innovative and entrepreneurial action. We will examine social, environmental and economic problems in our community while learning about the University's own entrepreneurial ecosystem.

ENTR.1500 Introduction to Entrepreneurship and Business - Credits: 3

Entrepreneurship can be considered a process of economic or social value creation, rather than the single event of opening a business. This course focuses on creativity, innovation, problem identification, opportunity recognition, developing solutions, and resource acquisition. The functional areas of business and the cross-functional nature of these will be demonstrated as student teams will address problems they discover.

ENTR.3000 Principles of Innovation and Entrepreneurship (Formerly ENTR/64.300) - Credits: 3

Course number was formerly 64.300. This course is designed to help non-business students understand the importance of innovation and entrepreneurship in today's global economy and to cultivate an entrepreneurial mindset among students in the Manning School of Business entrepreneurship concentration. It will cover different forms of entrepreneurship such as small businesses, growth ventures, corporate entrepreneurship and social entrepreneurship. The course will focus on the types of innovation, turning innovation into an ongoing new venture and on the entrepreneurial process. Innovation and entrepreneurship theories and concepts will be discussed with real life examples and cases.

ENTR.3610 Starting a New Venture (Formerly ENTR/64.361) - Credits: 3

This course is designed for students with a curiosity and interest in starting a new business. In this course, students will explore the entrepreneurship process including how entrepreneurs discover and evaluate the sources and opportunities for new business ventures; how they assemble the resources, how they operate and grow a new business; and finally how they harvest their hard work as successful entrepreneurs. The course covers a variety of topics associated with launching and running a new business venture, such as marketing, financing, building the venture team, legal and regulatory issues, and social and environmental issues. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS).

ENTR.3620 Corporate Entrepreneurship (Formerly ENTR/64.362) - Credits: 3

This course focuses on entrepreneurship in established companies. In order to compete in today's dynamic business environment, organizations need to spur and promote entrepreneurial thinking and actions as a way of remaining innovative and competitive. Thus, the course explores how the entrepreneurship process works within an existing organization, including the identification of strategies companies engage to rejuvenate their business, markets and industries. Students will also study how individuals can play a role in promoting entrepreneurial activities in their organizations.

ENTR.4100 Global Entrepreneurship and Innovation - I (Formerly ENTR/64.410) - Credits: 3

The Course is offered as a 2-week intensive experiential learning of Global Entrepreneurship and Innovation. It is designed to help students to understand the importance of entrepreneurship and innovation in today's global economy and to cultivate an entrepreneurial mind-set among the students in the UMass Lowell. Students will work in interdisciplinary, multi-cultural environments exploring problem solving techniques, opportunities identification, business concept development & venture planning using standard business model framework and bringing ideas to reality.

ENTR.4110 Global Entrepreneurship and Innovation - II (Formerly ENTR/64.411) - Credits: 3

The Course is offered as a 2-week intensive experiential learning of Global Entrepreneurship and Innovation. It is designed to help students to understand the importance of entrepreneurship and innovation in today's global economy and to cultivate an entrepreneurial mind-set among the students in the UMass Lowell. Students will work in interdisciplinary, multi-cultural environments exploring problem solving techniques, opportunities identification, business concept development & venture planning using standard business model framework and bringing ideas to reality.

ENTR.4150 Entrepreneurial Customer Discovery - Credits: 3

This course focuses on leveraging entrepreneurial approaches such as Lean Launchpad methodology to validate and solve pressing technology commercialization processes and problems. The course provides students with an opportunity to work with interdisciplinary teams on real-world problems/projects sourced from the government, faculty research, incubators, etc. The course will offer students a rigorous exploration of the
customer discovery process, including value proposition design, repeated hypothesis testing and validation with key stakeholders. By the end of the course, students will have conducted in-depth market research, fully vetted and validated a project/problem, and provided a minimum viable product concept addressing customer needs.

**ENTR.4200 Leading Successful Entrepreneurial Team**
- Credits: 3

The focus of this course is to enable students understand the importance of entrepreneurial team characteristics (demographic, functional and cognitive) and dynamics on team success as well as entrepreneurial leadership in the new venture setting. Students will have opportunities to understand their own entrepreneurial mindset profile and learn to work with team members with heterogeneous entrepreneurial styles and preferences. Working together as entrepreneurial teams, students will identify innovative and proactive solutions to various problems while learning to manage risk effectively.

**ENTR.4630 Managing Innovation (Formerly ENTR /64.463) - Credits: 3**

A critical issue for entrepreneurs and managers is how to translate opportunity into competitive advantage. This course examines theories of innovation and their application to real-world business opportunities. A particular focus is placed on emerging scientific and technical innovations and the opportunities and challenges they present to both existing businesses and new venture entrepreneurs. Students examine innovation strategies, planning models, evaluation models, licensing and the commercialization process required to launch new businesses around innovative products and technologies.

**ENTR.4640 Finance for Emerging Business Enterprises (Formerly ENTR /64.464) - Credits: 3**

Course content covers financial aspects of an entrepreneurial venture from its start to a potential sale. Major sources of financing covered in the course include venture capital, private placement, bank credit, and public financing. Other financial concepts covered include organization of the business, financial forecasting, financial analysis, firm valuation and acquisitions.

**ENTR.4800 Current Topics in Entrepreneurship (Formerly ENTR /64.480) - Credits: 3**

Topics of current interest in entrepreneurship. Subject matter to be announced in advance. For a current semester course title please log on to SiS, the Inter-Campus Student Information System.

**ENTR.4890 Internship in Entrepreneurship (Formerly ENTR /64.489) - Credits: 3**

Opportunity for students to earn academic credit through the integration of professional work experience with related academic work. Project jointly supervised by a faculty member and representative of the employing organization.

**ENTR.4960 Entrepreneurship Strategy Implementation (Formerly ENTR /64.496) - Credits: 3**

The Course focuses on innovation and entrepreneurship utilizing experiential learning and venturing projects. It will deal with ideation methods and tools, technology commercialization, business planning and potential initial incubation of an early-stage business by project teams, and the development of an investment proposal to launch a new business. Students will be exploring, identifying and analyzing the path from Idea to Market for technology projects.

**ENTR.4991 Independent Studies (Formerly ENTR /64.499) - Credits: 1-3**

**MKTG.1CO-OP Curricula Practical Training - Credits: 0-1**

Curricula Practical Training. "Variable credit course, student chooses appropriate amount of credits when registering."

**MKTG.2010 Marketing Principles (Formerly MKTG 201/62.201) - Credits: 3**

The role of marketing in the economy. The elements of the marketing mix--product, price, distribution, and promotion--are discussed in the context of social and political constraints on marketing activity.

**MKTG.2100 Professional Communications (Formerly MKTG 210/66.210) - Credits: 3**

This course provides students with the theory and practice of successful oral and written communication in business. Emphasis is on the development and improvement of communication skills needed for today's fast-paced organizations. Such skills include written communication in short memos and reports, including the use of conferencing technology to convey information. Additionally, the course focuses on oral communication through presentations and discussions as well as the use of current presentation software.

**MKTG.3020 Marketing Research (Formerly MKTG 302/62.302) - Credits: 3**
Analysis of the information gathering function of marketing management. Design, execution and evaluation of marketing research.

**MKTG.3100 Digital Marketing - Credits: 3**

This course presents an overview of the growing field of digital marketing and offers opportunities for acquiring technical skills of performing vital daily marketing functions. Through case studies, interactive sessions, and online simulation, class exercises, and/or client projects, students learn about the latest research and best practices in the industry. Topics covered include search engine optimization, search engine marketing, online marketing, web analytics, email marketing, social media marketing, mobile marketing, legal and security issues, and online reputation management. Students will leave the course with working knowledge of the tools and processes for creating, managing, and executing digital marketing plans.

**MKTG.3130 Sales and Customer Relations (Formerly MKTG 313/62.313) - Credits: 3**

Focuses on the concept of customer value, operating decisions in sales, customer service, and account management. Focus is given on calculating the value of a good or service to the customer, professional selling and sales forecasting, retail and wholesale operations, purchasing, and logistics.

**MKTG.3150 New Product & Service Management (Formerly MKTG 315/62.315/62.311) - Credits: 3**

Course number was formerly 62.311. Focuses on the process of new product &service development and marketing. Emphasis is given on market opportunity identification, R&Dmarketing interface, business model development, market potential estimation, and market entry timing.

**MKTG.4010 Advertising (Formerly 62.401/MKTG.401) - Credits: 3**

Evaluation of various marketing communication methods, including sales promotion and public relations, with an emphasis on advertising. Research, copy writing, scheduling and budgeting from the viewpoint of the marketing manager.

**MKTG.4020 Buyer Behavior (Formerly MKTG 402/62.402) - Credits: 3**

Applications of behavioral theories and techniques to the understanding of consumer and organizational purchasing processes.

**MKTG.4070 Retailing (Formerly MKTG 407/62.407) - Credits: 3**

This course examines the strategic role of retailing in the distribution of consumer goods and services. Students will gain insights into retailing concepts and practices and will develop skills for building sustainable competitive retail strategies. Key topics include retail formats, retail mix, retail market strategy, integrated retail communication, and customer service, with a focus on new trends and technologies in retailing and electronic retailing such as multichannel/omnichannel retailing, electronic/mobile retailing, social media, and global retailing. This course is designed to provide a foundation for those students interested in pursuing a retail career or in owning/running a retail or e-tail business. Experiential assignments are used to apply the concepts.

**MKTG.4110 Marketing Analytics (Formerly MKTG 411/62.411/62.312) - Credits: 3**

Course number was formerly 62.312. Focuses on marketing strategies and tactics. Emphasis is given on research methods and applications for strategy building and implementation. Meets Core Curriculum Essential Learning Outcome for Critical Thinking &Problem Solving (CTPS) and Quantitative Literacy (QL).

**MKTG.4120 Global Marketing (Formerly MKTG 412/62.412/62.303) - Credits: 3**

Course number was formerly 62.303. Focuses on the marketing aspect of global business. Emphasis is given on cultural dynamics and economics as well as political, social and regulatory constraints as they affect the global marketing practice and strategy implementation. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**MKTG.4300 Social Media Marketing - Credits: 3**

This course presents how social media should be effectively used as a digital communication tool in diverse business contexts. Emphasis is placed on the effective uses of social media for enhanced customer relationship building and brand equity. Topics include PR campaigns on social media, risk management, social entertainment, social commerce, online reputation management, and content marketing.

**MKTG.4960 Current Topics in Marketing (Formerly MKTG 496/62.496) - Credits: 3**

Topics of current interest in Marketing. Subject matter to be announced in advance. For a current semester course title, please log on to ISIS, the Inter-Campus Student Information System.
MKTG.4970 Senior Seminar - Credits: 3
MKTG.4980 Marketing Internship (Formerly MKTG 498/62.498) - Credits: 3
Specific projects undertaken by senior marketing students under joint supervision of department internship coordinator and representative from the business organization hosting the internship. Enrollment restricted to marketing seniors selected by internship coordinator. P/NC (free elective credit) only.

MKTG.4991 Independent Study in Marketing (Formerly MKTG 499/62.499) - Credits: 3
An opportunity for the student to carry out individualized study relating to the field of Marketing under the supervision of a member of the faculty.
Degree Pathway for the Bachelor of Science in Business Administration, Analytics & Operations Management Concentration, 2021, Spring

For students who entered spring 2021 and beyond.

### Freshman Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course#</th>
<th>Course Name</th>
<th>Cr.</th>
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<tbody>
<tr>
<td>ENGL.1010 (<a href="https://www.uml.edu/catalog/courses/ENGL/1010">https://www.uml.edu/catalog/courses/ENGL/1010</a>) / HONR.1100 (<a href="https://www.uml.edu/catalog/courses/HONR/1100">https://www.uml.edu/catalog/courses/HONR/1100</a>)</td>
<td>College Writing I / FYSH (CW)</td>
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<td>ENTR.1500 (<a href="https://www.uml.edu/catalog/courses/ENTR/1500">https://www.uml.edu/catalog/courses/ENTR/1500</a>)</td>
<td>Introduction to Entrepreneurship</td>
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<tr>
<td>MATH.1210 (<a href="https://www.uml.edu/catalog/courses/MATH/1210">https://www.uml.edu/catalog/courses/MATH/1210</a>)</td>
<td>Management Precalculus (STEM)</td>
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<td>Science Elective (SCL)</td>
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<tr>
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**Total** | 16 |

#### Spring Semester

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<tr>
<td>ECON.2110 (<a href="https://www.uml.edu/catalog/courses/ECON/2110">https://www.uml.edu/catalog/courses/ECON/2110</a>)</td>
<td>Statistics I</td>
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<td>MKTG.2100 (<a href="https://www.uml.edu/catalog/courses/M">https://www.uml.edu/catalog/courses/M</a> KTG/2100)</td>
<td>Professional Communications (WOC)</td>
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<tr>
<td>xxxxx.xxxx</td>
<td>Social Sciences Persp. (SS/2)</td>
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**Total** | 15 |

### Sophomore Year

#### Fall Semester

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<tr>
<td>ACCT.2020 (<a href="https://www.uml.edu/catalog/courses/AC">https://www.uml.edu/catalog/courses/AC</a> CT/2020)</td>
<td>Accounting/Managerial</td>
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<td>FINA.3010 (<a href="https://www.uml.edu/catalog/courses/FINA/3010">https://www.uml.edu/catalog/courses/FINA/3010</a>)</td>
<td>Financial Management (QL)</td>
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<td>LGST.2620 (<a href="https://www.uml.edu/catalog/courses/LGST/2620">https://www.uml.edu/catalog/courses/LGST/2620</a>)</td>
<td>Business Law</td>
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**Total** | 16 |

#### Spring Semester

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<tr>
<td>MATH.1220 (<a href="https://www.uml.edu/catalog/courses/MATH/1220">https://www.uml.edu/catalog/courses/MATH/1220</a>)</td>
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<td>HIST.xxxx (<a href="https://www.uml.edu/catalog/courses/HIST">https://www.uml.edu/catalog/courses/HIST</a>)</td>
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**Total** | 16 |

### Junior Year

#### Fall Semester

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Spring Semester

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<tr>
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<th>Course Name</th>
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<tr>
<td>POMS.4020</td>
<td>Global Supply Chain Management (AIL, IL)</td>
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<td>POMS.4030</td>
<td>Service Management (CTPS, QL)</td>
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<td>Manning Elective (3000/4000 level)</td>
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<tr>
<td>xxxx.xxxx</td>
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**Spring Minimum Credits = 15**

Senior Year

Fall Semester

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<th>Course#</th>
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<tr>
<td>POMS.4010</td>
<td>Logistics and Transportation</td>
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<tr>
<td>POMS.4040</td>
<td>Managerial Quality Control</td>
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<tr>
<td>MGMT.3800</td>
<td>Business Ethics (SRE)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Manning or Non-Manning Elective (3000/4000 level)</td>
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<tr>
<td>xxxx.xxxx</td>
<td>Manning or Non-Manning Elective</td>
<td>3</td>
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<tr>
<td>Total</td>
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</table>

**Total Minimum Credits = 122**

1Either course satisfies the Capstone requirement.

2The Core Curriculum Diversity and Cultural Awareness (DCA) Essential Learning Outcome is met outside the major. Students are encouraged to select an AH or SS course that meets this degree requirement. Please see the DCA course listing (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for a full list of classes that fulfill these requirements.

No more than two Breadth of Knowledge courses can be taken with the same prefix. The Core Curriculum courses may be taken in any sequence. Refer to the Core Curriculum policy for further details. You should meet with your faculty advisor to determine how you will meet the Core Curriculum requirements.

Current UMass Lowell students should use their Advisement Report in SIS (https://www.uml.edu/Enrollment/SIS/default.aspx). If you need assistance, please contact your advisor.

**Restriction on off-campus study:**

Be advised that any course taken at another institution must be formally approved (https://www.uml.edu/docs/offcampus_courses_tcm18-274376.pdf)
prior to enrollment. See the catalog policy (https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf) for details.

Last updated: 10/30/2020
MIST.2010 Business Information Systems (Formerly 63.301: Management Information Systems, MIST 201) - Credits: 3

The course familiarizes students with key components and principles of information systems and information technology. Students will learn about the role of IS/IT in businesses for improving organizational performance, competing globally, and gaining competitive advantage. The course covers basic principles and technologies pertaining to information management, business intelligence, and business analytics for improving decision-making and managing knowledge. The basic role of enterprise systems in businesses for enabling operational excellence is also discussed. Social and ethical issues associated with the use of information systems are also discussed. Students will utilize IS technologies (e.g., spreadsheet and database software) in a hands-on manner for business problem-solving.

MIST.3030 Database Management Systems (Formerly 63.303, MIST 303) - Credits: 3

An introduction to databases and Database Management Systems (DBMS). Topics include basic concepts of database technology, an introduction to SQL, techniques for logical and physical database design, interaction with a commercial DBMS, and data warehousing.

MIST.3040 Data Communications and Networks (Formerly 63.404, MIST 304) - Credits: 3

A comprehensive overview of concepts and practice in Business Data Communications and Networking. Explores the principles and applications of data communications in organizations from familiar applications into the more technical aspects of telecom architecture. Analyzes the various types of telecom networks, and how they are designed and configured, including issues involving the management and decision-making process within the telecom department. Students provided with hands-on network administration and configuration experience with a LAN administrator. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

MIST.3050 Business Applications Development (Formerly 63.330: Application Systems Development, MIST 305) - Credits: 3

Introduction to programming and computing. Topics include fundamental programming constructs, data structures, and object orientation. Through hands-on exercises to build business applications, students will learn programming concepts, software development principles, and computational problem-solving skills. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS).

MIST.3070 Web Development in MIS (Formerly 63.408 Current Topics in MIS, MIST 307) - Credits: 3

This course addresses one or more current topics to the field of Information Systems. Topics can change at each course offering. Typically, the course will focus on an emerging information technology, discussing fundamental concepts and the technology’s application to and effect on business. Examples of possible topics are expert systems, hypermedia and hypertext systems, factory automation systems, and the planning for and management of information resources. Subject matter to be announced in advance. Visit the current semester schedule on the Continuing Studies website for more details.

MIST.4020 Systems Analysis and Design (Formerly 63.307, MIST 402) - Credits: 3

An overview of the information system and systems development life cycle (SDLC). Emphasis on tools and techniques that analyst can use to document information systems. Current, classical and structured tools for describing data flow, data structure, process flow, file design, input and output design and program applications will be discussed.

MIST.4060 Data Mining for Business Intelligence (formerly 63.406: Decision Support Systems) - Credits: 3

This course introduces the concepts and techniques of data mining and analytics for transforming raw data into business intelligence and insight. It is intended to provide the students with the working knowledge for using and developing data mining technologies. The course studies how data-oriented business intelligence techniques can be used by organizations to gain competitive advantages. Topics include data integration, data transformation, Big Data Analytics, classification, prediction, clustering, association analysis, and text mining. Data-mining related ethical issues will also be discussed.

MIST.4070 Electronic Business (Formerly 63.407, MIST 407) - Credits: 3

This course familiarizes students with current and emerging electronic commerce technologies using the Internet. Focus is on both Web Design and E-Business. The web design portion provides a foundation for designing dynamic interactive websites for electronic commerce. It addresses planning and developing well-designed websites that combine effective navigation with the balanced use of graphics, text, color, and
database access. The electronic business section covers both the
theory and practice of doing business over the Internet
including issues relating to Internet technology for business
advantage; managing electronic commerce funds transfer;
reinventing the future of business through electronic commerce;
business opportunities in electronic commerce; electronic
commerce website design; social, political and ethical issues
associated with electronic commerce; and business plans for
technology ventures.

MIST.4080 Enterprise Systems Management
(Formerly 63.308, MIST 408) - Credits: 3

This course, a MIS elective, focuses on implementation of
Enterprise Resource Planning systems (ERPs) and its impact on
business change process in organizations. ERPs integrate
information and applications, spanning the functional
boundaries within an organization. The goals of the course are
to help students understand ERP systems and their underlying
components and technologies, and the business change process
with ERP in organizations. The course covers people and
technical issues during the pre-implementation, implementation
and post-implementation stages of the ERP systems life-cycle.

MIST.4090 Directed Study in Management
Information Systems (Formerly 63.409, MIST 409) -
Credits: 3

MIST.4880 Current Topics in Management
Information Systems (Formerly 63.498, MIST 488) -
Credits: 3

Selected topics having current and future impact in the field of
MIS. Subject matter to be announced in advance. Contact the
course instructor for topic details.

MIST.4890 Internship in Management Information
Systems (Formerly 63.489, MIST 489) - Credits: 3

Opportunity for students to earn academic credit through the
integration of professional work experience with related
academic work. Project jointly supervised by a faculty member
and representative of the employing organization.

POMS.2010 Introduction to Business Analytics
(Formerly 63.210/POMS.201 Managerial Decision
Making) - Credits: 3

Introduction to quantitative methods for analyzing business
problems. Analytic methods include decision analysis, linear
programming, queuing and simulation. Applications address
issues in areas such as marketing, production, finance and
logistics.

POMS.3010 Operations Management (Formerly
63.371/POMS 301) - Credits: 3

Principles of production/operations management. Nature and
function of production systems; operational planning and
control; plant layout; materials handling; inventory and quality
control.

POMS.4010 Logistics and Transportation (Formerly
63.469/POMS 401) - Credits: 3

This case-based course will examine methods and strategies for
managing and controlling material movement, with particular
emphasis on international operations, from the purchase of
production materials to the control of work in process to the
distribution of the finished product. Strategies that will be
discussed include the design of international distribution
networks, the use of third-party logistics providers, and the
creation of links between logistic systems and marketing to
create competitive advantage. The course will also explore
tactical issues that must be managed to pursue a logistics
strategy successfully, including choices regarding means of
transportation, packaging, and inventory policies. Underlying
themes of the course will be the use of information
technologies (such as electronic data interchange and bar
coding) and mathematical models to support logistics decision-
making.

POMS.4020 Global Supply Chain Management
(Formerly POMS 402/63.402) - Credits: 3

A supply chain consists of all of the activities and organizations
required to produce and deliver a good or service from raw
materials to the final end user. Global Operations and Supply
Chain Management (GOSCM) involves the coordination of
this complex network of organizations and flows of materials,
funds, and information among and between the stages of a
supply chain. GOSCM integrates the traditional business
functions of operations, marketing, logistics, finance, and
information systems in an international business context. The
course traces the flow of products and services from
development through delivery to the final user and will address
topics such as global sourcing strategies, managing demand
and supply uncertainties distribution strategies and logistics
network design for global operations, global strategic alliances,
and the role of information technology and Enterprise
Resource Planning (ERP) in managing global supply chains.
Meets Core Curriculum Essential Learning Outcome for
Applied & Integrative Learning (AIL) and Information Literacy
(IL).

POMS.4030 Service Management (Formerly POMS
403/63.470) - Credits: 3
This course is intended to provide students with the necessary tools and understanding for managing service operations. Service firms represent the fastest-growing sector of the economy. This course will focus on the various aspects involved in the management of service operations. The service operations are managed differently to their intangibility, time-sensitivity, high levels of customer involvement and lack of engineering standards. This course will explore topics such as design and delivery of services, the measurement of productivity and quality, managing capacity and demand, redesign of service delivery processes, management of technology, and others.

POMS.4040 Managerial Quality Control (Formerly 63.471/POMS 404) - Credits: 3

Views quality control from the total or company-wide perspectives. It contains traditional material on statistical process control (SPC), quality cost, quality assurance, quality information systems, as well as the recent management theories and ideas of Deming, Jurand, Ishikawa, and Taguchi.

POMS.4050 Predictive Data Analytics - Credits: 3

The main objective of this course is for the students to develop an understanding of the role of predictive analytics in direct support of managerial decision-making commonly referred to as data analytics, and how they relate to other types of business analytic methodologies. Topics to be covered include logistic regression, data mining, regression prediction, classification prediction, artificial neural networks, sensitivity analysis, information fusion, and combining forecasts form different models. Data analytic enabling software packages will be used including some hands-on capabilities.

POMS.4060 Simulation and Optimization for Business Analytics - Credits: 3

Uncertainty manifests itself in most business dataset. Descriptive analytics tools help us explain the nature of the uncertainty that we have experienced, while predictive analytics tools further aid us in estimating outcomes for any given set of predictors. In this course, we cover simulation and optimization as prescriptive analytics methodologies. They take descriptive and predictive analytics results as input, helping us make managerial decision under such uncertainty. They are the art and science of creating and analyzing a model of real-world systems. This course covers business process design and analysis, simulation and optimization model development, and discrete-event simulation software application.

POMS.4090 Directed Study in Operations Management (Formerly 63.479/POMS 409) - Credits: 3

Topics of current interest in operations management. Subject matter to be announced in advance.

POMS.4890 Internship in Operations Management (Formerly 63.490/POMS 489) - Credits: 3

Opportunity for students to earn academic credit through the integration of professional work experience with related academic work in Operations Management. A project, jointly supervised by a faculty member and representative of the employing organization with mutually defined objective(s), will be completed by the Student. An approved report in written form will be submitted to the supervising faculty member.
ENGL.1010 College Writing I (Formerly 42.101) - Credits: 3
A workshop course that thoroughly explores the writing process from pre-writing to revision, with an emphasis on critical thinking, sound essay structure, mechanics, and academic integrity. Students will read, conduct rhetorical analyses, and practice the skills required for participation in academic discourse. Students will write expository essays throughout the semester, producing a minimum of four formal essays.

ENGL.1010S College Writing Studio - Credits: 4
A workshop course that thoroughly explores the writing process from prewriting to revision, with an emphasis on critical reading, essay structure, mechanics, and academic integrity. Students will read, conduct rhetorical analyses, and practice the skills required for participation in academic discourse. Students will write expository essays throughout the semester, producing a minimum of four formal essays. This 4-credit version of the course provides extra time and guidance each week for critical reading, sentence-level work, and revision. Anti Req for ENGL.1011 and ENGL.1010. Placement test score determines enrollment.

ENGL.1010SI Intensive Writing Lab - Supplemental Instruction (Formerly 42.101SI) - Credits: 1
Taken simultaneously with College Writing I, the Intensive Writing Lab offers students supplemental instruction to complement their work in that course. Students who place into the Writing Lab will receive extensive training in grammar, mechanics, and the use of Standard English. The once-per-week lab encourages students’ success in College Writing I and in their other classes. The course credit cannot be used to satisfy the credits required for graduation.

ENGL.1020 College Writing II (Formerly 42.102) - Credits: 3
A workshop course that thoroughly explores the academic research writing process with an emphasis on entering into academic conversation. Building on the skills acquired in College Writing I, students will learn to write extensively with source material. Key skills addressed include finding, assessing, and integrating primary and secondary sources, and using proper documentation to ensure academic integrity. Students will produce analytical writing throughout the semester, including a minimum of four formal, researched essays.

ENGL.1020SI Intensive Writing Lab 2 - Credits: 2
Taken simultaneously with College Writing II, the Intensive Writing Lab offers students supplemental instruction to complement their work in that course. Students who place into the Writing Lab will receive extensive training in grammar, mechanics, and the use of Standard English. The once-per-week lab encourages students’ success in College Writing I and in their other classes. The course credit cannot be used to satisfy the credits required for graduation.

ENGL.1100 College Writing Workshop (Formerly 42.110) - Credits: 3
A workshop course that provides a thorough review of the basics of essay writing in preparation for success in College Writing I, with a focus on the particular needs of multilingual students. Students placed into this course will use the writing process to strengthen the fundamental skills necessary for clear academic writing in English, including the basic rules of grammar and principles of rhetoric. Credit for both 42.100/ENGL.1000 and 42.110/ENGL.1100 will not be granted.

ENGL.1100SI College Writing A ESL Supplemental Instruction - Credits: 1
College Writing A ESL Supplemental Instruction.

ENGL.1110 College Writing I ESL (formerly 42.103/111) - Credits: 3
Satisfies the first half of the first-year writing requirement, equivalent to 42.101 College Writing I, with a focus on the particular needs of multilingual students. Credit for both 42.101 and 42.111 will not be granted, nor credit for both 42.101 and 42.103.

ENGL.1110SI Supplemental Instruction for College Writing I ESL (Formerly 42.111SI) - Credits: 1
Supplemental Instruction for College Writing I ESL.

ENGL.1120 College Writing II ESL (formerly 42.104/112) - Credits: 3
Satisfies the second half of the first-year writing requirement, equivalent to 42.102 College Writing II, with a focus on the particular needs of multilingual students. Credit for both 42.102 and 42.112 will not be granted, nor credit for both 42.102 and 42.104.

ENGL.1120SI College Writing II ESL Supplemental Instruction (Formerly 42.112SI) - Credits: 1
College Writing II ESL Supplemental Instruction.
HONR.1100 First Year Seminar in Honors: Text in the City (Formerly HON 110) - Credits: 3

The First Year Seminar in Honors (FYSH) uses Lowell as its text. Rich in history and culture, and the students' home for the next four years, the City of Lowell offers a perfect topic to promote connections while learning how to view the city through the lens of the Humanities. Students will develop library research skills, including facility with primary and secondary sources, and an appreciation for the narratives that lie in buildings, objects, and what people leave behind. Activities include field trips, readings, writing, and an artistic interpretation. As important, students will have the opportunity to form strong connections to each other, to the faculty, and to the community. Note: New course, but combination of current 59.102 and 59.103 in one semester.
AEST.2210 20th Century Art (Formerly 79.221) - Credits: 3

A study of American and European movements in painting, sculpture, and architecture from 1900 to the present. Emphasis is placed on Fauvism, Cubism, Expressionism, Surrealism, International Style, Pop, Op Art, Minimal Art, Photorealism, and Post-Modernism.

AEST.2250 History of Photography (Formerly 79.225) - Credits: 3

Less than 200 years old, photography seems to span millennia. With 1839 as the invention’s launch date, there is no photograph of George Washington, but very soon we are flooded with the faces of composers, painters, and presidents: we know and are reminded of the ravages of civil and world wars, industrial progress and social injustice, or the beauty of pristine landscapes and their ecological demise. In this course, students will become familiar with some 100 notable photographers, from the beginning years of its invention to contemporary times with works by major artists and forgotten visionaries, all serving as a foundation for inspiration and understanding of the art worlds most visible medium. Grading in the course is based on a mid-term and final exam along with a major research paper.

AEST.2310 Aesthetics and Critical Studies Seminar (Formerly 79.231/490) - Credits: 3

The Aesthetics and Critical Studies Seminar introduces a wide variety of artists, designers, images, concepts, movements and theories. The objective of this course is to improve critical awareness and provide a theoretical background to art and design studio courses. Topics to be announced. Course may be repeated.

AEST.2410 Art Serving Political, Religious, & Social Needs (Formerly 79.241) - Credits: 3

The objectives are to study the production of meaning in paintings and frescos, sculpture, stained glass, architecture and other art forms that were commissioned through the church and state patronage system; to analyze how these images are used to represent and define social order; how these images support the patron’s interpretation of history while appealing to aesthetic needs; and ways in which art supported the educational and evangelical aims of church and state. The course will introduce students to the visual and critical language of art produced at this time and analyze works in the context of contemporary history. The thematic focus of this class is designed for Italian cultural studies. No knowledge of Italian is required.

AEST.2800 From Collective to Personal Aesthetics (Formerly 79.280) - Credits: 3

This course is an exploration in aesthetics and culture. The seminar examines a variety of works by contemporary artists and designers; and also introduces important texts by philosophers, art theorists, and critics. Throughout the semester, student will study current trends in visual studies. They will examine a range of works form popular culture to high art and respond to various readings through class discussions and papers. In addition, the course will facilitate intellectual engagement with ones own visual work. Through their research, student will explore the connections between their work and that of other artists and designers. They will situate their artwork within the field of criticism, creating a bridge across the traditional divide between theory and practice.

AEST.3600 Aesthetics and Critical Studies of Graphic Design (Formerly 79.360) - Credits: 3

Examination of the aesthetic theories and practice of graphic design. Significant practitioners of the art will be highlighted.

AEST.3620 Post-digital Aesthetics - Credits: 3

Post-digital Aesthetics explores art after the digital revolution focusing on critical analysis of digital images and environments. We will study how digital technology has transformed art making and also how it impacts the very definition of art. The blurring of boundaries between art, life and design is more than ever evident as human experiences are increasingly mediated through technological devices and high-quality design. The internet has dramatically altered how and why we make art while virtual presence and embodiment in VR bring unprecedented questions about the role of artists and designers in our understanding of the world. This course will be taught as a face-to-face seminar. However, we will also travel beyond the classroom walls into virtual worlds and environments.

AEST.3800 Understanding Movies: Cinema as Social Commentary (Formerly 79.380) - Credits: 3

This film theory seminar has several main objectives: to study the production of meaning in films; to analyze how moving images are used in social representation; and to introduce students to the visual and critical language of cinema. In this course, we will view a series of films by international authors. These address some of the most pressing issues of today’s global world such as identity, subjectivity, difference and otherness, race relations, representations of gender and sexuality, immigration, war, colonialism and post-colonialism, poverty, and social inequalities. The films that we watch will be studied not as isolated cinematic texts but as illustrations
and examples of theories of representation. Students will develop their critical analysis skills by being introduced to theoretical concepts such as “the gaze” in art and cinema as well as formal elements such as mise-in-scene, cinematography, editing, and sound.

AEST.4900 Aesthetics and Critical Studies Seminar (Formerly 79.231/490) - Credits: 3

The Aesthetics and Critical Studies Seminar introduces a wide variety of artists, designers, images, concepts, movements and theories. The objective of this course is to improve critical awareness and provide a theoretical background to art and design studio courses. Topics to be announced. Course may be repeated.

AEST.4940 Directed Study in Aesthetic Concepts (Formerly 79.494) - Credits: 3

An individual supervised research project relating to questions of aesthetic interpretation and understandings. Fall and Spring.

AEST.4960 Practicum Experience in Aesthetic Concepts (Formerly 79.496) - Credits: 3

A program of on-campus and/or off-campus experiences for art majors only. Specific requirements will vary depending upon department policies and the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural or artistic area and for applying techniques of problem solving and/or credits. Students will be graded "satisfactory" or "unsatisfactory". Fall and Spring.

AMST.2480 Perspectives American Culture (Formerly 40/42.248) - Credits: 3

The goal of this class is to enhance students’ ability to read and interpret American texts by learning how to see them in context, to understand the way readers approach texts from interpretative lenses, and to express their insights about American culture in a variety of forms and genres. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility &Ethics (SRE).

AMST.2570 The Family in American Literature (Formerly 40.257) - Credits: 3

A study of literary selections dealing with traditions of family life, the individual, and social change. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ARCH.2060 History of Architecture (Formerly 58.206) - Credits: 3

A survey of the major technical and stylistic developments in ecclesiastical and secular architecture from Prehistory to the present day studied with an emphasis on the major monuments (Parthenon, Pantheon, Gothic Cathedrals, St. Peter’s, Versailles Palace, Eiffel Tower, Guggenheim Museum). Spring, alternate years.

ARCH.3140 American Architecture (Formerly 58.314) - Credits: 3

This course begins with a discussion of native American building traditions and proceeds chronologically from the 17th through the 20th centuries. Students will gain a familiarity with the major movements in American architecture (such as Colonial, Greek Revival, Victorian, Arts and Crafts, City Beautiful, International Style, Postmodern) as well as the leading architects such as Frank Lloyd Wright and Frank Gehry. The architecture is discussed in its historical context with attention to the inventions, materials and aesthetic assumptions that made it possible.

ARCH.3150 Modern Architecture (Formerly 58.315) - Credits: 3

This course will examine global architecture from the 19th century to the present. It addresses the major movements, "isms", architects, publications, schools, and technological innovations that contributed to varied (and often conflicting) notions of "Modern architecture." Growing nationalism and politics, travel and colonial occupation, the effects of war, and changing conceptions of nature and science, all transformed the built environment. This course will provide a better understanding not only of individual works but also of the ways architecture manifests important themes such as nationalism, regionalism, functionalism, rationalism, and the most current theme, happiness.

ARCH.3160 Architectural Utopias - Credits: 3

Can we build a better world? Many people from various eras and geographical locations have argued we can. The idea of utopia -- a place of harmony free from want and strife -- has shaped both imagined and real places. So has its opposite: dystopia. This course will focus on architectural visions and solutions for utopias from the ancient world to the present: from myths of long-lost cities to projected colonies on the moon and Mars.

ARCH.3550 The City and the Environment - Credits: 3

This course examines the many ways that communities, architects, and developers have responded (or not responded)
to the American landscape and environment. It will begin with the earliest settlements established by the colonists, such as Havana, Cuba, and New York City and progress to the present with a special emphasis on Lowell and Boston. The course will not only examine specific cities but also architectural utopias, city planning, the national park system, sustainable design, and contemporary efforts to merge the needs of the city with environmental awareness.

ARHI.1010 Art Appreciation (Formerly 58.101) - Credits: 3

The course introduces the student to the technical, aesthetic and historical aspects of architecture, sculpture, and painting. An analysis of the visual elements used in fine arts such as color, line, shape, texture, and principles of design are developed through slide lectures, museum visits and assigned readings. In addition, students investigate the purposes of art and visual communication and develop a heightened sense of critical thinking that allows them to investigate successfully different modes of representation, styles and media in a multicultural society.

ARHI.1050 Comparative Arts (Formerly 58.105) - Credits: 3

This course studies the aesthetic, artistic and intellectual similarities between art history and music history. Discussion of the arts focuses on the development in examining the human creativity and expression through the arts: from ancient times as art and morality followed in the Renaissance as art and sciences continued in the Enlightenment as art and society contrasted in the nineteenth century as art and entertainment. Furthermore, this course surveys some of the fundamental aspects of music and art, such as the nature of aesthetic judgment, the task of art and music criticism, including formalist, representational, and contemporary theories on viewing, analyzing, and interpreting the arts. In addition, with a comparative analysis between the modes of visual and aural representation, visual and aural perception, this course analyzes the principal forms and genres of the visual and aural elements of art history and music history, providing an understanding for human creativity and expression. Spring, alternate years.

ARHI.2030 History of Art I: Prehistoric to Medieval Art (Formerly 58.203) - Credits: 3

A survey of the origins of painting, sculpture, and architecture from the prehistoric period through approximately 1300 CE. Works of art are discussed in their historical, cultural, and artistic contexts.

ARHI.2040 History of Art II: Renaissance to Modern Art (Formerly 58.204) - Credits: 3

A survey of the origins and development of painting, sculpture, and architecture from Renaissance times to the Modern period. Emphasis is placed on representative works of art from the Renaissance, Baroque, Rococo, Nineteenth Century Movements-Neoclassicism, Romanticism, Impressionism, Cubism, Dadaism, Surrealism and Abstract Art. The aim of the course is to introduce the student to basic critical and art historical methods as well as the analysis of style and content within sequential cultural contexts.

ARHI.2110 Nineteenth Century Art (Formerly 58.211) - Credits: 3

A study of the major artists and artistic movements of the 19th century. This course examines major cultural, social and political forces (e.g. class struggles, racial and gender inequalities, industrialization, scientific discoveries, emancipation, education reform, the influence of early "social media," etc.) through the lens of the visual arts and pays particular attention to how these forces impacted the way art was produced, viewed, and understood.

ARHI.2210 Twentieth Century Art (Formerly 58.221) - Credits: 3

A study of developments in painting, sculpture, performance, media arts, conceptual art, architecture, and design after 1900. This course encompasses modernisms in Europe, the Americas, Asia and the global south.

ARHI.2310 Greek and Roman Art (Formerly 58.231) - Credits: 3

A study of Greek painting, sculpture, and architecture from the Cycladic to the Hellenistic period, and an examination of Roman Art from the Etruscan age to the beginning of Christian art. Emphasis is placed on the Greek Classical period and the Roman Empire.

ARHI.3000 Art History, Music and Culture (Formerly 58.300) - Credits: 3

This course is a historical and critical examination of the aesthetic and intellectual similarities between art history, music history, literature and culture from Ancient Egypt to contemporary Art. Emphasis is placed on an in-depth exploration of western cultures. In addition, this course provides an understanding of human creativity and expression through a comparative analysis of visual art and music.

ARHI.3020 Studies In World Art (Formerly 58.302) -
Credits: 3

Historical and critical examination of regions works of art from China, Asia, the Islamic world, India, Africa, North America, Latin America, Native American Art and Mexico. Topics vary from year to year. Course may be repeated.

ARHI.3130 American Art (Formerly 58.313) - Credits: 3

This course centers on the study of American painting, sculpture, and decorative arts from the period of first contact up through the mid-twentieth century. One of the central questions of American art remains its definition: when does it start? What sources does it draw upon? In this class we will discuss American art through its ties to the peoples, events, institutions, and landscape that shaped it.

ARHI.3151 Islamic Art and Contemporary Society (Formerly as 59.315) - Credits: 3

This course introduces students to Islamic art through a survey of works across the broad reach of the Islamic world including Saudi Arabia, Northern and Saharan Africa, Spain, the former Ottoman Empire surrounding Turkey and the Greater Middle East. The last unit of the course looks at Islamic art in the diaspora. The course highlights works form c. 500 CE to the present, ending with the ultra modern city of Dubai.

ARHI.3210 Italian Renaissance Art (Formerly 58.321) - Credits: 3

A study of painting, sculpture, and architecture in the major artistic centers of Italy (Florence, Rome, Venice, Milan and the Northern Courts) during the 15th and 16th centuries. In addition to examining artworks by some of the most important artists of the period - Leonard da Vinci, Michelangelo, titan - this course considers larger themes raised by these works and gives attention to the conditions within which the works were originally produced and viewed.

ARHI.3230 Northern Renaissance Art (Formerly 58.323) - Credits: 3

A study of 15th and 16th century painting and sculpture north of the Alps including artists such as Jan van Eyck, Hieronymus Bosch, Jean Fouquet and Albrecht Drer. This course considers how social forces (politics, race, religion, gender etc.) influenced the manner in which Northern renaissance art was produced, viewed, and understood, as well as how these forces led to the creation of some of the most startling, strange and enigmatic images of any period in the history of art.

ARHI.3250 Studies in Latin American Art (Formerly 58.325) - Credits: 3

An introduction to the art and architecture of ancient, colonial, and modern Latin America. The course provides a framework by which students consider the complex intersections--of vision, power, history, and artistic production--in Latin American art within both local and global contexts.

ARHI.3300 Italian Mannerism (Formerly 58.330) - Credits: 3

A study on the impact of the High Renaissance in the sixteenth century, the subsequent development of early Mannerism in central Italy and the formation of the Proto-Baroque style in Venice and Northern Italy, the establishment of the courtly Mannerist style. The role of representative artists such as Anguissola, Pontormo, Rosso, Parmigianino, Bronzino, Beccafumi, Fontana, Vasari, Veronese, Bandinelli, Cellini, Palladio, Peruzzi and Ammanati is emphasized.

ARHI.3310 Asian Art (Formerly 58.331) - Credits: 3

The purpose of this course is to provide a general overview of the art of the traditional cultures of Asia, China, India and Japan. This survey provides a critical and historical examination of these cultures.

ARHI.3320 Baroque Art (Formerly 58.332) - Credits: 3

This course surveys the drama and dynamism that infused painting and sculpture from 1550-1750. With its origins in Italy, Baroque art quickly spread throughout much of Europe (including Flanders, France, England, the Dutch republic, Spain, Portugal) and the New World. This course will explore the ways the arts were used to express political ambition, forge social and political alliances, as well as to create cultural identity and memory.

ARHI.3350 The Golden Age of Spanish Art - Credits: 3

This course is a survey of art in Spain from the discovery of the Americas in 1492 through the mid-seventeenth. This roughly 150-year period, known as the Spanish Golden Age or Siglo de Oro, witnessed the expansion of the Spanish empire across the Atlantic and Asia and gave rise to many of Spain’s greatest artistic achievements. This course will survey the unprecedented contributions of Spanish painters, sculptors and architects; the patrons and political forces contributing to this Golden Age of artistic production; and the place of the Spanish golden Age within broader European and global contexts.

ARHI.3360 Arts of Sub-Saharan Africa - Credits: 3
This course surveys the arts of Sub-Saharan Africa from the 12th century to the present day. It will situate works of art firmly in the history, aesthetics, values, and motivations of the cultures that created it. Students will discover that each culture has its own unique relationship with art and history. The course will also address the process of ambiguities of living and making art in global, post-colonial world. Students will gain not only a strong foundation of art historical knowledge but also how that knowledge affects our current interactions with African art through museum exhibitions and collections.

ARHI.3400 Women and Art (Formerly 58.340) - Credits: 3

An introduction to key issues and theoretical approaches to the study of women and art. This course examines women as makers of art, as subjects of art, and as interpreters of art. The class will explore the ways artists have represented the intersections of gender identities, sexual orientation, power, race, class and nationality in their works and the socio-cultural conditions in which specific artists have been excluded or marginalized in art practice, exhibition, collecting and critical discourse.

ARHI.3410 Medieval Art (Formerly 58.241) - Credits: 3

This course examines the rich cross-cultural artistic heritage of the medieval world from the Late Antique period (third century CE) through the Gothic period (fourteenth century CE). The course includes the study of paintings, sculpture, illuminated manuscripts, mosaics and architecture. It will explore materials and technique, the relationship of images to sacred texts and rituals, and the controversies regarding image production. Drawing examples for the eastern Mediterranean to the rocky coast of Ireland, the course will draw out the way works of art reflected relationships between the Jewish, Christian, and Islamic religions.

ARHI.3470 French Impressionism and Post-Impressionism - Credits: 3

This course surveys the artists and artistic movements associated with impressionism and Post-Impressionism in France. The course will begin with an examination of the arts just prior to the last quarter of the nineteenth century and will continue through the beginning of the twentieth century. Readings, lectures and assignments will engage students in a close study of French artists and France itself as the art-making capital of the West during this period. In this capacity, the course will investigate how social forces (politics, gender, race, religion, etc.) influenced the manner in which "modern" art was produced, viewed, and understood.

ARHI.3500 Post Modernism (Formerly 58.350) - Credits: 3

Following the Second World War, artists transformed the avant-garde tradition of their European predecessors to establish a dialogue with the mass media and consumer culture that has resulted in a wide array of artistic movements. Issues ranging from multiculturalism and gender to modernism and postmodernism will be addressed through the movements of abstract expressionism, pop, minimalism, neo-expressionism and appropriate in the diverse media of video, performance and photography, as well as painting and sculpture.

ARHI.3520 Contemporary Art and Culture (Formerly 58.352) - Credits: 3

Examination of issues of content, theory, and criticism in contemporary art. Current exhibitions and criticism are integral to the course. Topics vary from year to year. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ARHI.3530 History of Public Art in the Modern Era (Formerly 58.353) - Credits: 3

This course serves as an introduction to the history of public art in the modern and contemporary world. The history of public art is examined in relation to such concerns as the definition of public space, community involvement in the creative process, the institutional and economic support system for the arts, the modern understanding of memorial sculpture, and the use of the visual arts to foster public dialogue and cultural exchange.

ARHI.3600 Museum Issues (Formerly 58.360) - Credits: 3

The art museum in the United States is a unique social institution because of its blend of public and private support and its intricate involvement with artists, art historians, collectors, the art market, and the government. This course will study the art museums history and status in our society today. Special consideration will be given to financial, legal and ethical issues that face art museums in our time. Short papers, oral reports and visits with directors, curators and other museum officials in nearby museums will be included along with a detailed study of a topic of ones choice.

ARHI.3650 Art and Environment (Formerly ARHI.2300) - Credits: 3

This course surveys developments in land, environmental, and ecological art. Some of the most compelling artists today engage with the politics of land use, including the conditions of the global economy, climate change, environmental justice,
sustainability, sovereignty and land claims, uneven geographies and expanding megacities, and the privatization of public space.

ARHI.4900 Art History Seminar (Formerly 58.490) - Credits: 3
Study of particular artist, style or selected art historical problem. Topics to be announced. Course may be repeated.

ARHI.4910 Art History Seminar (Formerly 58.491) - Credits: 3
Study of particular artist, style or selected art historical problem. Topics to be announced. Course may be repeated.

ARHI.4940 Directed Study in Art History (Formerly 58.494) - Credits: 1-4
An individual supervised research project relating to stylistic, thematic or methodological issues in Art History, the result to be presented in a significant paper.

ARHI.4950 Advanced Tutorial in Art History (Formerly 58.495) - Credits: 3
A program of directed study affords the advanced student with an additional opportunity to pursue a previously explored problem in greater depth or to initiate and investigate an additional problem. The purpose is to sharpen and refine skills for scholarly research and presentation.

ARHI.4960 Practicum Experience in Art History (Formerly 58.496) - Credits: 3
A program of on-campus and/or off-campus experiences for Art History students only. Specific requirements will vary depending upon department policies and the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural or artistic area and for applying techniques of problem solving and/or credits. Students will be graded satisfactory or unsatisfactory.

ARTS.1010 Art Concepts I (formerly 70.101) - Credits: 3
Art Concepts I will focus on learning the visual language of the creative process through an examination of the principles of two-dimensional visual organization. These fundamental basics form the underlying structure of all studio and communication arts. Through slide lecture, guest lecturers, field trips, and studio projects, students will begin to understand the many forms that visual expression takes. The course will develop creative problem solving skills and students will learn to respond to personal challenge. Students will also be instructed in the principles of professional execution and be introduced to diverse modes of thought, media, and aesthetic expression. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS).

ARTS.1020 Art Concepts II (formerly 70.102) - Credits: 3
Art Concepts II will focus on learning the visual language of the creative process through an examination of the principles of three-dimensional visual organization. These fundamental basics form the underlying structure of architecture, environmental graphic design, product design and sculpture. Through slide lecture, guest lecturers, field trips, and studio projects, students will begin to understand the many forms that three dimensional expression takes. The course will develop creative problem solving skills and students will learn to respond to personal challenge. Students will also be instructed in the principles of professional execution and be introduced to diverse modes of thought, media, and aesthetic expression. Art majors only. Fall and Spring.

ARTS.1130 Digital Foundations (Formerly 70.113) - Credits: 3
This course explores the computer as a tool of the visual language. Topics included are raster and vector-based image making, art for the internet & mobile devices, and current image capture and output methods. This course will introduce Photoshop, Illustrator, Flash and a basic programming with the aim of expanding the artist's toolkit. Lectures, readings, and discussions will provide an overview of history and contemporary ideas on the use of computers in art. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

ARTS.1140 The Creative Process (formerly 70.114) - Credits: 3
This course explores the relationship between the creative process, self-expression and communication, through the visual arts. The creative process is first explored broadly as a problem-solving tool applicable to all fields of human endeavor. The student then experiences the creative process in studio explorations and the creation of art works with an emphasis on process rather than product with the goal of broadening the basis for student self confidence in creative skill development, originality, critical thinking/writing, the use of information technology resources, and appreciation of the visual arts as a powerful vehicle for communication.

ARTS.1150 Drawing for Non-Art Majors - Credits: 3
This introductory drawing course is intended for students with little or no drawing experience. It is a studio art course involving the learner in a hands-on approach to basic drawing and composition. Learners explore, comprehend, and employ the basic elements and principles of art, use various graphic media and become familiar with the vocabulary, concepts and techniques of drawing.

**ARTS.1160 Graphic Design for Non-Majors - Credits: 3**

In this course, non-major students with an interest in Graphic Design will be introduced to design and typography fundamentals and how they apply to both print and screen-based media. In a variety of assignments, students will learn design process, image-making and layout, writing and responding to a client brief, including brand identity creation and a social awareness project. They will work with the Adobe Creative Cloud programs Illustrator, Photoshop and Indesign and be able to execute their designs using the appropriate software. This class will meet once a week for 3 hours.

**ARTS.1350 Kinetic Projects (Formerly 70.135) - Credits: 3**

Kinetic Projects is a hybrid course designed for a variety of majors to explore the intersections between mechanical engineering and sculpture. In this project-driven class, students will learn principles and practice in both the fields of engineering and art, and put them into practice by creating functioning kinetic objects to be displayed in a public setting. The course will also include guest lectures from practitioners in Art and Engineering. The course provides an introduction to technical communications, teamwork, data analysis, computer coding, computer-aided drafting/design/modeling program usage, prototyping techniques, report-writing and/or oral presentation.

**ARTS.1550 Drawing I (formerly 70.155, 70.255) - Credits: 3**

Provides a foundation in basic drawing concepts using a variety of media and approaches. The emphasis is on building visual literacy and its application to the realm of ideas. A wide range of assignments are given to develop graphic expression.

**ARTS.1560 Drawing II (Formerly 70.156, 70.256) - Credits: 3**

The emphasis is on giving form to ideas through building a solid sense of visual literacy. Assignments include a wide range of color media, surface, and subject matter with the focus on the psychological and structural use of color, creative experimentation, and the development of personal style. Fall and spring.

**ARTS.1610 Introduction to Photography (formerly 70.161) - Credits: 3**

Photography for Non Majors. Students learn how to transform the three-dimensional world before their eyes into the two-dimensional world of photography utilizing the human invention of the lens and camera. They come to appreciate the role photography plays in composition, lighting, and concept creation. Does not count towards a BLA minor or a BFA degree. AH.

**ARTS.2010 Form And Content (formerly 70.201) - Credits: 3**

Form and Content is considered the capstone course of the Art Foundations Requirement. Through a variety of studio assignments and individual projects students will explore the integration of humanities related concepts and develop an understanding of how visual artists think, live and function in the twenty first century. As part of the course requirements students will participate in the foundations exhibition at the end of the semester. Art majors only. Fall and Spring.

**ARTS.2100 Graphic Design I (Formerly 70.210) - Credits: 3**

Exercises, lectures and projects will introduce students to graphic design principles and techniques. Course will begin with a fundamental study of image, form, and space relations, then cover such topics as working with grids, typography basics, page layout, the introduction of color, rendering techniques, denotative and connotative image making, history, and more. Students will be assigned a series of projects to enhance their visual communication skills. Students will be introduced to the software used in contemporary design practice. Students must earn a C+ or better in the course to continue in the Graphic Design BFA program.

**ARTS.2200 Website Design I (formerly 70.220) - Credits: 3**

This course will focus on the creation of visual content for the web and will explore what constitutes a visually exciting and engaging site. Other topics that will be covered are: file formats, compression, web color strategies, and platform standards. Basic familiarity with Mac OS and/or Windows platforms required.

**ARTS.2210 Practicum/Internship (formerly 70.221) - Credits: 3**

The Practicum/Internship is an on-campus or off-campus
learning experience. Specific requirements will vary depending on department policies and the nature of the program undertaken by the student. The practicum experience is to provide an occasion for practical experience in an area of particular interest to the student.

ARTS.2300 Typography I (Formerly 70.230) - Credits: 3

This introductory typography course is for students interested in visual communication, type and its use. Students begin the semester working with a single letterform and numeral and end the semester researching and design an entire book. Proper typographic systems must be used including a detailed look at page layout software, creating grids, working with “style sheets” and the finer points of setting typography. We will also explore how to transfer these skills and concepts for use in screen-based media. This is a project based course which contains visual, written, and research components. Students will be introduced to the software used in contemporary design practice. Students must earn a C+ or better in this course to continue in the Graphic Design BFA program.

ARTS.2320 Ceramics I (formerly 70.232) - Credits: 3

Learn the basics of working with clay with a focus on traditional Khmer hand building and surface carving practices. Hand building techniques including slab construction, coil pinch, low relief carving, slip joinery, and additive processes to create vessels and sculptures will be covered as well as glazing, color, and traditional wood kiln firing processes. Students make sculptural and functional forms to fire in a Cambodian style environmentally green smokeless wood burning kiln. Course is suitable for both beginners and intermediate ceramists. This is a General Education elective in arts & humanities.

ARTS.2350 Sculpture I (formerly 70.235) - Credits: 3

The exploration of three-dimensional form through the use of basic materials, methods and approaches. Assignments will include expressive problems based on human and non-objective form relationships. Spring.

ARTS.2420 Language of Video (formerly 70.242) - Credits: 3

An introductory course in video camera principles and editing functions. Utilizing writing and still photography, students will explore the language of video in both images and sound as they produce factual documents and/or personal fiction.

ARTS.2560 Drawing III (formerly 70.256) - Credits: 3

This advanced course in drawing is designed to help students develop the expressive and conceptual concerns of their drawing practice while developing their ability to work in an independent manner. Designed for students in all disciplines, the course will emphasize the development of strong research skills through the exploration of historical and contemporary modes of drawing. The class will be combination of studio work, presentations, and individual and group critiques. Critiques are designed to provide feedback and to encourage and nurture each student's vision. Exploring a variety of drawing media, the ultimate goal of the course is the development of a visually coherent and conceptually unified body of work.

ARTS.2570 Monotypes (formerly 70.257) - Credits: 3

Exploration of the one-of-a-kind "painter's print". Emphasis is on the development of personal expression through a variety of assignments and techniques. Three portfolios of prints are required, two with assigned topics, and one with a self-assigned theme. Fall, alternate years.

ARTS.2590 Papermaking (formerly 70.259) - Credits: 3

The papermaking course is designed to explore paper, not just as a surface to receive an image, but as a material capable of being an artistic expression in and of itself. The course will explore the processes and techniques of making images in handmade paper, making images on handmade paper, making visual designs out of handmade paper and casting handmade paper into three-dimensional sculptural forms. Spring, alternate years.

ARTS.2610 Photography I (formerly 70.261) - Credits: 3

A foundation course that covers the basic analogue and digital camera techniques, as well as aesthetic principles. Students learn to make, develop, and print their own photographs.

ARTS.2620 Digital Imaging and Photography: Photoshop (formerly 70.262) - Credits: 3

This course will offer the student a transition between traditional photographic imaging and digital photographic imaging. The course will cover the fundamentals of digital scanning, digital capture, and image manipulation. Image preparation for other media will also be explored. Basic familiarity with the Mac OS and/or Windows platforms required. 6 Contact Hours required for Day School students.

ARTS.2660 Alternative Photo Processing (formerly 70.266) - Credits: 3

Alternative Photo Processing give the serious photography
student an opportunity to learn historic and contemporary alternative processes such as Cyanotype, Van Dyke Brown, Kallitype, Palladium, and Image Transfers. Alternative methods of creating negatives utilizing photocopiars, inkjet printers, Clich Verre, and Acrylic Lifts will give students the opportunity to make handmade photographs with and without a camera.

ARTS.2670 Printmaking (formerly 70.267) - Credits: 3

An introduction to basic printmaking processes and aesthetics with the emphasis on etching. The approach is concept oriented, emphasizing experimentation and exploration on an individual level to communicate ideas. Fall.

ARTS.2690 Color (formerly 70.269) - Credits: 3

A course in the systematic study of color and color theory to sharpen visual acuity, stimulate creativity and develop a greater facility in the use of color.

ARTS.2700 Figure Drawing (formerly 70.270) - Credits: 3

The study of the draped and undraped figure from life, stressing both sound observation and the creative use of human form as a vehicle for personal expression. A variety of assignments, graphic media, and approaches will be given in order to help explore both philosophical and aesthetic issues. Fall, alternate years.

ARTS.2710 Painting I (formerly 70.271) - Credits: 3

Presents oil painting techniques as vehicles for serious creative expression. A variety of assignments will be given to the student build proficiency in the use of color, paint handling, and subject matter.

ARTS.2720 2D Animation I (formerly 70.272) - Credits: 3

This course will provide students with the fundamental understanding about the process and the concepts in animation for narrative and experimental expression. Preproduction including scripting and storyboarding will be especially emphasized. Hybrid techniques in both traditional and digital animations including hand-drawing, stop-motion, rotoscoping, pixilation as well as tweening will be introduced. Static and kinetic aesthetics of moving images will be explored through the review of historic and contemporary animations, and through the production. Students from this course will make a much smoother transition to 3D animation courses, Language of Video, Interactive media as well as Web Design/Art. The course will also introduce the student to historical and contemporary perspectives related to the discipline.
This course will provide students with an understanding of the creative, visual and formal aspects of the applied art of illustration. Project challenges will be based on several real-world applications of illustration in a variety of genres including editorial, sequential narrative, portrait, nature and product application. The course includes an introduction to different illustration media, the stages and process of creating illustrations and learning about both contemporary and historic illustrators. They will be encouraged to develop unique thinking and conceptual approaches as they hone their artistic voice. Students will learn to communicate ideas and develop content through research, discussion, sketching, critique and creating.

ARTS.2950 Studio Workshop Abroad (formerly 70.295) - Credits: 3

In this course students will make a portfolio of small works and take them abroad to exhibit internationally. While on tour, participants will create further works by interaction with their surroundings, take visual notes, and collect items to broaden artistic practice upon return home. Participants are to generate work that develops their own artistic voice, explores and expresses their visions open to the surrounding foreign cultural influences. As this course takes place largely abroad, the unique challenges of interpreting culture, representing profound experience, and learning from a mix of ancient and modern sources will frame artistic investigations.

ARTS.2951 BioArt Workshop in Portugal - Credits: 3

This is an interdisciplinary course that combines art and science a Cultivamos Cultural in San Luis Portugal. The intersection of Art, Biology and the Environment offer unique opportunities to visual artists. This innovative summer course, which is already on its fourth edition, will allow non-specialists to acquire theoretical and practical skills in biological and environmental sciences in connection to the visual arts. The Summer School explores the interdisciplinary relationship between art, line and environmental sciences through hands-on exercises, combining theory and practice in an informal environment, e.g.: seminars, debates, visits, and the creation of artworks with biological media.

ARTS.2960 Character and Layout Design (formerly 70.296) - Credits: 3

This course is designed for students to understand the fundamentals of character and layout design for Animation. Students will focus on rendering life forms in space. Emphasis will be placed on the anatomical structure of characters as well as practical and aesthetic elements of pre-production. Shot design, composition, staging, mood, texture and lighting for layout and background design will be covered in this course as well. Students will also learn the basics of using props a background and foreground design elements.

ARTS.2970 Studio Workshop (formerly 70.297) - Credits: 3

Presents a study of studio problems in visual structures and organization, as well as an exploration of various media and techniques. Topics will vary. This course may be repeated.

ARTS.2980 Book Arts (formerly 70.298) - Credits: 3

Book Arts will engage students in the design and fabrication of handmade, one-of-a-kind artists books. A wide variety of material and processes will be investigated. Students will learn how to produce compelling book structures for visual and graphic content. The course will introduce students to the history of Eastern and Western methods of bookmaking as well as the contemporary practice of one-of-a-kind conceptual artists books. The three-dimensional possibilities of bookmaking will also be explored.

ARTS.3010 Graphic Design II (formerly 70.310) - Credits: 3

Students will continue improving their visual communication skills, and develop their ability to take a project to its final stage and render it as a professional portfolio piece. In a variety of print, screen-based, interactive, and time-based projects, students will be expected to conceive inventive, conceptual solutions to design problems. Building on design fundamentals, students are encouraged to maintain consistent, sophisticated design systems and explore various types of image-making. While strengthening their technical proficiency and design process, students will learn to apply concepts to multi-format project deliverables. Common projects include brand identity systems, data visualization, publication design, poster design, packaging, design for screens, and motion design. Students must earn a C+ or better in this course to continue in the Graphic Design BFA program.

ARTS.3200 Web Design II (formerly 70.320) - Credits: 3

This advanced-level course is designed for students who have completed Website Development (90.238) and Website Design (70.379). The course will cover advanced topics such as user-centered design, information architecture, testing, and usage analysis. Students will have the opportunity to further develop their design, development, and conceptualization skills.

ARTS.3300 Typography II (formerly 70.330) - Credits: 3

Continuation of 70.230

ARTS.3320 Ceramics II (formerly 70.322) - Credits: 3
Building on Ceramics I as an introductory course, Ceramics II will ask the student to explore functional and nonfunctional ceramic form. Students will be expected to challenge themselves with scale, advanced glaze methods and they will become familiar with kiln firings. Historical and contemporary issues in ceramics will be covered through lectures, slide presentations and critiques.

ARTS.3350 Sculpture II (formerly 70.335) - Credits: 3
A course allowing the student to further develop his or her techniques and understanding of sculptural form, leading to a more personal vocabulary. Conventional techniques will be extended to cover more contemporary materials and methods. Spring, alternate years.

ARTS.3610 Photography II (formerly 70.361) - Credits: 3
This is an intermediate course that will build on the experience of Photography I and further emphasize the medium as a complex cultural practice with its many approaches. Students will be asked to conceive, research and execute a long-term project as a culmination of the semester which will take a format of a photo book. Weekly instructions, lectures, demonstrations, and assignments are aimed at helping students further enhance their conceptual and technical skills, and to allow them to form their own vision and approach to the medium. Advanced digital camera and inkjet printing techniques will be taught along with the proper exhibition practices. Ideas related to contemporary, historical, and aesthetic concerns of the medium will be extensively explored. A meaningful portion of the course will be dedicated to reading, discussion, and critique of work in progress. Students are expected to be self-motivated and work independently.

ARTS.3670 Printmaking II (formerly 70.367) - Credits: 3
This course builds on the printmaking techniques and aesthetic issues explored in Printmaking and Monotype, using advanced methods in relief, intaglio and silkscreen to further develop individual aesthetic and conceptual goals. Students will use studio work, critique discussion, writing and research to explore cultural, conceptual and historical issues at the heart of printmaking. High levels of quality in imagery, increased technical proficiency and conceptual development are expected in the creation of work throughout the semester. Studio work is done during and outside of class time, along with image lectures, technical demonstrations and critique discussions.

ARTS.3710 Painting II (formerly 70.371) - Credits: 3
Designed to allow students to develop individual style and approach to content through a series of self-initiated paintings. Students will work closely with the instructor to develop a cohesive series that has a sound philosophical and aesthetic basis. Spring, alternate years.

ARTS.3711 Place: A Visual Exploration of Lowell (Formerly ARTS.2711) - Credits: 3
This studio course is designed for students who have an interest in making images to explore the concept of "place", using the landscape of Lowell as a creative resource. Open to all university students, the course is structured for students who are new to the arts as well as students who have previous studio art experience. Drawing upon the unique features of the particular landscape that is the city of Lowell, students will build a body of images that is a response to the geographical and cultural histories evident in the city's physical attributes. From its history as the center of industry and textile design to the present day, the city will be viewed as raw material for the conceptual foundation of the work produced in this course. (Class will meet both on and off-campus.)

ARTS.3730 Professional Photography (formerly 70.373) - Credits: 3
A professional level course in advertising product and studio portrait photography. Students will learn view camera techniques as well as principles of lighting using strobe equipment. Fall, alternate years.

ARTS.3740 Animation Studio (formerly 70.374) - Credits: 3
This course focuses on applying industry-standard storyboarding, character and layout and background design and scripting techniques to animation. Contents to be covered include the various purposes and formats of storyboards, the basic terminology and concepts used in production, and the application of production techniques to the creation of animated films with or without a written script and the production process of an animated film from idea to execution of complete film.

ARTS.3760 3D Modeling and Animation II (formerly 70.376) - Credits: 3
Students will learn the fundamentals of computer generated 3D modeling and animation. The emphasis will be on 3D character creation and the fundamental process of animation production including: concept development, organic modeling, rigging, posing, character animation, rendering and post-production. The course will also introduce the student to historical and contemporary perspectives related to the discipline. Various independent short animations will be screened for aesthetic and critical inquiry with the lectures dedicated to production techniques. The course will also introduce the student to
historical and contemporary perspectives related to the discipline.

ARTS.3770 2D Animation II (formerly 70.377) - Credits: 3
This course focuses on applying industry-standard storyboarding, character and layout design and scripting techniques to animation. Contents to be covered include the various purposes and formats of storyboards, the basic terminology and concepts used in production, and the application of production techniques to the creation of animated films with or without a written script and the production process of an animated film from Idea to execution of complete film.

ARTS.3780 Interactive Media II - Credits: 3
This course will immerse students in interactive storytelling. The class will investigate time-based interactive media practices and feature hands-on lab projects. The course will contextualize interactivity within the relevant history shaping contemporary storytelling. Students will engage with exemplary interactive media projects as well as survey experimental ones. The students will apply design thinking, user experience design (UX), and media archeology to increasingly self-directed projects. The course will engage in cross-platform content publishing to browsers, mobile devices, and emergent technology platforms such as Virtual Reality.

ARTS.3800 Special Topics in Art & Design - Credits: 3
Topics of current interest in Art & Design.

ARTS.3811 Game Design: Narrative (formerly ARTS.2810 Introduction to Game Design) - Credits: 3
The goal of this course is to introduce students to game design. Students will begin by creating basic tabletop games that take advantage of the playful classroom environment where different ideas and narratives can be quickly prototyped, played, and evaluated. Students will move to digital game creation for the screen using an industry standard game engine (Unity). The course includes exercises, lectures, readings, and two main projects. Students will be able to analyze the mechanics, dynamics, and aesthetics of games, create unique and innovative prototypes or games, contextualize class productions in the context of new media art and/or mainstream culture, work collaboratively in a group context, and learn the basics of a screen-based game engine.

ARTS.3820 Art & Design of Data Visualization - Credits: 3
This course focuses on applying foundations of artistic information graphics and data visualization to increasingly self-directed data driven projects. Participants will use data from various sources and engage diverse topics. The course covers the various purposes and formats of data visualization, the basic terminology and concepts used in the field, and the application of design techniques to the creation of static and interactive creative displays powered by data sets of varying sizes. Elements of typographic design, layout, and color theory will be used to sharpen communication and make projects accessible. The theory of information visualization will be balanced with hands on use of proprietary and open source tools including Adobe, Spreadsheets, and scripting (e.g. JavaScript).

ARTS.3950 Advertising Design Studio (formerly 70.395) - Credits: 3
This course introduces the components and principles of advertising design. Students will learn to develop strategic approaches to creating compelling ad campaigns for print and cross platform related media as they gain an understanding of the synergy between art and copy. The course covers how to write effective creative briefs, create storyboards, use social media, make engaging presentations and work as part of a team. Projects include both product, service and social campaigns, a unique self-promo piece, and working with real clients. In addition, students will learn how to negotiate and communicate in the advertising field with respectful and empowering language.

ARTS.3970 Art and Copy (formerly 70.397) - Credits: 3
The real world of advertising incorporates selling words and memorable images in a dynamic visual/verbal design unit. As copywriters and art directors, students learn to think pictures and see words as they prepare advertising campaign concepts for a variety of products and media, including print and television. Spring, alternate years.

ARTS.3980 Documentary Image (formerly 70.398) - Credits: 3
In a world of increasing manipulation, documentary photographs still astound us with their visual truths. In this course, students will utilize words and images "the primary tools of the photojournalist " to explore the significant issues of our time. Works by Fenton, O'Sullivan, Gardner, Riis, Hine, Bourke-White, Lange, Smith, Davidson, Salgado, Mark and others are studied for content, style, and inspiration. Fall, alternate years.

ARTS.4100 Graphic Design III (Formerly 70.410) - Credits: 3
Students will drive their own content creation to solve visual, conceptual and technical problems through independently and collaboratively-generated analysis, evaluation, and refinement. Through research, they will create an extensive multi-part project that addresses communication design (audience, messaging, interaction/experience) and representation of an idea across multiple elements in a system. The visual strategy should explore a brand language and system, and be applied to print and screen-based deliverables including, but not limited to: brand identity guidelines, packaging, website/app, print and social media advertising, and promotional motion graphics. They will write about and document their process throughout, and present final work in a professional presentation. Students must earn a C+ or better in this course to continue in the Graphic Design BFA program.

ARTS.4110 Design In Motion (formerly 70.411) - Credits: 3

The course aims to provide students with an understanding of the creative, visual and formal aspects of time based communication and motion graphic design from both a contextual and technical point of view. Designers, with their comprehension of the principles of graphic design, typography and theories of visual communication will develop a knowledge and understanding of processes and techniques involved in creating time-based media including title sequence design. Projects introduce students to time-based visual communication environments. Unique conditions influencing the roles of story boarding, planning, typography, graphics, symbolic systems, narrative, sound and time.

ARTS.4200 Web Design III (formerly 70.420) - Credits: 3

This course introduces students to the problems and solutions of advanced web design and development. It reviews the best web applications and practices for designing cutting edge websites. Students will get familiarized with the process of students to working with clients. Students will learn how to use version control software to track their design and development, manage assets, and work within a team. The course will further explore the relevant cultural and historical context of web design and prepare students for navigating the rapid changes inherent in the field.

ARTS.4300 Typography III (formerly 70.340) - Credits: 3

Typography III is a course in typographic theory and practice. This is a project based course, which includes a visual, research and writing component. During this course students, will create at least two grid systems and use them as primary units of organization. Students will apply typographic systems and basic interaction principles to two complex, text/image structures: a book and a series of web pages. Through readings, lectures and projects/critiques, you will be introduced to various theoretical approaches to the typographic page, as well as various approaches to designing interactive structures (book, web page/site) that hold and present typographic content. Students must earn a C+ or better in this course to continue in the Graphic Design BFA program.

ARTS.4310 Publication Design - Credits: 3

This is a book design course. using the typographic knowledge acquired in Typography I and Typography II, students will explore 3 forms of book design (traditional, digital, handmade) + 3 types of content (fiction, non-fiction, call-to-action).

ARTS.4350 Sculpture III (formerly 70.435) - Credits: 3

Sculpture III will allow students with a continued, special interest in three-dimensional media and installation art to find their personal visual voice and begin to develop a structured studio practice. Students will be asked to identify a conceptual theme for the semester that they will explore through research, development and execution in a series of installation works. The course will introduce and expand on contemporary media and methods not covered in Sculpture I and II. Verbal analysis and articulation of the final sculptural works will continue to be stressed.

ARTS.4550 Thought Made Visible - Credits: 3

This seminar based studio course is designed to enable students to expand their research in the painting and sculpture disciplines through focused individual investigation. The course will involve theoretical readings, lectures, and critiques associated with contemporary studio artist practices. Two of the primary objectives of the course are: (1) for students to broaden the conceptual foundation of their work while continuing to develop their personal direction and (2) to begin to think independently and be critical of their work beyond an assignment based pedagogy.

ARTS.4600 The Entrepreneurial Hustle for Creatives - Credits: 3

This course explores how students can advance and maintain sustainable creative careers with a combination of freelance clients, developing business and entrepreneurship opportunities, how to grants and how to the public request for proposals process. Through class presentations, discussions, research, and related assignments, this course provides an overview as of the components needed to be successful in today’s art market. Topics include the Artist and Designer as Entrepreneur, setting up our own business, Live/Work Income and Expenses, Reputation and Recognition, Goal Setting, Creating your own Opportunities, Specific Markets and
Marketing skills, Legal & Contract Issues, and Fundraising.

ARTS.4610 Photography Workshop (formerly 70.461) - Credits: 3
An advanced course in photography that will blend seminar-style discussions and studio practice. An emphasis will be made on critical thinking, research and analysis alongside developing problem solving strategies that could be applied to creative practice. Students will produce a portfolio of creative work upon completion of the course.

ARTS.4710 Painting III (formerly 70.471) - Credits: 3
The focus of this class is to give individual students the opportunity to work in an independent manner, expand their ideas and develop the ability to articulate both conceptually and formally the needs of their own work. The class combines studio work, presentations, visiting lecturers and individual and group critiques, with an emphasis on understanding and embracing risk as a necessary component of a painter’s studio practice. Critiques are designed to provide feedback, encourage, challenge, and nurture each student’s vision. Assignments are given on an individual basis. Students are expected to support their work by research of both historical and contemporary art.

ARTS.4811 Game Design II (formerly 70.381/ARTS.3811 Advanced Game Design ) - Credits: 3
This advanced level course is designed for students who have completed Interactive Game Design and who are interested in exploring interactive game strategies and multilevel game design. Basic familiarity with Mac OS and/or Windows platforms required.

ARTS.4910 Advanced Studio (formerly 70.491) - Credits: 3
In order to enable students to expand expression in areas of their choice, they may repeat any studio course that is the most advanced offered in that given subject. They will be given more freedom within assignments and be expected to perform on a more advanced level.

ARTS.4920 Advanced Studio (formerly 70.492) - Credits: 3
In order to enable students to expand expression in areas of their choice, they may repeat any studio course that is the most advanced offered in that given subject. They will be given more freedom within assignments and be expected to perform on a more advanced level.

ARTS.4930 Senior Studio I (formerly 70.493) - Credits: 3
Senior Studio I is one of the two capstone courses of the Bachelor of Fine Arts program in the Art Department. Students are required to research, develop and produce a mature, coherent and substantial body of work representing 6 credits (in a two course sequence) that will be presented to the faculty for evaluation as well as exhibited to the public in the BFA Senior Studio exhibition. Enrollment restricted to majors in BFA program. Senior Studio I will focus on research, professional portfolio, resume and artist statement.

ARTS.4940 Directed Study (formerly 70.494) - Credits: 1-3
A special problem in studio art is investigated through conferences and studio work.

ARTS.4950 Advanced Tutorial (formerly 70.495) - Credits: 3
A program of directed studies which affords the advanced students an opportunity to pursue a previously explored problem in greater depth. The purpose is to sharpen and refine skill, content and presentation.

ARTS.4970 Senior Studio (formerly 70.497) - Credits: 6
This course is designed to culminate four years of art experience for the BFA studies. The development of personal approach to media and idea is emphasized. Each student will be responsible for developing a self-assigned thematic concern. No assignments will be made by the instructor who will act only as an advisor and coordinator. Course evaluation is by the Senior Studio Review Committee. Enrollment restricted to majors in BFA program. Fall and Spring. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL), Critical Thinking & Problem Solving (CTPS) and Information Literacy (IL).

ARTS.4980 Senior Studio II (formerly 70.498) - Credits: 3
Senior Studio II is one of the two capstone courses of the Bachelor of Fine Arts program in the Art Department. Students are required to research, develop and produce a mature, coherent and substantial body of work representing 6 credits (in a two course sequence) that will be presented to the faculty for evaluation as well as exhibited to the public in the BFA Senior Studio exhibition. Enrollment restricted to majors in BFA program. Senior Studio II will focus on research, capstone project presentation and a process book.
ASAM.2120 Introduction to Asian American Studies - Credits: 3

This course provides students with an overview of the multidisciplinary field of Asian American Studies from two distinct disciplines. The course begins with the history of Asian American Studies and the methods used to advance the field. Next, various aspects of the Asian American experience, such as gender and sexuality, are examined. Students also participate in service learning in partnership with Asian-serving community organizations in and around Lowell, MA. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

CORE.AH Core Curriculum - (AH) Arts and Humanities Perspective - Credits: 0

The Core Curriculum at UMass Lowell ensures that students are learning deeply and broadly, developing essential intellectual abilities that prepare our students for work, life, and the world. The Arts and Humanities perspective is characterized by the interpretive analysis, critique, and creative and aesthetic expression of ideas and values. Select three courses from the following. No more than two courses can be from any one discipline, which is defined by the course prefix. Courses with different prefixes are considered as different disciplines. Courses with a prefix of ARHI, ARTS, (ENGL at or above 2000 level), HIST, (MUHI - 3 credit courses only), MUTH, PHIL and THEA. *World Language courses with a prefix: WLFR, WLGE, WLIT, WLAR, WLKH, WLCH, WLPO, WLSP, WLAN, WLLA. *Courses used to satisfy the language requirement in the College of FAHSS may not also be used to meet Core Curriculum Breadth of Knowledge requirements. Interdisciplinary courses are found on the Core Curriculum site and can only fulfill one breadth of knowledge requirement. NOTE: Some courses may have specific pre-requisites and/or co-requisites or are open only to majors within that discipline.

DGMD.1000 Introduction to Digital Media (Formerly JMS 100/DGMD 100) - Credits: 3

This foundational course that surveys the history and current state of digital and web-based media from a variety of perspectives: cultural and ethical, as well as the production and monetization of media. Students engage with and become critical consumers of media, learning how we use it to disseminate, market, entertain, influence and disrupt.

DGMD.2200 Screenwriting - Credits: 3

In this class students will be immersed in the art and craft of creating compelling stories for the screen in both fiction and nonfiction genres. As it has been said many times about media making, the story is the heart of media production. Students will develop screenwriting abilities through gaining knowledge of and experience with story conception and development: character development; story structure; dramatic action; dialogue; scene/sequence construction and writing for emotional impact.

DGMD.2310 Media, Law and Ethics (Formerly 41.237/DGMD 231) - Credits: 3

This course explores key legal issues likely to confront journalists, mass media professionals or students interested in learning more about the relationships between law, media and ethics in this global community. Nonetheless, students are challenged to think critically about the applicability of those issues to individuals and to media institutions that transmit information via spoken communications, writing, traditional media, mobile messages, social network sites, or e-mail messages.

DGMD.2400 Introduction to Digital Editing - Credits: 3

This is an introductory course in digital editing. Students are going to be introduced to the basics of digital editing, the aesthetics and technical skills of digital editing for film and video.

DGMD.2510 Video Production for Digital Media - Credits: 3

In this course students are going to understand the theory and practice of video production using a single digital camera for digital media through a mix of heavy hands-on practice and lectures. Students will be expected to understand; full digital camera operation and settings, audio control, basic directing, basic lighting, and basic editing intended for digital production. Students will also be expected to learn the terminology of video production/post-production intended for digital media.

DGMD.3000 Multimedia Storytelling (Formerly JMS 300/DGMD 300) - Credits: 3

This course will facilitate a deeper understanding of the uses of online and multimedia communication technologies in a democratic society and the impact of such technologies on the way we communicate The course will provide students with the opportunity to develop professional knowledge and skills with the tools used in online and multimedia creation. Students will develop a critical understanding of multiplatform and multimedia technologies and will learn how to use video, digital photography, audio, video, social networking and other new technologies.
DGMD.3100 Advanced Editing for Digital Media - Credits: 3

This class is dedicated to the practice of non-linear editing of media for films, television, or the web. Instruction will focus on the development of formal and conceptual post-production practices needed for creating compelling visual stories. Students will consolidate their post-production skills developed in previous courses and further improve in areas of editing picture and sound, color grading and effects. Emphasis will be made on developing necessary software skills, post-production workflow, and aesthetic approaches.

DGMD.3300 Digital Cinematography - Credits: 3

This course emphasizes the concepts needed to control the quality of images created, including such techniques as varying the frame rate, shutter speed, exposure, camera filters and color temperature. Topics covered will include camera operation, composition, framing, lens choice, camera movement, collaboration, blocking, continuity and all aspects of visual storytelling.

DGMD.3400 Lighting Principles (Formerly JMS 340/DGMD 340) - Credits: 3

In this course students are going to understand the principles of lighting, its nature, its physical Characteristics, and its artistic role in media production. Class will have significant hands-on assignments and demonstrations beside theoretical background lectures. The concept will be developed based on a one-camera setting only. Students will work with light meters to guide their lighting schemes.

DGMD.3502 Production Management for Film - Credits: 3

In this course students are going to be introduced to the process of film production management from preproduction through production and screening. Students will learn budget management, crewing requirements, location needs, equipment rentals, and associated production costs.

DGMD.3701 Visual Motion Effects - Credits: 3

In this course, students are going to use After Effects as a tool to help them achieve a successful and visually convincing effect after going through idea generation process. Students will work on masking, cloning, and three-dimensional space with the aim of producing short productions. Familiarity with Photoshop is preferred.

DGMD.4000 Directed Study in Digital Media (Formerly JMS 400/DGMD 400) - Credits: 1-6

Through frequent consultation with the instructor, the student carries out the investigation of a particularly specialized area of interest. This course may be repeated for up to a total of 6 credits.

DGMD.4100 TV Studio Production (Formerly JMS 410/DGMD 410) - Credits: 3

This course will offer you the opportunity to produce different types of live programs using digital technology. Plan, organise and direct TV studio-based broadcasting. Work effectively as part of a group. It provides a working knowledge of compositional, personal and organizational production skills in relation to the making of a live broadcast program using at least three cameras having in mind that you will cut/ edit form a camera to another without stopping. It requires collaboration, teamwork and strict, organized structures. In most cases, it requires leadership. But for everybody, personal qualities such as determination, enthusiasm and persistence are almost essential. So too is engaged participation.

DGMD.4103 TV Sport Broadcasting - Credits: 3

In this course, students are going to learn the techniques and theory behind mobile TV production in regards to the professional sports industry. A look into the major sports of American culture and production techniques utilized to produce each. Environmental factors governing outdoor TV production as well as state and community government issues regarding the broadcast of each sport. In this course, students will be working in collaboration with UMass Lowell Athletic Department and will be involved with the Tsongas Arena sports activities through its Audio/Video department.

DGMD.4110 Titles in Motion (Formerly DGMD 411) - Credits: 3

The course aims to provide students with an understanding of the creative, visual and formal aspects of time-based communication and motion graphic design from both a contextual and technical point of view. Designers, with their comprehension of the principles of graphic design, typography and theories of visual communication will develop a knowledge and understanding of processes and techniques involved in creating time-based media including title sequence design. Projects introduce students to time-based visual communication environments. Unique conditions influencing the roles of storyboarding, planning, typography, graphics, symbolic systems, narrative, sound and time.

DGMD.4200 Podcasting - Credits: 3

In this class, students will create audio segments in the style of a Podcast, each executed with increasing complexity. Students will use the language of cinema, television, print, and the web. They will conduct research, scriptwriting, producing, location
scouting, and organize scheduling. Students will use current technology to record a location-based audio program.

DGMD.4300 Directing for Film - Credits: 3

In this course, student will work on spatial exploration, mise en scene, and directing the actor. Students will learn methods in scene study and improvisation beside rehearsal techniques, script breakdown and analysis. Students will have first hand experience of the role of director on set and beyond. Leadership and decision making are two qualities and major factors that play a crucial role in the progress of this class.

DGMD.4750 Internship in Digital Media - Credits: 3

This course is a semester long internship with one of Digital Media community partners. Students in this course will be practicing media as it is being produced on the ground today through direct hands-on experience.

ENGL.1281 Introduction to Creative Writing (All Majors) - Credits: 3

This course is an introductory level workshop in creative writing. Students will read and discuss works of poetry, fiction, and creative nonfiction by established writers, and practice craft in all three genres through short exercises and assignments. Students will have an opportunity to workshop their creative work, and critique peer works. Class time will be divided between brief lectures on specific aspects of writing, craft techniques, group discussions of assigned reading, in-class writing exercises, and discussion of student writing assignments. This course is open to all majors.

ENGL.1810 Introduction to Literature - Credits: 3

This course, as the name implies, serves as an introduction to literature. We will read and discuss works in the main genres of the short story, short novel, poetry, and drama. In addition to presenting the conventions and development of each of these genres, the course will provide opportunities to strengthen skills in close reading and critical thinking.

ENGL.2000 Critical Methods of Literary Inquiry (Formerly 42.200) - Credits: 3

Examination of diverse critical and theoretical approaches to literature in the development of literary analysis.

ENGL.2010 Classical Mythology (Formerly 42.201) - Credits: 3

This course takes a literary approach to the mythology of Ancient Greece and Rome. We will explore stories of creation of the world, the fall of Troy, the travels of Odysseus and Theseus, the sins of Oedipus, and the rage of Medea. These texts examine some of the most disturbing and violent of human experiences, as well as some of the most moving: men and women’s encounters with community, family, war, death, and love. We will address how these narratives form ethical and social codes that underpin western culture, and devote some attention to how these texts are reinterpreted by later authors. Authors may include Homer, Hesiod, Ovid, Virgil, and the Greek tragedians.

ENGL.2020 Great Books of the Modern Period (Formerly 42.202) - Credits: 3

Much of what we consider "contemporary" was born out of the modernist period, roughly 1900-1950, and was considered radical, even salacious, in its time. This course provides a sampling of modernist literature. Students will explore this period by examining exemplary texts, numerous historical and social events, and a few films.

ENGL.2070 English Studies in a Digital Environment (Formerly 42.207) - Credits: 3

Students build on skills acquired in College Writing to gain English Studies discipline-specific mastery of the writing conventions, research, and citation practices used in departments of English. In addition, students practice the digital skills that will support them as they join the online learning community of the UML Department of English.

ENGL.2100 Drama (Formerly 42.210) - Credits: 3

Presents a study of plays from the classical period to the present.

ENGL.2110 Poetry (Formerly 42.211) - Credits: 3

Studies selections from the Renaissance through contemporary periods.

ENGL.2120 The Short Story (Formerly 42.212) - Credits: 3

This course teaches students how to sharpen their critical reading skills by learning to think about the short story in terms of its evolution over the last 200 years and by studying its literary techniques and themes. Student practice close, active reading as they examine and express their reactions to authors’ works. Readings may include authors such as Alexie, Alvarez, Baldwin, Bambara, Bechdel, Chekhov, Diaz, Faulkner, Gilman, Hawthorne, Hemingway, Irving, LeGuin, Lispector, Marquez, O’Connor, Poe, and Tolstoy.

ENGL.2160 Monsters, Apes & Nightmares (Formerly
42.216) - Credits: 3
This course examines literary responses to science in England and the United States from the early Nineteenth Century to the present. Readings include novels—Frankenstein, The Island of Doctor Moreau, Dr. Jekyll and Mr. Hyde, Jurassic Park—essays, and poems. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

ENGL.2170 The Horror Story (Formerly 42.217) - Credits: 3
Explores the genre from Poe to the present.

ENGL.2180 Comedy (Formerly 42.218) - Credits: 3
Presents the theory and practice of comedy from the Greeks to the present.

ENGL.2200 Oral & Written Communication for Computer Science (Formerly 42.220) - Credits: 3
The main goal of this course is to enhance the student’s understanding of the elements of effective communication, and to put that knowledge into practice in a supportive, cooperative, workshop environment. Limited to Computer Science majors.

ENGL.2220 Oral Communication (Formerly 42.222) - Credits: 3
Develops and applies the basic speaking skills that can be adapted to a variety of personal and professional contexts. Emphasis is placed on selection, analysis, organization and presentation of speech materials. Practice skills include listening, interviewing and the delivery and critique of extemporaneous speeches.

ENGL.2240 Business Writing (Formerly 42.224) - Credits: 3
Studies the theory and practice of writing letters, memoranda and reports on specific business and technical problems. Registration preference for students enrolled in Business programs.

ENGL.2260 Scientific and Technical Communication (Formerly 42.226) - Credits: 3
Studies the theory and practice of letters, memoranda, reports and oral presentations on specific scientific and technical problems.

ENGL.2270 Essay Writing for English Majors (Formerly 42.227) - Credits: 3
Analyzes and discusses the techniques and styles of selected professional essayists as well as the preparation of student essays. Emphasis will be placed on the writing process from prewriting through drafting and revising. English majors and minors only.

ENGL.2320 Turning Fiction into Film (Formerly 42.232) - Credits: 3
This course explores film adaptation by looking at how writing can be turned into the visual and auditory forms. Through reading novels and watching their film adaptations, students learn conventions of fiction and film, and draw on this knowledge to discover the implications of adapting a written story into a movie. By asking students to think about the different ways writers and filmmakers convey meaning to their audiences, this course attempts to answer the question of why the movie is never exactly like the book.

ENGL.2330 Play Analysis (Formerly 42.233) - Credits: 3
An introduction to the principles of play construction and the vocabulary and methods of interpreting play texts for theatrical production. Required of all theatre arts concentrators.

ENGL.2360 Science Fiction and Fantasy (Formerly 42.236) - Credits: 3
Designed to introduce students to understand science fiction and fantasy within the broader context of literature and literary theory. It attempts to develop and hone student’s skills of critical analysis as it supplies them with the tools to contextualize their reading experience - i.e., to understand the origins and politics of the books that they read.

ENGL.2380 Introduction to Creative Writing (Formerly 42.238) - Credits: 3
A course for aspiring creative writers among freshman and sophomores which offers an introduction to the craft of creative writing in its primary genres: poetry, fiction, drama, creative non-fiction (emphases will vary depending upon instructor). The focus of this course will be on learning the fundamentals of craft techniques and peer review.

ENGL.2381 Introduction to Creative Writing (All Majors) - Credits: 3
This course is an introductory level workshop in creative
writing. Students will read and discuss works of poetry, fiction, and creative nonfiction by established writers, and practice craft in all three genres through short exercises and assignments. Students will have an opportunity to workshop their creative work, and critique peer works. Class time will be divided between brief lectures on specific aspects of writing, craft techniques, group discussions of assigned reading, in-class writing exercises, and discussion of student writing assignments. This course is open to all majors.

**ENGL.2390 Introduction to Professional Writing**
(Formerly 42.239) - Credits: 3

This course offers an introduction to different types of professional writing, including journalism, technical writing, business writing, and other professional communication. Focus in the course will be on understanding the rhetorical situation, including the audience, purpose, and context of each communication task. Students will learn how to work effectively and ethically in a collaborative and professional environment. Students may not earn credit for both 42.227 and 42.239.

**ENGL.2400 Literature and Women**
(Formerly 42.240) - Credits: 3

A survey of literary attitudes toward women from the Judaic and Hellenic periods through the present.

**ENGL.2420 The Heroine in Modern Fiction**
(Formerly 42.242) - Credits: 3

Provides a study of selected short stories and novels which deal sympathetically with the changing roles of women.

**ENGL.2430 Contemporary Women Writers**
(Formerly 42.243) - Credits: 3

Contemporary Women Writers introduces students to American women writers of the last fifty years. We examine the historical, socio-cultural, political, and personal influences on these writers’ work by studying trends and events in recent American history and themes reflected in the works. By studying contemporary women’s writing in this contextualized fashion, students can appreciate larger trends in our society, the role writing plays in examining such trends, and the value of literature as an exploration of human growth and struggle. Through discussion, group collaboration, critical analysis, and by designing their own graphic organizers, students gain a breadth of knowledge in the following areas: the themes and stylistic concerns of contemporary American women writers; the key historical events that influence contemporary American women’s writing; the critical reading of literary texts. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**ENGL.2460 Gay & Lesbian Literature**
(Formerly 42.246) - Credits: 3

Explores the treatment of homoeroticism and homosexual love in literature from Antiquity to the present. Emphasis is given to texts reflecting the construction of a homosexual identity and recurring motifs among gay, lesbian, and bisexual writers. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**ENGL.2490 Literature on Technology and Human Values**
(Formerly 42.249) - Credits: 3

A study of the relationship between works of fiction, cultural attitudes toward technology, and social values. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

**ENGL.2500 The Bible as Literature**
(Formerly 42.250) - Credits: 3

Presents a literary and historical analysis of selected Old and New Testament books.

**ENGL.2510 War in Literature**
(Formerly 42.251) - Credits: 3

In "War in Literature" we will study conflict and human values in times of war, focusing on the literature of World War I, World War II, Vietnam, and the Gulf War. Content covered includes a selection of representative (and divergent) literary texts written throughout the 20th century in a variety of genres (poetry, essays, memoir, short story, novel, and hybrid forms like the "graphic novel"). Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

**ENGL.2530 The Culture of American Sport**
(Formerly 42.253) - Credits: 3

An examination of the history, literature, sociology, and aesthetics of sport. Attention to corollary issues and values including racism, sexism, and violence.

**ENGL.2570 The Family in American Literature**
(Formerly 42.257) - Credits: 3

A study of literary selections dealing with traditions of family life, the individual, and social change. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).
ENGL.2580 Disability in Literature (Formerly 42.258) - Credits: 3
This course explores how texts -- including novels, short stories, poems, memoirs, essays, plays, and videos -- portray people with disabilities. We will consider the problematic stereotypes about disabilities that sometimes appear in popular culture and literary depictions, and read texts that provide insight into a diverse community of people with a range of disabilities.

ENGL.2670 Discovering Shakespeare (Formerly 42.267) - Credits: 3
This class introduces students to some of the Bard's most popular and accessible plays. We will learn to understand Shakespeare's language and see how the plays were produced in Renaissance England, as well as examine his living legacy, in theater, film, and popular culture, throughout the modern world today. No previous experience with Shakespeare needed. Old Title: Introduction to Shakespeare.

ENGL.2675 Vikings - Credits: 3
An introduction to Norse mythology, sagas, and culture. The class will read translations of medieval texts recalling traditions of the old Norse gods and their cults during the Viking Age (ca. 800-1050 AD), as these were preserved in 13th-century Icelandic texts, but also in Latin, Arabic, Old High German, Old Swedish and Old English manuscripts and runic inscriptions. Students will explore the worldview and value system of this unique culture, and examine relations, often violent but sometimes comic or friendly, between groups of highly intelligent, vulnerable beings, both living and dead, male and female, animal and human, god and giant - a crowded universe full of trolls, elves witches, dwarfs, valkyries, berserks, shapeshifters, and various social classes of human beings.

ENGL.2720 Modern European Fiction (Formerly 42.272) - Credits: 3
A study of selected fiction by major continental writers of the nineteenth and twentieth centuries.

ENGL.2770 American Ethnic Literature (Formerly 42.277) - Credits: 3
The course addresses the literature of America's immigrant and cultural groups and how it contributes to defining our national character. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2772 Introduction to Latinx Literature - Credits: 3
Describing a wide range of racial and ethnic denominations, Latinx is a complicated term which this course will examine the trouble. This course emphasizes the historical and aesthetic networks established in the Latinx literary canon that continue into the present, while also exploring the relationship between genre and socio-historical issues. Reading from a diverse tradition that reflects the contested definition of "Latinx" and its shifting demographics in the U.S., this course investigates how U.S. Latinx literature speaks to and expands "American" literary traditions, and how unique ethnic identities such as the Mexican American, Dominican American, Cuban American, or mainland Puerto Rican offer different yet interconnecting representations of what it means to be Latinx in the U.S.

ENGL.2810 British Literary Traditions (Formerly 42.281) - Credits: 3
A survey of British Literary history from the medieval through the modernist periods.

ENGL.2820 American Literary Traditions (Formerly 42.282) - Credits: 3
A survey of American Literary history from early contact between Native American populations and European colonists through contemporary American writing.

ENGL.2830 World Literature in Translation I - Credits: 3
A survey of world literature (works outside British and American literary traditions) through 1660; all course readings are translated into English. Students will become familiar with conventions of different literary genres, including epic and lyric poetry, drama, fables and folktales, and religious and philosophical texts. The course also provides the major cultural, religious, and political contexts of the literary texts. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2840 World Literature in Translation II - Credits: 3
A survey of world literature (works outside British and American literary traditions) since 1660; all course readings are translated into English. Students will become familiar with conventions of various literary genres, including short and long fiction, autobiography, lyric poetry, and drama. The course also provides the major cultural, religious, and political contexts of the literary texts.

ENGL.2850 Crime in Literature (Formerly 42.285) -
Credits: 3

A study of how various authors use crime as a plotting device to study character, reveal social order, and critique social institutions. This course will focus particularly on detective and mystery fiction, sketching the history and development of these genres. Students might also study fiction and film outside these genres that explore significant questions of crime or criminality. Ultimately, students will think about how fictional representations of criminals, victims, policing, gender, and race relate to cultural assumptions and expectations. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2860 The Graphic Narrative: Comics in Context (Formerly 42.286) - Credits: 3

While picture-images date as far back as the Egyptian tombs, or the caves of Lascaux, this course will consider the development of the modern comic in twentieth-and twenty-first century America. Readings will include not just comics, but also the history of comics, art and literary theory, a novel about comics, and articles that consider the legal, political, and social issues surrounding comics. We will also look at traditional and contemporary comic strips and graphic novels to explore what we can learn from them about American Popular Culture. Comics are on the cutting edge of contemporary literature, and there are many avenues to pursue in the study of this narrative form. This course will include intensive reading and writing, and will ask students to engage with demanding theoretical works, in addition to incorporating a considerable amount of research. While the subject matter can be lighthearted the course takes these texts seriously, and asks for intellectual engagement with the issues and concerns of culture depicted in these words and pictures. (Full proposal and supplemental material available).

ENGL.2910 History of English Literature I (Formerly 42.291) - Credits: 3

A survey of representative writers and works from the Anglo-Saxon period to the mid-seventeenth century.

ENGL.2920 History of English Literature II (Formerly 42.292) - Credits: 3

A survey of representative writers and works from Milton into the twentieth century.

ENGL.2940 History of American Literature I (Formerly 42.294) - Credits: 3

Studies the historical development of American literature from the Colonial period to the Civil War. Selected works by representative authors from each period are studied.

ENGL.2950 History of American Literature II (Formerly 42.295) - Credits: 3

Studies the historical development of American literature from the Civil War to World War I.

ENGL.2980 Children's Literature (Formerly 42.298) - Credits: 3

A survey course covering traditional and contemporary children's literature. Texts are selected to represent different historical periods and a diversity of authorial perspectives. Attention is given to changing views of children and childhood as reflected in selected texts.

ENGL.3000 Intro to Journalism (Formerly 42.300) - Credits: 3

An introduction to techniques of writing for the news media.

ENGL.3020 Creative Writing: Fiction (Formerly 42.302) - Credits: 3

Studies the theory and practice of fiction. Conducted as a workshop with close analysis of student work.

ENGL.3030 Creative Writing: Poetry (Formerly 42.303) - Credits: 3

Discusses the theory and practice of poetry. Conducted as a workshop with close analysis of student work.

ENGL.3040 Creative Writing: Playwriting (Formerly 42.304) - Credits: 3

Studies the theory and practice of playwriting. Conducted as a workshop with close analysis of student work.

ENGL.3050 Reviewing the Arts (Formerly 42.305) - Credits: 3

Theory and practice of writing short, critical essays in a journalistic mode on the visual and performing arts. Special attention to theater, movie, and television criticism. Conducted as a workshop with close analysis of student work.

ENGL.3060 Intermediate Professional Writing (Formerly 42.306) - Credits: 3

This course develops more advanced skills in professional
writing and communication. Students will focus on analyzing and responding to professional writing situations, in which they will consider purpose and audience. Students will work in a collaborative and professional environment. This course may include a service-learning component. Contact the instructor for more information.

ENGL.3070 History of the English Language  
(Formerly 42.307) - Credits: 3

Explores the origins and structure of the English language, tracing the ways that English has evolved from Old English through Middle English to the varieties of Modern English in England and its former colonies, including the United States. We will also examine the literary, social, and political implications of these developments, for instance the evolution of Standard English or the use of dialects. The course does not assume any knowledge of Old or Middle English.

ENGL.3080 Structure and Variation of the English Language - Credits: 3

This course introduces students to a variety of approaches to the contemporary English language, with a focus on both structure and variation. Students will explore how English works in terms of its sounds (phonetics and phonology), words (morphology), sentence structures (syntax), meanings (semantics), and uses (discourse). Areas of variation may include social and regional dialects, World Englishes, accents, pidgins, creoles, multilingualism, language acquisition, registers, style, literacy, media, power, and identity. The course will also address attitudes towards language (language ideology), and the implications of language issues for education, work, policy, and everyday life.

ENGL.3100 Writing Popular Fiction (Formerly 42.310) - Credits: 3

This course is designed for students who are interested in writing in one or more of the popular forms of genre fiction: the mystery, the horror story, science fiction, fantasy, romance, and the thriller. Class time will be spent discussing and workshopping student writing. Some time will also be devoted each week to brief lectures on practical matters like choosing between the short story and the novel, finding ideas, constructing plots, building characters, pacing, generating suspense, and marketing one’s work. In addition, there will be assigned readings to illustrate the above.

ENGL.3110 The South in American Literature  
(Formerly 42.311) - Credits: 3

A study of the writers, movements, and social culture of the South, from both the nineteenth- and twentieth-centuries.

ENGL.3120 Literature of Colonial America (Formerly 42.312) - Credits: 3

This course will explore the literatures (including some selections in translation) written during America’s colonial era. The periods of exploration, first encounters, settlement, the rise of Anglo-America, the emergence of a national sensibility, and the years of transition in the new republic will be considered. The course will also treat a small selection of nineteenth century texts that present visions and re-visions of the colonial past.

ENGL.3130 Realism and Naturalism American Fiction  
(Formerly 42.313) - Credits: 3

A study of realism and naturalism in fiction from the end of the Civil War to World War I.

ENGL.3150 Old English Language and Literature  
(Formerly 42.315) - Credits: 3

Students will acquire reading knowledge of the Old English Language, spending half the semester mastering grammar and vocabulary, and the second half translating texts such as The Wanderer, Dream of the Rood, and Beowulf. Attention will also be given to early medieval cultures in England.

ENGL.3154 Middle English: Literature and Language  
(1066-1500) - Credits: 3

England in the 11th century had a multi-lingual and diverse culture, with French, German, Scandinavian, and Latin speakers interacting daily. By 1500, England was English-speaking, with various dialects of Middle English emerging from this linguistic mix. In this class, students will learn to read and analyze the dialects of Middle English, translating text such as Sir Gawain and the Green Knight, the Harley Lyrics, the York Plays, and the Canterbury Tales from their original language. We will learn and apply the rules of grammar, pronunciation, and vocabulary. Students will analyze critically questions of creolization, dialect and social class, and the emergence of print culture.

ENGL.3170 British Literature of the Twentieth Century  
(Formerly 42.317) - Credits: 3

A study of twentieth-century British short stories, poetry, and drama.

ENGL.3200 Personal and Reflective Writing (Formerly 42.320) - Credits: 3

A workshop format encourages peer criticism of individual
writings and discussion of models from various texts.

ENGL.3210 Community Writing I (Formerly 42.321) - Credits: 3

Students work on various writing projects the professor brings into the classroom on behalf of local non-profit organizations. This service learning course provides opportunities for students to learn through thoughtful engagement with the community, applying knowledge of writing gained in the classroom to real world problems. The course will be held in a workshop format with strong emphasis on revision.

ENGL.3220 Creative Writing: Creative Non-fiction I (Formerly 42.322) - Credits: 3

An intermediate level creative writing workshop in nonfiction (personal essay, memoir, literary journalism, etc.).

ENGL.3240 Writing About Place (Formerly 42.324) - Credits: 3

Writers throughout time have been thoroughly grounded in place. Students in this course will read and write on a variety of topics: travel, cities, suburbs, dwelling places, nature, environmental issues, etc., in a variety of genres: creative non-fiction, essays, journalism, short stories, poetry, journals. This course will be held in a workshop format with strong emphasis on revision.

ENGL.3245 Writing about the Environment - Credits: 3

From John Muir to Rachel Carson to Bill McKibben, environmentalists have traditionally relied upon the power of their prose to transform the thoughts and behavior of their contemporaries. Stemming from the premise that writing is a form of environmental action, this course introduces students to a range of modes of writing in environmental studies. In the process of reading, discussing and practicing different kinds of environmental writing, students will develop a variety of writing skill in addition to an appreciation for writing as an important form of environmental action.

ENGL.3250 The Rise of the Novel (Formerly 42.325) - Credits: 3

A study of the British novel in the eighteenth century, as it increased significantly in publication, sales, and cultural prominence. We explore the relation between formal elements (narrative, dialogue, plotting), philosophical questions (the nature of the self, the good society), and cultural and historical contexts (industrialization, middle class culture, the sexual double standard). Along with canonical authors such as Defoe, Richardson, and Austen, students will read other popular novels form the period, as well as texts such as spiritual autobiographies, criminal profiles, and advertisements.

ENGL.3270 Victorian Fiction (Formerly 42.327) - Credits: 3

A study of fiction from 1837 through 1901. May include reading and writing about texts by Dickens, Collins, Gaskell, Bronte, Eliot, Thackeray, Trollope, Hardy, Wilde, and others.

ENGL.3280 Writing About Women (Formerly 42.328) - Credits: 3

Writing About Women

ENGL.3300 Twentieth Century British Novel (Formerly 42.330) - Credits: 3

A study of the novel from Conrad through Greene and others.

ENGL.3310 American Novels to 1900 (Formerly 42.331) - Credits: 3

with the emergence of novels labeled "American," novelists explored the role of the frontier, the shift from an agricultural to an industrial society, the rise of social reform movements, the impact and legacy of slavery, the influence of science and technology, the debate over gender roles and expectations, and the role of the artist/writer within American culture. The novels in this course, all written before 1900, allow us to explore the issues that a selection of American novelists treat within their fiction as well as to consider the debates that occurred over the nature of narrative.

ENGL.3320 Twentieth Century American Novel - Credits: 3

A study of the American novel from 1900 to the present.

ENGL.3330 American Autobiography (Formerly 42.333) - Credits: 3

A Study of autobiographical writing from Colonial America to the present. Works from the 17th to the 21st century will allow students to explore the genre of autobiography and related sub-genres, including the captivity narrative, the slave narrative, and the immigration narrative. Readings will also explore literary and political autobiographies. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3332 Autobiographies of Paris Modernism -
Credits: 3
Students in this course study autobiographies of important figures of modernism in Paris and can expect to learn about the genre of autobiography and modernism as an artistic movement, particularly how modernist ideals manifested across several genres.

ENGL.3350 American Women Novelists (Formerly 42.335) - Credits: 3
A study of selected novels by American women. Focus on the female voice within the American tradition. Treatment of such issues as domesticity, education, and authorship. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3360 Beowulf and Heroic Literature (Formerly 42.336) - Credits: 3
We will read Beowulf in translation, and discuss contemporary approaches to the poem. We will also study other Old English works such as Judith, as well as Frankish and Old Norse-Icelandic literature in translation to gain a cultural context for Beowulf. May include discussion of how later works, such as those of J.R.R. Tolkien or modern fantasy writers have been influenced by these medieval epics.

ENGL.3370 The Gothic Tradition in Literature (Formerly 42.337) - Credits: 3
This course will consider works that fall under the very broad genre known as "The Gothic." As this genre is one of highly contested boundaries, we will consider how to define the Gothic, and what exactly constitutes this form. We will look at texts from both England and America, and spanning from the late 18th century to our own times. Our study will focus on the form of the novel, and the development and emergence of the gothic novel from its beginnings in England to its contemporary manifestations in the United States.

ENGL.3380 Medieval Women Writers (Formerly 42.338) - Credits: 3
Woman have always written and read and participated in culture. This class will explore writings on literary and non-literary genres by woman in the European Middle Ages (600-1500). Students will learn how different pre-modern cultural conditions affected the possibilities for women's authorship, readership, and patronage. We will also examine how women writers interacted with literary traditions and constructions of gender.

ENGL.3410 Studies in Film (Formerly 42.341) - Credits: 3
A rigorous examination of a topic of current interests in film studies organized by particular themes, genres or filmmakers.

ENGL.3411 International Cinema Studies: French New Wave - Credits: 3
This course will introduce students to the aesthetic and theoretical qualities that define the New Wave movement in French cinema, focusing on major directors, performers, and composers associated with the New Wave. Through the close intertextual comparison of a range of films contextualized through the historical lens of 1960s Paris, students will develop sophisticated analyses that combine elements of film theory and cultural studies. This semester, we will read contemporary criticism, manifestos, mid-century French philosophy, and secondary scholarly studies to ground our discussions and writing in appropriate historical and theoretical context.

ENGL.3420 Women Writers and the Past (Formerly 42.342) - Credits: 3
Women Writers and the Past. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3440 Women in Theatre (Formerly 42.344) - Credits: 3
A study of the significant contributions of women to the literature and art of the theatre in various periods and cultures. Topics may include: plays written by women, the progress of women in theater, the evolution of female roles, and the portrayal of feminism on the stage.

ENGL.3450 British Women Novelists (Formerly 42.345) - Credits: 3
Selected novels by writers such as Austen, the Brontes, Eliot, Woolf, Bowen, and Drabble. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3460 Homer’s Iliad and Odyssey (Formerly 42.346) - Credits: 3
This class will explore the story of the ancient city of Troy from its origins in Homeric epic and classical drama to some of its many European iterations beginning with Vergil's Aeneid. Students will examine how these Trojan texts encode narratives of gender, ethnicity, and welfare, and how they help create an
occidental European identity.

ENGL.3480 Modern American Drama (Formerly 42.348) - Credits: 3
A study of such playwrights as O'Neill, Odets, Wilder, Williams, and Miller.

ENGL.3490 Arthurian Literature (Formerly 42.349) - Credits: 3
Will examine works in modern English translation from a variety of genres (romance, history, tragedy, epic) that tell stories of the mythical King Arthur and the knights and ladies of his courtly world. The course will focus primarily on texts of the medieval and renaissance periods, but will include attention to nineteenth- and twentieth-century versions in poetry, prose, art, music and film.

ENGL.3510 Literature of the Middle Ages (Formerly 42.351) - Credits: 3
This course will examine a variety of medieval genres: epic, chanson de geste, romance, fable, lyric, and drama. We will analyze the circumstances under which the works were produced (orally and in manuscript) and imagine how they may have been read by men and women in their day. Texts are selected from the courtly pursuits of the aristocrats and from the popular, religious rituals and writings of the rising merchant class. We will also give some attention to medievalism, that is, how the middle ages have been perceived and transformed by contemporary cultures.

ENGL.3520 Renaissance Literature (Formerly 42.352) - Credits: 3
A study of English prose and poetry of the period.

ENGL.3530 Literature of the Seventeenth Century (Formerly 42.353) - Credits: 3
A study of English prose and poetry of the period excluding Milton.

ENGL.3550 Literature of the Romantic Period (Formerly 42.355) - Credits: 3
A study of English prose and poetry from 1798-1832.

ENGL.3560 Literature of the Victorian Period (Formerly 42.356) - Credits: 3
A study of British fiction, poetry, and prose from 1837 to 1901.

ENGL.3600 Medieval & Renaissance Theater (Formerly 42.360) - Credits: 3
A study of Medieval mystery cycles, morality plays, interludes, and other forms of popular and court theater.

ENGL.3610 Restoration Comedy (Formerly 42.361) - Credits: 3
A study of comic plays from 1660 to the mid-eighteenth century. Focus on the works of Ethridge, Wycherley, Congreve, and Sheridan.

ENGL.3620 Modern Drama (Formerly 42.362) - Credits: 3
A study of selected Continental, British and American plays of the late nineteenth century to the present.

ENGL.3630 English Renaissance Drama (Formerly 42.363) - Credits: 3
A study of major dramatists of the Age of Shakespeare including Marlowe, Dekker, Webster, Jonson, Beaumont and Fletcher, Massinger, Ford and others

ENGL.3640 African American Drama (Formerly 42.364) - Credits: 3
A study of the history and development of African American drama, with emphasis on major aesthetic, political, and social movements in African American culture. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3660 Creative Writing: Poetry II (Formerly 42.366) - Credits: 3
Combines discussion and critique of student poems with readings in contemporary poetry and poetics. The focus is on enabling students to develop their individual voices, forms, and subjects.

ENGL.3680 Feature Writing (Formerly 42.368) - Credits: 3
This writing-oriented course will focus on learning how to write feature stories for newspapers, magazines, and the
ENGL.3685 Sports Writing - Credits: 3
This course will explore the practice, theory, and context of sports writing. In the course, students will write in a variety of sports related genres: the game story, the feature, and the column, as well as online related work, such as a blog. The course will also discuss the meaning of sports; Sports writing often covers subjects that range beyond its genre, which is why it can be so evocative, funny, sad and profound.

ENGL.3690 Reading and Writing New Media (Formerly 42.369) - Credits: 3
This course will focus on learning how to write for electronic media and understanding the changing world of journalism.

ENGL.3700 Contemporary American Fiction (Formerly 42.370) - Credits: 3
Discusses novels and short fiction from World War II to the present.

ENGL.3710 The Literature of the Beat Movement (Formerly 42.274/ENGL.2740) - Credits: 3
Explores both the writings and the personal lives of a loose confederation of poets, novelists, and essayist who emerged onto the American literary and cultural scene following World War II and who came to be known as the -Beat Generation.+ The primary focus will be on the life and writings of Lowell native Jack Kerouac (1922-1969) with others of the -beat circle+ included as well, i.e., Allen Ginsberg, William Burroughs, Diana DiPrima, etc.

ENGL.3730 Modern Poetry (Formerly 42.373) - Credits: 3
A study of the development of British and American poetry from 1900 through World War II.

ENGL.3740 Contemporary Poetry (Formerly 42.374) - Credits: 3
A study of selected British and American Poets since World War II.

ENGL.3750 Modern Irish Literature (Formerly 42.375) - Credits: 3
Poetry, drama, and prose fiction from the Irish literary renaissance to the present. Writers will include Yeats, Joyce, O’Casey, Friel and Heaney.

ENGL.3760 African-American Literature (Formerly 42.376) - Credits: 3
A study of selected works by black American writers, such as Toomer, Wright, Ellison, Walker, and Morrison. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3770 Theories of Rhetoric and Composition (Formerly 42.377) - Credits: 3
This course will examine the history and theories of composition and rhetoric, studying the field from its inception to more recent developments and challenges. We will also explore our own writing practices and literary practices. The course is furthermore grounded on the idea that literary practices are shaped by our culture. The course introduces practical approaches to as well as theoretical frameworks beneficial for those interested in composition studies. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL).

ENGL.3780 Asian American Literature (Formerly 42.378) - Credits: 3
Asian Americans hold an intriguing place in the cultural imagination: as perpetual foreigners, as so-called 'model minorities' that serve to maintain hegemonic power relations, and as living embodiments of America's memory of its involvement in recent wars. As artists, however, Asian Americans have contributed and impressive body of literary work, and we'll examine some of the most enduring and provocative of these texts. We'll explore themes such as trauma and the immigrant experience, issues of exile and dislocation, Asian Americans' embattled place in our country's history, and the intersections of race and ethnicity with gender and sexuality. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3790 Postcolonial Literature (Formerly 42.379) - Credits: 3
When the peoples of Africa, India, the Caribbean, Ireland, and Canada finally gained, to a greater and lesser extent, independence from the British during the 20th century, they found that their national, cultural, and individual identities had been radically altered by the experience of colonization. In this course, we will examine how authors have related this postcolonial condition. We will examine a diverse body of texts--poetry which eloquently describe the heroic journey out
of colonialism, drama which lays bare the conflicts of assimilation, and novels which fantastically present political struggle—as we determine how postcolonial theory and literature affects and possibly redefines all literature.

ENGL.3800 Travel Literature - Credits: 3

We all yearn to travel. But why? In this course, we will investigate this question by not only studying works of travel writing (supposedly non-fiction travel accounts written by those who have done the journeying), but also other works of literature and culture in which travel is a significant theme. Our reading will cover a diversity of writers from around the globe and from different periods in history and we will pay particular attention to the interrelationship amongst the key issues of representation, power, and identity as we consider travel literature alongside interdisciplinary theories about travel and tourism.

ENGL.3820 Theatre History I: Ancient Greece through the 18th Century (Formerly 42.382) - Credits: 3

A survey of ancient to early modern theatre in its historical and social contexts, tracing changes and developments in acting styles, theatre architecture, scenic practices, dramatic literature, and the audience. The course examines how theatre both reflects and shapes the changing beliefs and priorities of a culture.

ENGL.3830 Theatre History II: Nineteenth Century to the Present (Formerly 42.383) - Credits: 3

A survey of theatre in its historical and social contexts from the 19th century to the present, focusing on innovations in design and technology, the advent of the director, the emergence of modern schools of acting, and the creation of new forms of theatre to suit the changing needs of a modern world.

ENGL.3860 Editing: Grammar and Style (Formerly 42.386: The Science of Editing) - Credits: 3

The course will examine the varied editing roles in a publishing company, from acquisitions to copy editing.

ENGL.3870 Introduction to Editing and Publishing (Formerly 42.387) - Credits: 3

Designed for students considering a career in book publishing, this course provides an overview of the publishing industry. You will examine the stages of the book publishing process from acquisition to bound book or e-book, using assignments and examples from school, college, and trade book publishing. You will also consider the specific responsibilities of an editor. The course includes class visits by authors, editors, or publishing executives, as well as a trip to a local printing company.

ENGL.3880 Undergraduate Seminar on the Teaching of Writing (Formerly 42.388) - Credits: 3

Training in writing theory for direct application in peer tutoring. Discussion supplemented by experimental exercises, class presentations, reading, and writing. Meets two hours each week. Students tutor four hours each week.

ENGL.3910 Writing on the Job (Formerly 42.391) - Credits: 3

A study of special problems of writing in business from memos and press releases through reports and proposals, including strategies for correspondence, presentation of complex information, and writing for diverse audiences. For English majors and minors.

ENGL.3920 Visual Rhetoric (Formerly 42.392) - Credits: 3

This course introduces students to the theory and practice of visual communication. Students will explore how scholars mean by terms such as visual rhetoric and visual literacy in order to think concretely about how these concepts apply to the communication practices they will engage in their academic, professional, and everyday life. Special attention will be paid to the ways in which visual representations communicate culturally-specific meanings about race, gender, class, sexuality, age, nationality, and difference. Assignments include contributions to a course blog, rhetorical analyses of visual texts, design modules, and a multimodal project.

ENGL.3925 Rhetorics of Social Movements - Credits: 3

This course examines the communication strategies used to build social movements and agitate for social change: What genres and persuasive tactics are used to identify social problems and attract people to participate in a social movement? What means of communication sustain the energy around and investment in social movements? How do people use language to silence or otherwise reject calls for social change? What role do journalists play in bringing attention to social movements? Students are introduced to social movement studies and analyze the rhetoric of historical movements in order to ultimately evaluate the persuasive strategies used in social movements happening today.

ENGL.3950 Special Topics in English (Formerly 42.395) - Credits: 3
This course focuses on the exploration of thematic or issue-oriented or timely topics of interest. The precise topics and methods of each section will vary. Barring duplication of topic, the course may be repeated for credit.

ENGL.3952 Topics in Latinx Literature and Culture - Credits: 3

This course focuses on thematic or issue-oriented topics in Latinx literature and culture. Topics and methods will vary each section, but topics might include: "Monsters, Hauntings, and the Nation," which examines Latinx horror to understand how the genre addresses the unique experience of Latinx people in the Americas. Reading from a wide variety of Latinx texts, students will gain a deeper understanding of the capacities of horror to depict the foundational yet spectral presence of Latinx people in the "American" imaginary.

ENGL.3953 Topics in Multiethnic Literature and Culture - Credits: 3

This course explores thematic or issue-oriented topics in multiethnic literature and culture. The precise topics and methods of each section will vary.

ENGL.4010 Selected Authors (Formerly 42.401) - Credits: 3

A study of selected works. Authors to be announced each semester.

ENGL.4020 Topics in Writing (Formerly 42.402) - Credits: 1-3

A study of issues and the practice of skills needed in specific areas of professional writing. Topics to be announced each semester.

ENGL.4060 Community Writing II (Formerly 42.406) - Credits: 3

Students work for a local non-profit for the semester completing a variety of writing tasks, depending on the placement. In class students apply the principles of rhetoric and use the tools of research and revision to write effectively for their community partner; to articulate in a public presentation a thoughtful, intelligent position on relevant social policy; and to become more active, engaged citizens.

ENGL.4070 Creative Writing Fiction II (Formerly 42.407) - Credits: 3

Creative Writing Fiction II

ENGL.4080 Principles of Technical Writing (Formerly 42.408) - Credits: 3

Provides the fundamental concepts and principles of technical writing, including technical description, audience analysis, editions, document specifications and outlines, graphics, definitions and revising documents. Writing assignments include preparing a document specification, editing and creating graphics.

ENGL.4130 Advanced Software Writing (Formerly 42.413) - Credits: 3

Introduces a range of advanced topics in software writing. Topics may include electronic publishing, hyper text, advanced graphics, document set components, and working in project teams. In this course, the student selects some aspect of the computer industry that interests him/her and documents it.

ENGL.4150 Young Adult Literature-Critical Methods (Formerly 42.415) - Credits: 3

Using young adult literature as a vehicle, this course considers traditional methods of interpretation and evaluation. Particular attention is given to the analytical, psychological and sociological approaches.

ENGL.4180 Creative Writing: Creative Non-fiction II (Formerly 42.418) - Credits: 3

An advanced creative writing workshop in nonfiction (personal essay, memoir, literary journalism, etc.).

ENGL.4230 Shakespeare I (Formerly 42.423) - Credits: 3

A study of selected histories, comedies, and tragedies. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Written &Oral Communication (WOC).

ENGL.4240 Shakespeare II (Formerly 42.424) - Credits: 3

A study of selected histories, comedies, and tragedies not covered in 42.243. Shakespeare I is not a prerequisite.

ENGL.4290 Introduction to Literary Theory (Formerly 42.429) - Credits: 3

A solid introduction to major trends in contemporary critical theory. Emphasis on producing a sample critical paper treating one or more current critical approaches to reading a literary
ENGL.4350 Literary Journalism (Formerly 42.435) - Credits: 3
This course that looks at the genre of Literary Journalism, a largely American innovation in literature that developed in the late 19th and 20th centuries. Students will closely read and discuss books and articles by literary journalists, seeking to understand the genesis and shifts of this hybridized form (literary techniques applied to true or fact-based stories), and the contributions literary journalism is making to literature, documentary and witness narratives, to historical records, and to the notions of truth reportage.

ENGL.4360 Writing About Culture (Formerly 42.436) - Credits: 3
In this course, students will write about local culture, using a mix of first-hand observation, archival research, and/or contextual or geographic readings of culture of literature produced in the region. This course is designed to serve as a course in a study abroad program or one that focuses on regional authors such as Jack Kerouac or Henry David Thoreau.

ENGL.4370 Newspaper Editing (Formerly 42.437) - Credits: 3
This course will explore the techniques of putting together a student newspaper, focusing on everything from brainstorming for coming up with stories, to writing and editing them, writing headlines and captions, and design and layout. The course also discusses the nature of journalism audiences. It also discusses the practicalities of applying for journalism jobs and writing query letters for freelance writing.

ENGL.4375 Writing a Book - Credits: 3
In this course, students will learn about the methods of writing and publishing a book and put those lessons to work in writing their own work in a genre of their choice.

ENGL.4500 Creative Writing: Capstone (Formerly 42.450) - Credits: 3
In this intensive workshop course, upper-level students in the creative writing concentration work for an entire semester on a reading and longer-form writing project in one of three genres - poetry, fiction, or creative nonfiction. Students devise reading lists specific to their writing projects, with instructor’s guidance. Through a creative process that involves planning and drafting, peer workshop, instructor feedback, and rigorous revision, students ultimately create portfolios that represent their best undergraduate writing.

ENGL.4790 Literature Seminar (Formerly 42.479) - Credits: 3
An advanced course that explores a variety of issues and topics in literature, literary history, and related fields. The topic or issue for a specific seminar will be announced in advance.

ENGL.4900 Directed Studies in Writing (Formerly 42.490) - Credits: 1-3
The student develops a plan for a sustained writing project or portfolio and submits preliminary and final versions for critique and evaluation.

ENGL.4910 Directed Study in Literature (Formerly 42.491) - Credits: 1-3
The student develops a plan of directed reading, defines a problem for individual research, and prepares a paper or papers.

ENGL.4920 Directed Study in Language Analysis (Formerly 42.492) - Credits: 1-3
The student develops a plan of directed readings in linguistics, semantics, or stylistics and defines a topic for individual research.

ENGL.4930 Directed Study in Creative Writing (Formerly 42.493) - Credits: 1-3
The student develops a series of projects in creative writing and composes poetry, fiction, or drama.

ENGL.4960 Internship I (Formerly 42.496) - Credits: 3
Internship experience (usually off-campus) gives English majors the opportunity to apply their skills in actual business, technical, educational, or professional situations. Classroom time supports student professionalization and career development. Topics include resumes, cover letters, networking, LinkedIn profiles, portfolios, and professional behavior and expectations.

ENGL.4970 Practicum (Formerly 42.497) - Credits: 1-3
An off-campus professional experience for English Majors, Minors, and BLA English Concentrators. The Practicum is
intended to provide students with the opportunity of applying their writing skills in actual business, technical, educational, or professional situations. By permission only.

**ENGL.4980 Practicum-English Study (Formerly 42.498) - Credits: 1-3**

A short-term, intensive project related to English study and/or writing.

**ENGL.5060 Writing in the Community (Formerly 42.506) - Credits: 3**

Students learn advanced writing techniques in the classroom and apply them to real writing tasks in the community. Assignments include a writing project designed to meet the needs of a local organization, along with research and reflective pieces.

**ENGL.5200 Experiencing Poetry: Sound and Sense (Formerly 42.520) - Credits: 3**

The class offers seminar-style discussions on specific aspects of poetry, considering a range of excellent poems from various eras. Through hands-on writing exercises, we will examine the art from the vantage point of the practitioner, using imitation and exploration of technique as a kind of close reading. Assignments include analytical essays as well as creative work.

**ENGL.5400 Modernist Literature (Formerly 42.540) - Credits: 3**

Much of the influential literature produced during the modernist period, roughly 1900-1950, was considered radical in its time. This course will focus on the experimental, avant-garde impulse that manifests itself in the themes and techniques of key modernist texts, relating that impulse to questions about the nature of identity, the role of gender and class in constituting the modernist subject, and the sociocultural functions of literature itself. Readings will primarily consist of primary texts such as Virginia Woolf's *Mrs. Dalloway*, Zora Neale Hurston's *Their Eyes were Watching God*, T.S. Eliot's poetry, and James Joyce's *Portrait of the Artist as a Young Man*, as well as theoretical texts. We will explore this period by examining these exemplary texts, historical and social events, and films.

**FAHS.3600 Creative Community Workshop (AH) - Credits: 1-3**

This course seeks to motivate and guide students toward the improvement of their community in a measurable, actionable, and continuable manner. The course encourages creativity and promotes serviceable thinking, from concept to delivery. Students will be expected to work in a team structure to solve problems, process information, explore and pursue entrepreneurial opportunities, make decisions, communicate verbally within their team and be able to present their ideas to external audiences. The course satisfies Arts and Humanities Perspective (AH).

**GNDR.2400 Introduction to Gender Studies (Formerly GNDR 240) - Credits: 3**

This course is an interdisciplinary introduction to the field of Gender Studies that examines both commonalities and differences among diverse groups of women. A variety of topics are presented such as past and present stratification in work and family, sexual identities, medial representations of women, and violence against women. Social movements for women's equality and feminist theories and methods are also introduced.

**HIST.1010 Classical Civilization (Formerly 43.101) - Credits: 3**

This course provides an introduction to the Ancient Near East, Greece and Rome. The class first examines the formation of urban centers and the evolution of civilization as the late Bronze Age world transforms into the Iron Age with the creation of the vast empires such as Assyria and Achaemenid Persia. The course then focuses on the development of Greek city-states and the ideological differences between Athens and Sparta with a brief exploration of Classical Greed culture. Finally the class looks at the conquests of Alexander and his successors in the East, and the development of Rome as it shaped and was shaped by the cultures it conquered. The course requires short analytical papers, exams, and historical analysis of primary sources.

**HIST.1050 Western Civilization I (Formerly 43.105) - Credits: 3**

This course surveys some important issues and tendencies in the history of Western Civilization from its origins through the early modern period, including ancient Mesopotamia, classical Greece and Rome, the Middle Ages, and the Renaissance. These include "civilization" and the rise of cities, different imaginings of god(s) and humanity, evolving forms of political organization, continuity and change in social organization and everyday life, and the ongoing dialogue of faith and reason. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**HIST.1060 The Modern World (Formerly 43.106) - Credits: 3**

In a period of intensifying globalization a basic understanding of our world is increasingly important. The main purpose of this course is to expose students to the global processes that
have shaped our modern world since roughly the year 1500. Taking on a global and comparative perspective, this course will help students to develop a topical, chronological, and geographical understanding of global history and cultures.

HIST.1070 World Civilizations to 1500 (Formerly 43.107) - Credits: 3
This class examines societies and cultures from ancient until early modern times with the underlying assumption that world history is an important conceptual tool for understanding our interdependent world. Course topics analyze the nature of the earliest human communities, the development of the first civilizations and the subsequent emergence of cultures in selected areas of Eurasia, Africa, and the Americas. This course also offers a consideration of issues related to the connections and relationships that shaped civilizations as a result of migration, war, commerce, and the various cultural expressions of self, society, and the cosmos before 1500. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HIST.1080 World Civilizations Since 1500 (Formerly 43.108) - Credits: 3
This course will introduce you to the study of world history, its relevance for living in the present, and the challenge to think critically about the emergence and subsequent development of the modern world since 1500. Participants in this course will examine experiences that transcend societal and cultural regions, focus on processes of cross-cultural interaction, and investigate patterns that influenced historical development and continue to impact societies on a global scale. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HIST.1110 United States History to 1877 (Formerly 43.111) - Credits: 3
This course surveys United States history from the early settlement of North America through the Civil War and Reconstruction. It considers the role of the political and economic leadership in the building of the nation as well as actions of ordinary people whose energies and aspirations constitute the fabric of United States society. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HIST.1120 United States History since 1877 - Credits: 3
This course surveys the history of the United States from the end of Reconstruction to the present. It covers significant developments in the politics, economy, culture, and other aspects of American life during that period. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HIST.2000 Early Christianity (Formerly 43.200) - Credits: 3
This course serves as an introduction to the first 800 years of Christian history. It will begin with an introduction to the Apostolic Church of the first century (and its Jewish/Greco-Roman background) and conclude with an introduction to the Eastern Orthodox Church of Late Antiquity. The course will also consider popular topics like "Gnosticism," "Women in Early Christianity," and "Early Christian Worship and Art."

HIST.2001 Religions in Medieval Europe - Credits: 3
This course serves as an introduction to religion in medieval Europe (ca. 500-1500), that is, the Roman and Eastern traditions of Christianity, Christian movements deemed "heretical" by "orthodoxy," Judaism, and Islam. Understanding the medieval history of these religions results in our gaining not only a comprehension of their individual developments but also how the three great monotheistic faiths have become some of the most powerful religious forces ever seen in civilization. These different religions will be treated not only individually but also in dialogue with one another.

HIST.2040 China & the Modern World (Formerly 43.204) - Credits: 3
This course introduces China's interactions with the world since the 1840s. With the Opium War as the starting point, students are ushered into a traditional China whose political, cultural, and economic structure stood in sharp contrast to those of the outside world. The main focus of the course is to explore the process in which China fought for its survival as a sovereign nation and searched for its road to modernization.

HIST.2070 Women in China (Formerly 43.207) - Credits: 3
From Confucian texts to current conditions, the course examines the evolution of Chinese women's status throughout the centuries. The course will ask questions such as whether Confucianism dictated oppression against women, what factors influenced the changes of status for women, how Western feminism is connected with Chinese women, what roles women played in transforming China, and how ordinary women lived and are still living in China.

HIST.2090 Colonial Latin America (Formerly 43.209) - Credits: 3
This class examines the history of Latin America from 1492 until the early nineteenth century. After considering the rise of the Aztec and Inca empires, we will consider how the Spanish and Portuguese were able to acquire and maintain control in the region. Topics include indigenous-European relations, slavery, economic developments, the challenges of maintaining a colonial government, and Latin American independence.

**HIST.2110 Historical Dimensions of Globalization (Formerly 43.211) - Credits: 3**

This course explores the impact of globalization on the development of world societies in the late 20th-early 21st century. Using historical analysis of contemporary realities, it develops an appropriate frame of reference to address questions about the nature and cause of globalization.

**HIST.2120 Modern Latin America (Formerly 43.212) - Credits: 3**

Modern Latin America, a 200-level course, surveys Latin America from independence in the early nineteenth century to the present using primary sources, a textbook, and scholarly works. It begins with an understanding of the political, social, and economic context from which ideas of independence emerged and considers the wars for independence. We will spend a significant part of the course studying nation-building: how did the leaders of new nations define their nations and the values that would guide them? Who was included and who was excluded in the process of nation-building? The next part of the course examines the demands of groups originally excluded: the indigenous population, women, and the poor. The portion of the course covering the twentieth century emphasizes Latin America’s international connections, focusing on influence from the United States and the effects of world wars on the region. Mass politics also emerge, and are expressed in the Mexican Revolution and in Peronism. We also will consider the Cuban Revolution and its wider effects in the region. We will conclude our survey of the region by considering how historical trends continue to affect politics today. For example, the Bolivian political scene continues to be affected by the events and outcome of the War of the Pacific (1879-1883) and by a strong indigenist movement.

**HIST.2130 History of the Ancient Near East (Formerly 43.213) - Credits: 3**

This broad survey investigates the development of the so-called “Cradles of civilization,” Ancient Mesopotamia, Egypt, Anatolia, the Levant and Persia. At times the class will dip deeply into these cultures, using primary texts as well as archaeological and artistic evidence to better understand the political, religious, economic, military, social and artistic evolution of these closely associated cultures. We will focus on themes such as the development of kingship as a secular and sacred ruler, the ideology of Empire, the environment, and the fragility of the inter-connected network of resources that developed. The ultimate goal is to understand the inter-cultural milieu of the Ancient Near East and demonstrate how much Western civilization owes to these historical developments.

**HIST.2140 Early America Through Material Culture - Credits: 3**

This class examines American history from the period before European contact to the early stages of the Industrial Revolution in the nineteenth century through the lens of material objects. Comparisons will be drawn between the objects and cultures used by European, Native American, and African American peoples, as well as over time.

**HIST.2230 England to 1660 (Formerly 43.223) - Credits: 3**

A survey of English History to 1660 with emphasis on the Institutional, Economic and cultural developments. In addition to providing general knowledge of the topic, the course is designed to enhance the learning experience of both History and English majors.

**HIST.2240 Modern Britain (Formerly 43.224) - Credits: 3**

A survey of the political, social and cultural history of modern Britain from the early 19th century to the present, focusing on the evolution of Britain from the period of Empire to its current membership of the European Union. Key themes include the transition from Empire to post-imperial Britain; economic development and distress; parliamentary and popular politics; social unrest and repression; nationalism, sub-nationalism and post-nationalism; and migration and citizenship.

**HIST.2250 Ancient Greek History (Formerly 43.225) - Credits: 3**

A study of Greek history, institutions and culture from Minoan times through the Hellenistic period.

**HIST.2260 Roman History and Civilization (Formerly 43.226) - Credits: 3**

This course examines one thousand years of Roman history (ca. 500 BC-500AD) with equal emphasis upon social, political, military, and cultural aspects of the Republic and Empire.

**HIST.2270 Europe in the Middle Ages (Formerly 43.227) - Credits: 3**

A survey of European history from the fall of the Roman Empire to the Renaissance, with emphasis on major political, social, economic, intellectual, and cultural developments.
HIST.227 - Credits: 3
A survey of the Latin West during the formative period from the Roman Empire to the creation and development of the first European civilization.

HIST.2280 Women in European History (Formerly 43.228) - Credits: 3
This course examines the history of women in late medieval, early modern, and modern Western Europe (ca. 1300-1900). From medieval saints and Renaissance queens to Enlightenment salonieres and ordinary wives and mothers, women have played an astonishing variety of roles. We will utilize primary and secondary sources, historical films, and works of art to understand the contributions and challenges of women in the past.

HIST.2310 Renaissance and Reformation (Formerly 43.231) - Credits: 3
The history of Europe in the time of transition between the late Middle Ages and the Early Modern Period. Two principle topics are the intensification of cultural change which began in Italy around 1300 and spread slowly northward and the disruption of the unity of the Western Christian Church.

HIST.2350 Civil War and Reconstruction (Formerly 43.235) - Credits: 3
This course explores ways in which the U.S. changed in the years between 1848 and 1877. Topics covered may include the antislavery movement, black activism, secession, the war and reasons for U.S. victory, and the changes in American society and politics during Reconstruction.

HIST.2370 Europe in the Twentieth Century (Formerly 43.237) - Credits: 3
This course will survey the continent’s history over its "age of extremes" in the twentieth century, moving broadly from the apogee of European global power at the turn of the century to its decline in the trauma of two world wars and decolonization, through the Cold War and post-1945 recovery and the challenges and possibilities that have arisen for Europe in the aftermath of 1989 and the fall of the Berlin Wall.

HIST.2390 The Nonwestern World Since 1945 (Formerly 43.239) - Credits: 3
The recent history of Africa, the Middle East, Asia and Latin America and the comparative global processes and trends that have influenced the world since 1945.

HIST.2400 World War I (Formerly 43.240) - Credits: 3
The course will cover the wide range of causes of this major conflict, the difficulties and changing dynamics of waging this massive war and the effects of all this on both the internal political and social conditions and external consequences for the combatants with the peace settlement.

HIST.2410 Colonial Survival: Case Studies in Early American Legal and Political History (Formerly 43.241) - Credits: 3
This class contrasts the dominant monoculture colonies of Massachusetts Bay and Virginia with the lesser known multicultural colonies of Maine, Plymouth, New Amsterdam, Maryland and Rhode Island. While some of the multicultural colonies foundered, others flourished by utilizing a wide range of political and legal methods which allowed for their survival alongside much larger rival colonies. The class finishes by examining similar political and legal methods employed by Native American tribes for their own survival, in particular the Cherokee, whose carefully negotiated accommodations to Anglo-American culture allowed them to live side by side with the growing United States until the 1830's. Close analysis of both primary and secondary source material will provide students with an intensive look at rarely examined issues in early American history.

HIST.2420 World War II (Formerly 43.242) - Credits: 3
The Second World War transformed states and people from East Asia to the United States to Europe. We examine diplomatic and military aspects of the war and how it affected the lives of people in the countries involved. Topics include the prelude to the war, military campaigns in Europe and the Pacific, collaboration and resistance, the home front, the Holocaust, science and the atom bomb, and the consequences of the war.

HIST.2485 United States Military History - Credits: 3
This course is a survey of military history and the interaction between society and military institutions, technology and techniques, from the pre-colonial era to the present. The causes and consequences of war, the role of technology in war, and strategies and tactics of war will be emphasized.

HIST.2490 The Vietnam War (Formerly 43.249) - Credits: 3
Covers the U.S. was in Vietnam from its origins in the French colonial era to its impact on contemporary culture and foreign
policy.

HIST.2580 Russia to 1796 (Formerly 43.258) - Credits: 3

The growth of the Russian state: Varangian origins, the Kievan state, conversion to Christianity, Mongol domination, the rise of Muscovy, Europeanization and expansion under Peter the Great and Catherine the Great.

HIST.2700 Women in American History (Formerly 43.270) - Credits: 3

This course surveys the history of women in the British North American colonies and United States with a special focus on social and economic change. It examines women as a distinct group but also attends to divisions among them, particularly those based on class, ethnicity/race, and regional diversity. Course themes include concepts of womanhood, the development and transgression of gender roles, unpaid work and wage labor, social reform and women's rights activism, as well as changing ideas and practices with respect to the female body.

HIST.2740 Native American History (Formerly 43.274) - Credits: 3

A comprehensive study of the Native Americans through historical and first-hand accounts of their lives. Designed to enlighten students and to represent fairly the Native Americans, dispelling some of the existing myths about them.

HIST.2745 History of the U.S. South - Credits: 3

The history of the southern United States from the colonial period to the present. Topics include the development of plantation slavery, the Civil War and Reconstruction, industrialization and the "New South," segregation and disenfranchisement, the Civil Rights Movement, and conservatism.

HIST.2750 African-American History (Formerly 43.275) - Credits: 3

This course surveys African American history in the United States from colonization to the present. It begins with a study of life in West Africa and traces the forced migration of Africans to the Americas. It explores West African transmissions, the freedom struggle, the great migrations from the South, the Harlem Renaissance, the modern Civil Rights movement, and the continuing impact of African Americans on life in the 21st century.

HIST.2790 History of Lowell (Formerly 43.279) - Credits: 3

This course will provide an overview of the growth, decline, and rebirth of the city of Lowell, Massachusetts. Topics will include the Industrial Revolution, role of women and unions in the workplace, immigration and the formation of ethnic neighborhoods, urban renewal, and historic preservation. The survey will also discuss notable personalities such as labor activist Sarah Bagley, Civil War general Benjamin Butler, writer Jack Kerouac, Senator Paul Tsongas and boxer Micky Ward. The foregoing names may differ over time.

HIST.2810 Sub-Saharan Africa (Formerly 43.281) - Credits: 3

This course provides a basic introduction to the history of the African continent. It will expose students to the processes and patterns that have shaped modern African history. The course examines the historical roots of the many challenges that the continent faces today. But, at the same time, it will also provide students with the knowledge to shatter the myths and stereotypes about Africa.

HIST.2860 United States History Through Film (Formerly 43.286) - Credits: 3

This course explores selected moments in United States history - such as slavery, the Great Depression, World War II, the Vietnam War, and the feminist movement - through the lens of film. Using written historical sources as well as film, students will investigate how particular films have depicted the past and shaped the way that Americans remember their history.

HIST.2950 Japan Since 1600 (Formerly 43.295) - Credits: 3

A study of the traditional Japanese institutions and the transformation of Japan into a modern state after 1868: the Tokugawa Shogunate, Meiji Restoration, Russo-Japanese War, world power status, militarism, World War II, and present day Japan.

HIST.2960 United States Diplomatic History (Formerly 43.296) - Credits: 3

Although the course takes the entire United States diplomatic history as its field of historical study, its focus is on the American foreign policy in the twentieth century. The course first explores domestic and international factors that made the United States a world power by 1898. It will then consider the goals, the practices, and the results of the twentieth century American foreign policy. The course challenges students to view American diplomacy in a global context.
HIST.2980 Introduction to Historical Methods (Formerly 43.298) - Credits: 3
An introduction for the undergraduate student to the nature and principles of history. The course takes up methodology, historiography, research methods, electronic resources, bibliography, and the technical and stylistic problems involved in the presentation of research in scholarly form. Required of all history majors in the sophomore year. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Social Responsibility & Ethics (SRE).

HIST.3010 The World of Things: Consumer Cultures in the Modern West (Formerly 43.301) - Credits: 3
This course will examine the emergence and historical impact of consumer cultures in the modern West, from the eighteenth century through the present. Topics to be covered will include the emergence of spaces of consumption (the home, the commercial/spectacular metropolis, the department store, the shopping mall, the tourist site), changing attitudes toward shopping and spending, the construction of modern social identities of class, gender, generation and race through consumption, and political struggles over consumption.

HIST.3020 The Byzantine Empire (Formerly 43.302) - Credits: 3
Through this course, students will examine the history of Byzantine culture, which grew from the Greek-speaking remains of the Roman Empire. Students will consider how leading men and women shaped Byzantine Civilization and the political and military institutions that preserved it through the fifteenth century. The course will also focus on the development and spread of Eastern Orthodox Christianity and significant aspects of Byzantine culture, such as cuisine, gender roles, cities, and art. We will explore in some detail Byzantium's complex and difficult dialog with its neighbors: the Islamic world, the Slavs, and the Latin West. This course especially emphasizes reading and discussion of primary source documents. Students will compose a research paper as their main work for this class.

HIST.3040 European Economic & Social History (Formerly 43.304) - Credits: 3
Europe has been transformed in the last 250 years from an agricultural society to a post-industrial one. We study the processes by which this happened, from the Industrial Revolution of the 18th and early 19th century to the wars and depressions of the early 20th century and the collapse of the communist system and European unification in the late 20th century. Students learn basic concepts and methods of history and economics.

HIST.3080 History of Crime and Social Control (Formerly 43.308) - Credits: 3
Analyzes the causes and development of attempts to control crime, ethnic conflict, radical protest movements, urban disorders, and attitude and role conflicts.

HIST.3100 History of New England (Formerly 43.310) - Credits: 3
Explores the evolution of New England society from pre-Columbian to the Post-Industrial, emphasizing the ways succeeding generations of New Englanders have confronted social and economic change. Topics include: white-Indian relations, ecological change, Puritanism, the New England town, the industrial revolution, the rise of cities, immigration, ethnic and class conflict, and the distinctiveness of the region.

HIST.3105 War and Native Americans in Colonial New England - Credits: 3
war has played a significant role in the history of the indigenous peoples of New England and the Atlantic Northeast. From pre-colonial times through the American Revolution, conflict and warfare has had a dramatic impact on Native American societies in the region. In fact, as we examine in this course, war has been a defining feature in many indigenous communities. This course provides a cultural history of how the almost constant state of warfare shaped the lives of the Native Americans of the colonial Northeast.

HIST.3140 American Social History II (Formerly 43.314) - Credits: 3
This course explores various aspects of common peoples' lives in the United States since 1880. Primary areas of investigation include work and leisure, family and community, as well as culture and values.

HIST.3151 Food in American History - Credits: 3
This course examines change and continuity in American foodways from the pre-Revolutionary era to the present, focusing on the significance of class, race, gender, nationality, religion and region as well as transnational dimensions in that culinary history.

HIST.3160 American Environmental History (Formerly 43.316) - Credits: 3
This course explores the environmental history of early America and the United States from the end of the last ice age (c. 12,500 years ago) to the present. It examines the role played
by nature as an historical agent as well as the relationship between human communities and the physical and organic environment. Course themes include evolving land use, the environmental significance of industrial capitalism, urban public health, resource conservation and wilderness protection, the impact of ecology on public consciousness, as well as environmentalism.

HIST.3200 American East Asian Relations (Formerly 43.320) - Credits: 3

The course examines relations between the United States on one hand and Japan, Korea, China, Vietnam, and the Philippines on the other in the 19th and 20th centuries. Besides political, trade, and cultural relations, there is also emphasis on American laws and practices regarding immigrants from these East Asian countries. The aim of the course is for students to gain a basic knowledge of American relations with East Asia and to develop analytical skills for sophisticated inter-national relations.

HIST.3210 The Holocaust (Formerly 43.321) - Credits: 3

In a world in which genocide is real, the murder of six-to-eight million Jews between 1939 and 1945 remains a critical topic of inquiry. When were factories of death first conceived? What perverse rationale motivated the collaborators who built and operated the gas chambers and crematoria? This course will answer questions of this kind by examining the most respected scholars who have written on primary sources that speak directly to the Holocaust.

HIST.3220 Chinese Foreign Policy (Formerly 43.322) - Credits: 3

Chinese foreign policy since 1949 with a strong emphasis on tracing the links between historical, ideological, and cultural influences, on the one hand, and pragmatic and nationalistic considerations on the other. While tracing these links, the course explores the intricate process of policymaking in the People's Republic of China.

HIST.3230 World of the Atlantic (Formerly 43.323) - Credits: 3

The concept of the Atlantic world arose to describe the interactions of the peoples of the Americas, Europe, and Africa through trade, conquest, colonialism, independence and beyond. In this class, we will consider the cultural, economic, and political relationships that are formed and change over time between these groups. We will pay special attention to historical approaches to studying and writing about the Atlantic World.

HIST.3270 Medieval England (Formerly 43.327) - Credits: 3

From the first century Roman Conquest of the Britons to the 15th century Tudor victory at the Battle of Bosworth Field, this course aims to illuminate the social, political, religious, and cultural elements that made medieval England. This course will explore art, gender, class structures, and England's interactions with non-Christians, among many other topics. In addition to the extensive written sources available, special attention will be paid to archaeological discoveries that help us understand daily life in medieval England.

HIST.3290 Childhood in Premodern Europe (Formerly 43.329) - Credits: 3

This course examines the concept of childhood in medieval and Renaissance Europe (ca. 1100-1600), with particular attention to England and Italy. There are no specific prerequisites, although some knowledge of European history (i.e., Medieval Institutions, Western Civilization, Renaissance-Reformation) will be useful. Among the topics we will consider are the following: the different stages of childhood; children's education and apprenticeship; dress, diet, and demeanor of children; orphans; royal children; Protestant and Catholic views of children; adolescent sexuality; depiction of children in art; child labor; literature for children.

HIST.3300 Tudor and Stuart England, 1485-1714 (Formerly 43.330) - Credits: 3

Traces the transformation of England from a small island kingdom to the hub of an overseas empire. During this period the English people underwent religious upheaval and civil war, saw the rise and partial decline of the monarchy, built and rebuilt London, and enjoyed the plays of Shakespeare. Although England provides the focus for this course, the rest of the Tudor and Stuart world is included.

HIST.3320 Warfare in the Ancient World (Formerly 43.332) - Credits: 3

Warfare in the Ancient World is a practical introduction to the study of warfare in the ancient world and traces the advances made in empire building, ideology and military technology. The chronological structure of the class starts with the Egyptians and continues through the Dark Age, Classical and Hellenistic Greeks, to the rise and fall of Rome. This course will trace certain themes through the centuries: how different civilizations waged war; who served in various armies and why soldiers decided to fight. While major battles and important individuals are discussed, military tactics and strategies are only tools to help understand the underlying causes for armed conflict.
HIST.3333 American Women and Public Activism, 1800-1920 - Credits: 3

Over the course of the 1800’s, women developed numerous strategies for influencing American society and politics, even though they were unable to vote in most elections. This course will explore how diverse groups of American women formed organizations that acted decisively in the public arena. By analyzing women’s social and political activism, we will see how vital civil society is for a functional democracy, and explore how change happens. Possible topics include women’s activism in social reform, local and state governments, civil rights, labor organizations, charitable work, religion, and women’s rights. Consideration will be paid to the differences among women in terms of race, class, and sexuality.

HIST.3340 The French Revolution and Napoleon (Formerly 43.334) - Credits: 3

This course will involve students directly in critical consideration of the central events and issues of the Revolutionary and Napoleonic periods, with an eye to their longer-term historical resonances in France, Europe and beyond. The core problems we will be discussing are ones which have remained vital in modern and even contemporary political history: the nature of liberty, the nation and national identity, equality and inequalities, violence and terror in politics, the cult of the leader, war and empire.

HIST.3360 Modern Ireland (Formerly 43.336) - Credits: 3

An upper-level course on the history Modern Ireland from the late 18th century to the present, covering the movements for independence in the 19th century, the cultural revival and revolutionary period from the 1890s, the social and economic history of the independent state, and the Celtic Tiger phenomenon of the late 20th century. Key themes include nationalism and identity, colonialism and post-colonialism, religion and repression, emigration and diaspora, culture and social life, and changing definitions of "Irishness" over time.

HIST.3370 Germany Since 1871 (Formerly 43.337) - Credits: 3

This course will survey major developments of Modern German History, from German Unification through European Union. Topics covered will include German social, political and military evolution under the Empire; the impact of modern, "total" war; the upheavals of the Weimar and Nazi periods; German recovery and division during the Cold War; German reunification and its contemporary aftermath.

HIST.3380 War and Memory in Twentieth Century France (Formerly 43.338) - Credits: 3

This course will address the individual and collective trauma of modern warfare, as that was experienced in France both during and after the country’s three main wars in the twentieth century. It focuses on how the experience of modern war was negotiated in culture---in personal and official memory, in gender relations, and in a great variety of written and visual texts. Individual units will be dedicated to World War I, the Occupation and Vichy Regime during World War II, and the Algerian War, and to the long and conflicted afterlife of those conflicts.

HIST.3420 Inquisition: Myth and Reality (Formerly 43.342) - Credits: 3

Following a brief introduction and an overview of the medieval Inquisition, the first few weeks of the course will be devoted to a study of the Inquisition in Spain and Italy from 1450-1650. We will also discuss the way in which the history of the Inquisition has been analyzed during the past five hundred years (what historians call “historiography”). The second half of the course will focus on student research and selected topics in Inquisition studies.

HIST.3430 Fascism and the Radical Right in Twentieth Century Europe (Formerly 43.343) - Credits: 3

This course will offer a comparative exploration of the deep and enduring appeal of fascism and far right politics in twentieth century Europe. Beginning with the nationalist revival and cultural crisis of the late nineteenth century and the cataclysm of World War I, we will trace the rise of the radical right to political prominence in Europe in the 1920’s and 1930’s. While retaining a Europe-wide perspective throughout, we will analyze in particular detail the Fascist and National Socialist seizures of power in Italy and Germany, and examine their efforts of political, social, economic and cultural mobilization. Issues covered will include fascist political communication and governance, terror and "normality" in everyday life, labor and youth policy, racism and racial purification, and gender and reproductive politics, among others. In the final section of the course, we will contemplate the historical legacy of fascism after 1945, focusing on the politics of memory and representation in post-war Germany, Italy and Europe more generally, and assessing the recent resurgence of fascist and quasi-fascist political tendencies in the 1980’s and 1990’s.

HIST.3440 Revolutions in the Modern World (Formerly 43.334) - Credits: 3

In this comparative history course, we look at the theories of
Marx, Barrington Moore, Crane Brinton, Theda Skocpol, William Sewell, and others on the causes, dynamics, and outcomes of revolutions in the modern world. We then consider the history of the French, Russian, Vietnamese, and Iranian Revolutions (list may vary each semester) to see how well the theories fit the events. The course ends with a discussion of whether the patterns and analyses discussed in the course are helpful in understanding a contemporary revolution, such as that in Egypt.

HIST.3449 American Slavery: History, Fiction, and Film - Credits: 3
This course examines the history of slavery in the United States. It explores topics such as the role of slavery in the economy, the culture of enslaved Americans, resistance to slavery, and the abolition of slavery, often making comparisons to slavery in other parts of the Western Hemisphere. The course also investigates how the institution of slavery has been represented by different generations of historians and in American popular culture from the 1830’s through the present.

HIST.3450 Slavery and Abolition (Formerly 43.345) - Credits: 3
This course takes a comparative approach to the study of plantation slavery in the Americas with special attention to developments in Virginia and Cuba. It surveys the structure of slavery in the nineteenth century United States South; slavery’s legacy in the United States; and its twenty-first century reincarnation in human trafficking and forced labor around the world.

HIST.3480 Making an Historical Documentary (Formerly 43.348) - Credits: 3
This course provides students with the basic conceptual and technical skills for developing and completing an historical documentary, including instruction about subject choice, narrative structure, camera work, and editing.

HIST.3489 Reform and Revolution in Latin America - Credits: 3
This course focuses on reform movements and revolutions in modern Latin America as a way of considering how individuals and groups articulate their needs and demand access to resources, representation, and political change. Calls for land reform, voting rights, environmental protection, indigenous representation, and anti-imperialism are common themes we will consider during the semester.

HIST.3490 The Cuban Revolution (Formerly 43.349) - Credits: 3
The Cuban Revolution has been surrounded by controversy since it took power in 1959. Through readings, films, and discussions, we will examine not only the events that have occurred in Cuba over the last four decades but also the ways that they have been presented to audiences in Cuba, the United States, and elsewhere. We will carefully consider the role of perspective in academic writing and the media and how it has shaped understandings of the Castro era.

HIST.3500 Colonial North America, 1550-1750 (Formerly 43.350) - Credits: 3
This class explores societal groups across the North American continent from 1550 to 1750 by comparing the approaches and responses to colonization taken by different European and Native American groups alongside the emergence of African slavery in North America. The semester concludes with the escalating colonial wars in the early eighteenth century, which would lead to both the French and Indian, and Revolutionary, Wars.

HIST.3510 Captivity Narratives and Colonial Societies (Formerly 43.351) - Credits: 3
The long sequence of military conflicts in New England at the turn of the eighteenth century led to an equally long sequence of accounts describing the experiences of English colonists taken captive by Native American or French military forces. While these narratives remain the best known examples of this particular literary genre in the United States, this class will explore the multitude of ways in which the captivity narrative was used in colonial North America by people of different races and cultures.

HIST.3520 British Colonization in the Eighteenth Century (Formerly 43.352) - Credits: 3
This class provides a thematic examination of the British North American colonies. Topics include colonies founded in the long eighteenth century, material culture, the multi-racial British empire, the Enlightenment, and the rise of individualism’s impact on society and religion, and shifting political relationships between Britain and its colonies.

HIST.3530 The French and Indian and Revolutionary Wars (Formerly 43.353) - Credits: 3
The years between 1754 and 1784 saw drastic change on the North American continent and around the world for Britain and its colonies. Colonists in North America went from being devout British subjects during the French and Indian War to rebelling and founding their own new country during the American Revolution. In turn, the British Empire went from spending millions of pounds on North America in the 1750’s to
barely committing the resources necessary for fighting the Revolution. This class examines these cultural and political transitions in context with discussions on the varied populations of North America who experienced them.

HIST.3550 Jacksonian America (Formerly 43.355) - Credits: 3

An investigation of the social, political, and economic developments in the United States from 1815 to 1848. Special emphasis is placed on the spread of capitalism, the growth of reform movements, the development of cities, and the conflict over slavery.

HIST.3560 Civil War and Reconstruction (Formerly 43.356) - Credits: 3

This course surveys the increasing political, social, and economic tensions between the North and the South during the first half of the nineteenth century; the explosion of those tensions into secession and conflict; the four years of war; and the postwar struggle to reconstruct the South and forge a new union.

HIST.3570 American Civil War in Memory (Formerly 43.357) - Credits: 3

Students analyze how Americans have remembered the American Civil War in the years after the war ended in 1865. By looking at novels, memoir films, National Park Service Battlefields, and monuments, students discover how remembrances are influenced by views of race, gender, patriotism, regionalism, and economic forces.

HIST.3575 The Age of Jim Crow - Credits: 3

This course examines U.S. History--particularly the history of the South--during the era of Jim Crow, the period between the Civil War and the Civil Rights Movement when African Americans were systematically denied political and social rights. This course examines the visions white southerners held for what their region should be in this period, as well as the responses of African Americans.

HIST.3580 Amazing American Lives (Formerly 43.358) - Credits: 3

Biography often has been used by historians as source material for representing the nature of the American experience. An examination of outstanding biographies of the lives of various Americans can yield insights into all levels and ranks of American society from colonial days to the late twentieth century.

HIST.3590 Democracy in the United States 1800-1860 (Formerly 43.359) - Credits: 3

The course examines what is often referred to as the Golden Age of American Democracy. How much power did ordinary Americans have in the political system? What motivated people to participate in politics? What roles did women and racial minorities play in American politics despite not being able to vote?

HIST.3620 The Twenties and the Thirties (Formerly 43.362) - Credits: 3

An examination of the emergence of the corporate and governmental institutions of modern America set in two turbulent decades of cultural and political ferment that involved both booming prosperity and the economic collapse of the Great Depression.

HIST.3650 United States History since 1960 (Formerly 43.365) - Credits: 3

Discusses Cold War politics and civil rights upheavals during the 1960's and 1970's, the decline of American economic and political power, and the resurgence of conservative politics in the 1980's.

HIST.3690 Russia 1796 to the Present (Formerly 43.369) - Credits: 3

This course covers the history of Russia in its various incarnations—Imperial Russia from the end of Catherine the Great’s reign the Soviet Union, and today’s Russian Federation. We use both historical works and literature to get a better understanding of the Imperial state, the nature and the social bases of autocracy, the ideologies and actions of the movements that supported the Empire and those that opposed it. We cover the cataclysms of World War I, the Revolutions, Civil War, and the Soviet period (preparing the student for the course on “Stalin’s Russia”, 43.374). We examine the causes and events involved in the decline and collapse of the Soviet Union, and the rise and emerging patterns of behavior of the Russian Federation.

HIST.3710 Medieval Institutions (Formerly 43.371) - Credits: 3

This is a reasonably intensive reading seminar focusing on a number of important medieval institutions that have helped to influence our modern world. You will read a number of works in order to discuss them in detail in class. In addition, you will be required to write a review of one of three required books.
HIST.3720 Women in the Middle Ages - Credits: 3
This course explores medieval Europe through the female lens. We will illuminate the influence of women on war, politics, business, religion and culture. We will study queens, writers, artists, nuns, businesswomen, and peasants in order to understand how women shaped the medieval world, how they were shaped by it, and how they contributed to the brilliance of the Renaissance.

HIST.3730 Nazi Germany (Formerly 43.373) - Credits: 3
This course looks at the period 1933-1945 (the period of the "Third Reich") in Germany from the perspectives of economics, politics, society, and the arts. In the course, we will read preeminent historians who have written on each of these themes in order to gain a firm understanding of the historical debates that surround the period. Specific subjects include the Nazi consolidation of power, the increasingly brutal nature of anti-Semitic policies, the power struggles among chief Nazi officials, the ideologies and personae of figures like Hitler, Rosenberg, and Goebbels, the nature of "Nazi art" and cultural policies, and the path to war.

HIST.3740 Stalin’s Russia (Formerly 43.374) - Credits: 3
Spanning the period from the "October Revolution" of 1917 to Stalin’s death in 1953, this course considers "Stalinist Russia" from the perspectives of economics, society, the arts, politics and war. In the course, we will read the preeminent historians who have written on these topics.

HIST.3760 20th Century Irish History in Film (Formerly 43.376) - Credits: 3
This course is on the representation of Irish history in narrative feature and documentary films made in or about Ireland. Starting with the revolutionary era, it covers the key events, issues, and debates that defined Irish politics, culture and society in the last hundred years. The course is divided into five thematic sections and proceeds chronologically through the 20th century, starting with the War of Independence against the Britain and the Civil War that followed; the American romanticism of Ireland in films; social issues that plagued the Irish Free State and Republic; the period of violence in the North known as The Troubles; and the issued raised by multiculturalism during the Celtic Tiger era.

HIST.3790 United States Industry Twentieth Century (Formerly 43.379) - Credits: 3
An exploration of the rapid growth of the American economy in the 20th century, including the evolution of the large corporation and the mass production assembly line. Particular attention is devoted to the ways in which immigrants, women, and the African Americans were affected by the rise of big business. The course also traces the decline of the traditional U.S. manufacturing base following the Second World War and the impact this had on the working class and their unions.

HIST.3800 Work and Society (Formerly 43.380) - Credits: 3
Provides a survey of labor history from the colonial period to the present focusing on the interrelationship between culture and work in American society and on the dynamics of technical and economic changes on the organization of work processes.

HIST.3840 Radicalism in American History (Formerly 43.384) - Credits: 3
A biographical approach to the influence of radicalism on American history with emphasis on significant and representative personalities and heir contributions.

HIST.3845 Malcolm X - Credits: 3
This course investigates the personal transformation of Malcolm X during his lifetime as well as the impact he has had on both American and transnational culture and politics from the mid-twentieth century to the present.

HIST.3880 Ancient Mediterranean: Cultures in Contact (Formerly 43.388) - Credits: 3
The ancient Mediterranean was home to a diverse array of cultures in close contact with each other through trade, warfare, and colonization. This course will study a variety of Greco-Roman responses to other cultures through a series of case studies of contact between Greeks, Romans, and other cultures of the ancient world. In particular, we will examine questions of the applicability of modern concepts such as race and ethnicity, and explore the ways in which these shifting representations of other cultures are reflective of the ways in which Greeks and Romans perceived themselves. We will also reflect on the ways in which these ancient Greco-Roman
conceptions of culture relate to our own modern understandings of cultural difference.

HIST.3885 Law in the Ancient Greek World - Credits: 3

This course will examine the body of evidence for law in the ancient Greek world as a means of understanding the legal, political, and social history of the Greek poleis. In particular we will focus our attention on the large corpus of forensic speeches form Classical Athens with an eye to understanding the ways in which the Athenian city governed itself and resolved conflict within the poleis. Due to the nature of these speeches and the evidence for Greek legal practices, we will also be examining various aspects of Greek social and economic history within a legal context, including gender, slavery, property law, and citizenship.

HIST.3890 Ancient History in Film (Formerly 43.389) - Credits: 3

Ancient History in Film seeks understand the interconnection between ancient texts, social history and pop culture in American cinema. This course is more than an excuse to watch fun films and gain academic credit. It will engage the primary texts that are the foundation for these cinematic creations while investigating the social and cultural influences that shaped the making of these movies. Ultimately, this course will provide a clearer view of our own world through the lens of moviemakers mimicking the Greco-Roman world. We will read primary texts in translation, modern analyses of these movies and you are responsible to watch an entire film between class sessions. All films are on reserve in the Media Center of the O’Leary Library.

HIST.3900 Topics in History (Formerly 43.390) - Credits: 3

An advanced course of study and examination of a variety of issues and topics in history. Students without a sufficient background in history courses should not attempt this course. Subject matter to be announced in advance.

HIST.3901 Topics in History of the Portuguese World - Credits: 3

An advanced course that will cover various topics in the history of the Portuguese-speaking world, including medieval, early modern, and contemporary history in Portugal, Brazil, and other areas of the Lusophone world. The specific focus of each iteration will be announced in advance. Offered irregularly.

HIST.3910 America and the World (Formerly 43.391) - Credits: 3

In an age of increasing globalization, historians realize the need for putting the American national narrative in a wider historical context. This course will help students locate the study of the United States in a global, comparative and transnational perspective. This course will be used as one of the courses needed by History majors in the global, comparative and under-represented areas of the major.

HIST.3920 United States Immigration History (Formerly 43.392) - Credits: 3

The course focuses on the experiences of women, men, and children who came to the U.S. from the colonial era through the 21st century. Their emigrations will be examined in a global context. Irish migration, the mass European migrations during the mid and late 19th /early 20th centuries, and post-Second World War immigration particularly from Asian and African countries are discussed. The Lawrence, Lowell, and Boston immigration stories are also considered.

HIST.3930 History of the Middle East and Islamic World (Formerly 43.393) - Credits: 3

This course examines the history of the Middle East and the Islamic World from the time of Muhammad to the present. It provides an introduction to the history of this often turbulent region. It exposes students to the processes and patterns that have shaped the history of the Islamic World. The course examines the historical roots of the many challenges that the region faces today.

HIST.3931 Empire and Resistance in the Modern Middle East - Credits: 3

This course explores the role of empires in the Middle East from the 18th through the first half of the 20th century. During this period various forms of imperial rule defined the region's governance-from Ottoman rule to the British occupation of Egypt in the late 19th century to British and French mandate states in much of the region post World War I. The course will emphasize comparative approaches to understanding how these empires shaped the region. We will examine how these various forms of empire were engaged by local populations, from elites to peasants, and how their histories impacted the independent nation-states that succeeded them.

HIST.3932 Environmental History of Middle East & North Africa - Credits: 3

This course examines the history of the Middle East and North Africa from an environmental angle. We will think about how a focus on environmental factors enables alternative perspectives on colonialism, nationalism, capitalism, gender and sexuality, empire, race, and class. What are some of the
benefits of these interpretations? Are there also drawbacks? We will also consider what it means to talk about the impacts of climate change in the region when thinking historically.

**HIST.3940 Immigration and Assimilation in Contemporary Europe** - Credits: 3

This course examines contemporary European dilemmas of immigration, assimilation and multiculturalism, within the context of the larger history of European imperial decline after 1945. It will aim at providing fuller historical understanding of Europe’s ongoing crises of integration, while also exploring the textures of individual and community life among those of immigrant descent within contemporary Europe. For purposes of focus and continuity, greatest attention will be dedicated to South Asian, Turkish, and North African communities in Britain, Germany and France, respectively.

**HIST.3960 Alcohol In American History** (Formerly 43.396) - Credits: 3

This course uses the production, distribution, consumption, and prohibition of alcoholic drinks as a lens for studying cultural, political, and economic change in American life from the colonial era to the present.

**HIST.4010 History Writing and Community** (Formerly 43.401) - Credits: 3

Restricted to upper-level students and available only with permission of the instructor, this course offers a select number of students the opportunity to work for non-profit and governmental organizations within Lowell. Such organizations might include the National Park Service; Community Teamwork Inc.; Girls Club of Lowell; St. Athanasius Church; American Textile History Museum, and so forth. The course is primarily intended for History majors. Students will utilize their skills in research, writing, and analysis to assist an organization with its documented needs (e.g., conduct research on history of the organization; write a pamphlet or short article; organize oral history interviews; analyze the urban context in which the organization has developed). Students receive academic credit, along with invaluable work-related experience.

**HIST.4100 Olympic Games and World’s Fairs** (Formerly 43.410) - Credits: 3

The course studies Olympic Games and World’s Fairs from the mid-nineteenth century to the present. We examine how these international festivals participate in and contribute to six themes in the history of that period: nationalism and internationalism, mechanization of industry, modern architecture and urban planning, consumer culture, racial politics, and the Cold War. Students write brief papers connection these themes and one or more game or fair and a research paper on a relevant topic. Special attention is given to certain icons, like the Crystal Palace, the Eiffel Tower, the Nazi Olympics, and the Mexico City games.

**HIST.4320 Research Seminar** (Formerly 43.432) - Credits: 3

Systematic research in primary and secondary sources culminating in the writing of an original research paper using proper methodological and stylistic techniques. Weekly meetings and written and oral progress reports. Students must be acquainted with word-processing techniques. Required of all History majors. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL), Critical Thinking & Problem Solving (CTPS), and Written & Oral Communication (WOC).

**HIST.4430 'Foreigners' of the Middle East** (Formerly 43.443) - Credits: 3

This class focuses on how societies organize difference, looking at the relationships between national, ethnic, religious, racial, gender and socio-economic affiliations in creating and concretizing foreignness and minorities in the Arab Middle East and today’s Turkey and Iran during the late Ottoman and colonial eras. This class includes engagement with historical sources, movies, memoirs and more, and requires several short papers and one longer term paper and presentation.

**HIST.4910 Directed Study** (Formerly 43.491/591) - Credits: 1-4

Directed study offers the student the opportunity to engage in an independent study or research project under the supervision of a department member. Working closely with the instructor, students define and investigate a research topic in an area of special interest and present the results of their investigation in a significant paper. Juniors and seniors only.

**HIST.4960 Practicum** (Formerly 43.496) - Credits: 3

A program of on-campus and off-campus experiences for history majors only. Specific requirements vary depending upon the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural, or artistic area and for applying techniques of problem solving and/or skills that are appropriate to the student’s major discipline. May be repeated for a maximum of nine credits. Students are graded 'satisfactory' or 'unsatisfactory.' The practicum experience may not be substituted for a required course in the major.

**HIST.4970 Tsongas Center Field Practice** (Formerly 43.497) - Credits: 3

Receives academic credit, along with invaluable work-related experience, through placement at various non-profit and governmental organizations in Lowell. Such organizations might include the National Park Service; Community Teamwork Inc.; Girls Club of Lowell; St. Athanasius Church; American Textile History Museum, and so forth. The course is primarily intended for History majors. Specific requirements vary depending upon the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural, or artistic area and for applying techniques of problem solving and/or skills that are appropriate to the student’s major discipline. May be repeated for a maximum of nine credits. Students are graded 'satisfactory' or 'unsatisfactory.' The practicum experience may not be substituted for a required course in the major.
This 3-credit hour course will be an addition to the History Department’s other 400-level courses. Currently, students enrolled in the "Research Seminar" conduct primary original research and present that research in one or another format. Those in the "Directed Study" work with assigned faculty on the historiographic breadth of a particular topic, reading selected books, writing response papers, and meeting for weekly discussions. Additionally, the existing "Practicum" allows students to earn course credit for hands-on classroom and history museum projects. The "Tsongas Center Practicum" will combine elements of all three, and make it possible to identify the specific Tsongas Center focus as such on student transcripts.

HIST.5010 The Practice of History (Formerly 43.501) - Credits: 3

This course surveys the range of methodology and philosophy associated with various approaches to historical study. It includes a general introduction to the discipline as well as topical sections dealing with Historical Materialism, the Annales School, Postmodernism, Gender History, Post-Colonial Studies, and Public History, wrapping up with a focused reflection on the material as a whole.

HIST.5020 Introduction to Archives (Formerly 43.502) - Credits: 3

Ho should we remember and document the past? This course introduces students to the goals and operation of archives, which play a crucial role in the preservation of historical sources. The course considers archival administration, funding, management, record-keeping (both paper and digital), and security. Field trips to university, municipal, and national archives are expected, as well as occasional guest speakers from the world of archives. Students will complete a variety of different writing assignments as well as brief oral presentations.

HIST.5100 Modern Revolutions in a Global Context (Formerly 43.510) - Credits: 3

Course is an introduction to the historical study of revolutions and revolutionary movements. We will define revolution and examine competing theories about its causes, outcomes, and processes through the study of several revolutions, upheavals, coups, and rebellions from around the world. We will read about and discuss the origins of the modern idea of revolution and a few leading theorists and theories along with our historical analyses. Over the course of the semester, we will identify the elements of a revolution and the specific historical, social, and political contexts that create them.

HIST.5110 History of College, 1100-1900 (Formerly 43.511) - Credits: 3

The foundation of universities in late medieval Europe also ushered in the earliest colleges, intended primarily to house students but also to provide tutoring, social support, and financial assistance. The earliest colleges arose in Paris but soon spread to Bologna, Oxford, and other university towns. This course traces the history of colleges from late medieval Europe to nineteenth-century America. It considers the various models of colleges that developed in northern and southern Europe, and how those models were transferred across the Atlantic. Some colleges remained primarily residences, while others expanded to offer a full graduate and undergraduate curriculum. We will also consider topics like student life, financial arrangements, admissions, alumni, and academic requirements.

HIST.5120 Athenian Democracy and Political Culture (Formerly 43.512) - Credits: 3

The Athenian democracy serves as a key reference point in the history of democratic governance and is one of the best documented periods and institutions in ancient Greek history. We will undertake a detailed examination of the ways in which the workings of the Athenian democracy and state evolved throughout antiquity and the ways in which the workings of the Athenian democracy and state evolved throughout antiquity and the ways in which this form of radical democracy was viewed and critiqued during the period itself. The course will provide both an overview of Athenian institutional and social histories as well as a methodological survey of the variety of source material used by historians of ancient Athens. We will also look at broader issues including the connection between democracy and empire in the fifth century, social class, and the critique of democracy.

HIST.5130 World History: Theory and Practice (Formerly 43.513) - Credits: 3

In an increasingly globalized and diverse age, world history has become a growing teaching field at the secondary and the college level in the United States. The overarching purpose of this class is to prepare students as teachers and practitioners of world history. This course will introduce the field and concepts of world history. It will familiarize students with available materials such as textbooks, readers, primary documents, academic books and articles, websites, and podcasts. This course also exposes students to the global processes that have shaped our world since roughly the year 1400. Taking a global comparative perspective, this course will help students to develop a topical, chronological, and geographical understanding of global history and cultures.

HIST.5170 Post-Colonial Europe, 1945 to the Present -
Credits: 3

This course considers recent European history through a postcolonial optic, with particular focus on ongoing European dilemmas of immigration, assimilation and multiculturalism. Its approach will be interdisciplinary, beginning a critical reflection upon salient examples of postcolonial theory, and then moving through three different thematic units. The first will be immigration and immigration politics, as those came to the very fore of European concern from the 1960s forward. The final unit adopts a cultural approach, using film, fiction, memoir, music and other sources to explore the textures of individual and community life among those of immigrant decent within contemporary Europe.

**HIST.5350 Immigration History (Formerly 43.535) - Credits: 3**

The course focuses on the experiences of women, men, and children who came to the U.S. from the colonial era through the 21st century. Their emigrations will be examined in a global context. Irish migration, the mass European migrations during the did late 19th / early 20th centuries, and post-Second World War immigration particularly from Asian and African countries are discussed. The Lawrence, Lowell, and Boston immigration stories are extensively considered. Students will acquire an understanding of U.S. Immigration History - Both the experiences of immigrants and reactions to that immigration over time, including the frequent passage of federal legislation to block or impede immigration. Students will utilize area immigration archives to produce original research on the topic.

**HIST.5360 Readings on the Great Depression and the New Deal (Formerly 43.536) - Credits: 3**

This course examines a turbulent period in American history: the era of the great economic boom and cultural revolution of the 1920s, the Great Depression and the New Deal, and World War II. This course critically examines the growth of a consumer economy in the 1920s, the cause of the Depression, and how the New Deal response affected the lives of ordinary Americans. We take a close look at the Great Migration of African Americans out of the South and how it affected race relations and the impact of the Great Depression and the New Deal on women. Finally, we consider how the country shook off its isolationism and emerged at the end of the Second World War as the world's hegemonic superpower. Throughout, we consider the period's larger lessons for other disjunctures in history.

**HIST.5400 Law, Politics and Society in Early America (Formerly 43.540) - Credits: 3**

This class closely examines the colonies of Virginia, Maryland, Massachusetts, Maine, New Netherland/New York, Rhode Island and the Carolinas from the early seventeenth century through the mid-eighteenth century. The class focuses particularly on the wide range of legal, political and social systems present in British North America which made it possible for certain colonies to survive and thrive, while other colonies foundered and failed. Students will master a wide range of primary and secondary sources during the semester and will finish by conducting their own research on one of these seven colonies.

**HIST.5410 The American Revolution in the World - Credits: 3**

The American Revolution began as a North American conflict between the newly formed United States and Great Britain over the question of whether the thirteen colonies could become an independent nation. The entrance of France, the Netherlands and Spain into the war in the late 1770s made the Revolution a conflict which could be fought anywhere these five countries shared borders, whether in North America, Europe or Asia. The class will also examine the experiences of both Native Americans and African Americans in the Atlantic World as they experienced the war in far ranging ways. The class will use both primary and secondary sources and culminate in a research paper of topics chosen by individual students.

**HIST.5450 Native Peoples of the Northern Eastern Woodlands (Formerly 43.545) - Credits: 3**

Students will analyze and research the history of the Native peoples of the northern Eastern Woodlands - an area encompassing the northeastern U. S., southeastern Canada, and the North American Great Lakes region. The course provides coverage from pre-contact to the present. It emphasizes contributions of the first peoples to the broader course of the history of the northern Eastern Woodland region. The course offers a framework for understanding indigenous Americans and their historical experiences by exploring the forces of continuity and change that have shaped Native Americans' lives through time and space. This view will stress the ongoing presence of American Indian peoples and their efforts to preserve the integrity and viability of their dynamic and self-directed societies.

**HIST.5460 Topics in African-American History (Formerly 43.546) - Credits: 3**

This graduate-level course examines important ideas and events in African-American history as well as debates among historians about how to interpret these ideas and events. We will examine slavery and its demise, the labor system that emerged after slavery, violence against and intimidation of blacks, the relocation of millions of African Americans from the rural South to the urban North, and the struggle for civil
rights, among other topics. A theme that runs through the course is how African Americans were able to build a rich and vibrant culture as well as strong networks of kinship even as masters, landlords, and others sought to control their labor and deny them political and other rights.

HIST.5510 Reading Seminar on Modern China (Formerly 43.551) - Credits: 3

The course explores the intersection of tradition and revolution in modern Chinese history. It is a seminar where students do assigned readings and come to class prepared to discuss the readings. The objective of the course is to gain a critical understanding of China's modernization process - the traditional and radical forces that shaped the process, the impact of the process on everyday life, and the blending of what is traditionally Chinese and what is modern or borrowed from the outside.

HIST.5511 Transformation of Rural China - Credits: 3

A reading seminar exploring political, economic, and cultural changes in rural China since the 1920s. Special emphases are given to the Western impact on traditional China, the Land Reform, the collective period, and the post-1978 economic reforms. Students will read investigative reports, anthropological field work, scholarly analysis, and memoirs on China's rural transformation, engage in seminar-style discussions, write analytical and critical papers of assigned topics, and produce a final research paper on a topic of his/her own choice.

HIST.5520 Enterprise in Latin America (Formerly 43.552) - Credits: 3

This M.A.-level course introduces students to the history of enterprise in Latin America through four case studies and a research project. No prior knowledge of Latin American history is required or expected. Each of the case studies, including the students' own research projects on an enterprise in Latin America, will consider the wide range of factors that impact a business. These include infrastructure, government regulations and policy, labor, markets, and environmental concerns, among others. The case studies and readings may change from semester to semester, but will be representative of different time periods and regions within Latin America. Throughout the semester, the class will also consider the historical legacies of each enterprise and how it continues to affect the region’s economic and political development today.

HIST.5590 Reconstructing America: Upheaval, Immigration, and Reform (Formerly 43.559) - Credits: 3

The second year of the Teaching American History Project, involving UMass Lowell and eight school districts in the Greater Boston Area, will include a week-long Summer Institute, title “reconstructing America: Upheaval, Immigration, and Reform”. The institute’s seminars, readings, and field trip will focus on several topics tied to immigration, internal migration, social and economic struggle, and reform. This encompasses a history of the major immigrant groups in late 19th and early 20th century America; settlement, acculturation and resistance; Jim Crow and the Great Migration in the early 20th century; and post World War II immigration and refugee settlement. The Summer Institute will offer a blend of U.S. history and local history, namely Lowell and Lawrence, Massachusetts, with readings tied to recent scholarship in African-American, Latino, and Euro-American immigrant history.

HIST.5910 Directed Study (Formerly 43.491/591) - Credits: 1-4

Directed study offers the student the opportunity to engage in an independent study or research project under the supervision of a department member. Working closely with the instructor, students define and investigate a research topic in an area of special interest and present the results of their investigation in a significant paper. Juniors and seniors only.

HONR.1100 First Year Seminar in Honors: Text in the City (Formerly HON 110) - Credits: 3

The First Year Seminar in Honors (FYSH) uses Lowell as its text. Rich in history and culture, and the students’ home for the next four years, the City of Lowell offers a perfect topic to promote connections while learning how to view the city through the lens of the Humanities. Students will develop library research skills, including facility with primary and secondary sources, and an appreciation for the narratives that lie in buildings, objects, and what people leave behind. Activities include field trips, readings, writing, and an artistic interpretation. As important, students will have the opportunity to form strong connections to each other, to the faculty, and to the community. Note: New course, but combination of current 59.102 and 59.103 in one semester.

HONR.3300 Seminar: Special Topic in Honors (Arts & Humanities Perspective) - Credits: 3

Seminar: Special Topics in Honors offers students the opportunity to engage in depth with a subject that is of special interest in an Honors-level seminar. The course will address an inquiry-based topic that spans or falls outside the boundaries of any individual major on campus, but integrates methodology, content, and /or approaches from two or more.

LABR.2400 Introduction to Labor Studies (Formerly
WLS 240) - Credits: 3
This foundational course has two overarching learning objectives: (1) to give students basic empirical knowledge and analytical tools to understand the context of work in the United States at the dawn of the twenty-first century and (2) to give students an understanding of how labour unions work, what has been their impact historically, and what their role is in contemporary society. The course will be explicitly interdisciplinary, drawing on readings from history, sociology, economics, political science, and psychology to offer and introduction to understanding work and labor through and analytic lens. In addition, the course will include a service-learning component in collaboration with the UML Labor Education Program.

LABR.4020 Directed Studies in Work, Labor and Society (Formerly WLS 402) - Credits: 1-3
This course, taken for 1 or 3 credits, may serve as a capstone experience for advanced students in the Work, Labor and Society minor, helping them to explore a work-related topic of interest while working closely with a faculty member. Projects that students complete for the Directed Studies will vary in length, scope, and topic, depending on how many credits are taken and which faculty member agrees to work with the student. What all projects will have in common is (1) a topic clearly relevant to work, labor and society (2) an emphasis on achieving deep learning through advanced study, and (3) the integration of two or more distinct disciplines, integrating these disciplinary insights in order to solve a complex problem or analyze a complicated issue.

LABR.4100 Internship in Work, Labor and Society (Formerly WLS 410) - Credits: 3
This internship option allows students to take full advantage of the substantial links to the community that the UML Labor Extension program has built over many years of work in this region. The internship provides opportunities for students to learn through thoughtful engagement in community service, applying knowledge of work/labor issues gained in the classroom to the world outside the classroom. Students will be expected to spend a minimum of 100 hours during the semester at the internship site, and to have a designated supervisor on site as well as a faculty supervisor overseeing their work and ensuring it is a meaningful learning experience.

MUAP.0010 Applied Music (Formerly 72.001) - Credits: 0
MUAP.1000 Recital Attendance (Formerly 72.100) - Credits: 0
Required attendance at scheduled Thursday Recital Hours and ten concerts/recital each semester from those listed on the Department of Music Performance Calendar. Seven semesters required of all music majors.

MUAP.1010 Applied Keyboard 1 (Formerly 72.101) - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1020 Applied Keyboard 2 (Formerly 72.102) - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1110 Applied Voice 1 (Formerly 72.111) - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1120 Applied Voice 2 (Formerly 72.112) - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1210 Applied Woodwinds 1 (Formerly 72.121) - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.
setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1220 Applied Woodwinds 2 (Formerly 72.122) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1310 Applied Brass & Percussion 1 (Formerly 72.131) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1320 Applied Brass & Percussion 2 (Formerly 72.132) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1410 Applied Strings 1 (Formerly 72.141) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1420 Applied Strings 2 (Formerly 72.142) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1520 Performance Keyboard 1 (Formerly 72.152) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1620 Performance Voice 1 (Formerly 72.162) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1720 Performance Woodwinds 1 (Formerly 72.172) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1820 Performance Brass & Percussion 1 (Formerly 72.182) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.1920 Performance Strings 1 (Formerly 72.192) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons
consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2010 Applied Keyboard 3 (Formerly 72.201) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2020 Applied Keyboard 4 (Formerly 72.202) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2110 Applied Voice 3 (Formerly 72.211) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2120 Applied Voice 4 (Formerly 72.212) - Credits: 2

Studio instruction in graduated sequence with voice as the principal instrument.

MUAP.2210 Applied Woodwinds 3 (Formerly 72.221) - Credits: 2

Studio instruction in graduated sequence with woodwind as the principal instrument.

MUAP.2220 Applied Woodwinds 4 (Formerly 72.222) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2310 Applied Brass & Percussion 3 (Formerly 72.231) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2320 Applied Brass & Percussion 4 (Formerly 72.232) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2410 Applied Strings 3 (Formerly 72.241) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2420 Applied Strings 4 (Formerly 72.242) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.
MUAP.2510 Performance Keyboard 2 (Formerly 72.251) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2520 Performance Keyboard 3 (Formerly 72.252) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2610 Performance Voice 2 (Formerly 72.261) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2620 Performance Voice 3 (Formerly 72.262) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2710 Performance Woodwinds 2 (Formerly 72.271) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2720 Performance Woodwinds 3 (Formerly 72.272) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2810 Performance Brass & Percussion 2 (Formerly 72.281) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2820 Performance Brass & Percussion 3 (Formerly 72.282) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2910 Performance Strings 2 (Formerly 72.291) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.2920 Performance Strings 3 (Formerly 72.292) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.
MUAP.3010 Applied Keyboard 5 (Formerly 72.301) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3020 Applied Keyboard 6 (Formerly 72.302) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3110 Applied Voice 5 (Formerly 72.311) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3120 Applied Voice 6 (Formerly 72.312) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3210 Applied Woodwinds 5 (Formerly 72.321) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3220 Applied Woodwinds 6 (Formerly 72.322) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3310 Applied Brass & Percussion 5 (Formerly 72.331) - Credits: 2

Studio instruction in graduated sequence with brass or percussion as the principal instrument.

MUAP.3320 Applied Brass & Percussion 6 (Formerly 72.332) - Credits: 2

Studio instruction in graduated sequence with brass or percussion as the principal instrument.

MUAP.3410 Applied Strings 5 (Formerly 72.341) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3420 Applied Strings 6 (Formerly 72.342) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3510 Performance Keyboard 4 (Formerly 72.351) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.
will focus on technique and style building exercises and performances.

MUAP.3520 Performance Keyboard 5 (Formerly 72.352) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3610 Performance Voice 4 (Formerly 72.361) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3620 Performance Voice 5 (Formerly 72.362) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3710 Performance Woodwinds 4 (Formerly 72.371) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3720 Performance Woodwinds 5 (Formerly 72.372) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3810 Performance Brass & Percussion 4 (Formerly 72.381) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3820 Performance Brass And Percussion 5 (Formerly 72.382) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3910 Performance Strings 4 (Formerly 72.391) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.3920 Performance Strings 5 (Formerly 72.392) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4010 Applied Keyboard 7 (Formerly 72.401) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.
setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4020 Applied Keyboard 8 (Formerly 72.402) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4110 Applied Voice 7 (Formerly 72.411) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4120 Applied Voice 8 (Formerly 72.412) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4210 Applied Woodwinds 7 (Formerly 72.421) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4220 Applied Woodwinds 8 (Formerly 72.422) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4310 Applied Brass And Percussion 7 (Formerly 72.431) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4320 Applied Brass And Percussion 8 (Formerly 72.432) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4410 Applied Strings 7 (Formerly 72.441) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4420 Applied Strings 8 (Formerly 72.442) - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4510 Performance Keyboard 6 (Formerly 72.451) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons
consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4520 Performance Keyboard 7 (Formerly 72.452) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4610 Performance Voice 6 (Formerly 72.461) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4620 Performance Voice 7 (Formerly 72.462) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4710 Performance Woodwinds 6 (Formerly 72.471) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4720 Performance Woodwinds 7 (Formerly 72.472) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4810 Performance Brass And Percussion 6 (Formerly 72.481) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4820 Performance Brass And Percussion 7 (Formerly 72.482) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4910 Performance Strings 6 (Formerly 72.491) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4920 Performance Strings 7 (Formerly 72.492) - Credits: 3

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUAP.4991 Senior Recital (Formerly 72.499) - Credits: 1
Public performance to be presented, registered concurrently with Applied Music 8 or Performance Applied Music 7.

**MUBU.2010 Computers In Music Business (formerly 77.201) - Credits: 3**

This course provides students with fundamental collaborative computing tools applicable to the music industry. Topics will include standard office applications, web tools, and media processing tools. Students will develop skills and efficiency through collaboration with each other and outside artists. The internet will provide opportunities for researching relevant sharing platforms for the effective dissemination of information. Projects to include e-press kit creation/promotional website, video creation, and other media development.

**MUBU.3010 Music Business 1 (formerly 77.301) - Credits: 3**

A systematic look at career options in the Music Industry. Topics discussed include: songwriting, music publishing, national and international copyright law, music licensing, artist management, and concert promotion.

**MUBU.3020 Music Business 2 (formerly 77.302) - Credits: 3**

A systematic look at career options in the Music Industry. Topics include: music merchandising, arts administration, record promotion, marketing, and distribution, radio and television broadcasting, advertising and jingle production, and film scoring.

**MUBU.3030 Music Publication and Copyright (formerly 77.303) - Credits: 3**

A thorough study of the legal environment within the Music Industry. Topics discussed include: music publishing, national and international copyright law, live performance, managers &agents, music organizations, recording agreements, music publishing, film and television music production, music merchandising, and other contractual obligations.

**MUBU.3040 Music Promotion and Merchandising (formerly 77.304) - Credits: 3**

A thorough study of the principles and application of marketing, promotion, and distribution of products within the Music Industry. Case studies of various music products and companies will be studied and analyzed.

**MUBU.4010 Music Business Seminar (formerly 77.401) - Credits: 3**

Prepares students to undertake their Internship by providing an in-depth study of how to prepare successfully to enter a career path.

**MUBU.4040 Music Business Entrepreneur (formerly 77.404) - Credits: 3**

An in-depth study of how to start a successful business within the Music Industry. Case studies of successful entrepreneurs and their companies will be researched and analyzed. Students will develop a written Business Plan for their own Music Business enterprise.

**MUBU.4950 Directed Studies In Music Business (formerly 77.495) - Credits: 3**

Permission of coordinator required.

**MUBU.4991 Music Business Internship (formerly 77.499) - Credits: 6**

Music Business Internship

**MUED.1000 Observation Lab I (formerly 73.100) - Credits: 0**

All students who are registered for 73.151 Introduction to Music Education are required to sign up for Observation lab 1 and complete 15 hours of school observations outlined by course Instructor.

**MUED.1410 Introduction To Brass Pedagogy 1 (formerly 73.141/501) - Credits: 1**

Intensive class instruction toward the development of basic performance proficiency on brass instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

**MUED.1420 Introduction to Brass Pedagogy 2 (formerly 73.142) - Credits: 1**

A continuation of 73.141. Intensive class instruction toward the development of basic performance proficiency on brass instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

**MUED.1440 Introduction to Woodwind Pedagogy I (formerly 73.144/504) - Credits: 1**
Intensive class instruction toward the development of basic performance proficiency on woodwind instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.1450 Introduction to Woodwind Pedagogy 2
(Formerly 73.145/505) - Credits: 1

A continuation of 73.144. Intensive class instruction toward the development of basic performance proficiency on woodwind instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.1510 Introduction To Music Education
(Formerly 73.151) - Credits: 2

Designed to provide the student with an overview of the principles and practices of music education in today’s public schools. Students will observe regular classrooms and music instruction at all levels of N-12 education. This course is a prerequisite for all professional education courses in music education and includes the component of required pre-practicum fieldwork.

MUED.1620 Introduction to Percussion Pedagogy
(Formerly 73.162/5060) - Credits: 1

Intensive class instruction toward the development of basic performance proficiency on percussion instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.2000 Observation Lab 2 (Formerly 73.200) - Credits: 0

All students who are registered for 73.410 Globas Music for the Classroom are required to sign up for Observation Lab 2 and complete 20 hours of school observations outlined by course instructor.

MUED.2120 Special Topics (Formerly 73.212) - Credits: 3

Special Topics: A variety of topical issues in music will be explored through an interdisciplinary lens, which will vary from semester to semester. This music elective may include analysis and discussions of musical structure and form, culture and its influence on musical genres, gender in music, as well as identity and inclusion, depending on faculty and student interest.

MUED.2410 Introduction to Strings Pedagogy 1
(Formerly 73.241/507) - Credits: 1

Intensive class instruction toward the development of basic performance proficiency on string instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.2420 Introduction to String Pedagogy 2
(Formerly 73.242/508) - Credits: 1

Intensive class instruction toward the development of basic performance proficiency on string instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.2440 Introduction to Voice Pedagogy 1
(Formerly 73.244/516) - Credits: 1

Intended to cultivate the fundamental principles of singing. The psychology of singing and the psychology of the singing voice are considered as they apply to tone production and resonance.

MUED.2450 Introduction to Voice Pedagogy 2
(Formerly 73.245/517) - Credits: 1

A continuation of Voice Pedagogy 1. Intended to cultivate the fundamental principles of singing. The psychology of singing and the psychology of the singing voice are considered as they apply to tone production and resonance.

MUED.2470 Introduction to Practical Accompanying
(Formerly 73.247) - Credits: 1

This course develops students practical skills in leading and accompanying solo, small and large group performances. Students will accompany their own singing and the singing and performing of others using the piano, guitar, hand percussion, and an original computer arrangement. Original arrangement analysis and production projects will be integrated throughout the semester including realizing lead sheets from sheet music and recordings, performing basic comping, rhythmic, and strumming patterns, and arranging, sequencing and producing accompaniments via computer software. This course culminates in a school or community service-learning performance leading and accompanying youth in singing.

MUED.2490 Progressive Performance and Production Pedagogy (Formerly 73.249) - Credits: 1

This course introduces student to pedagogical approaches supporting music performance and production in progressive music experiences in school and community music settings. Students will develop basic performance technique on common
progressive performance instruments such as electric guitar and bass, drum set, and keyboard. Students will also develop basic proficiency in live sound reinforcement, including setting up a PA, vocal microphone techniques, and live mixing and balancing. Students will work in small peer groups designing and facilitating small group performance experiences, including songwriting, analysis, arranging and covering music for acoustic and electronic instruments. Students will have experiences facilitating individual and small group instruction with their peers.

**MUED.3000 Observation Lab 3** (Formerly 73.300) - Credits: 0

Pre-Practicum Field and Service learning teaching experiences tied to General Music Methods 1. Students observe and teach in partnership schools under the mentorship of Lowell music teachers and course instructor.

**MUED.3010 Technology in Music Education** (Formerly 73.301) - Credits: 3

Introduction to the role of computers and technology in music education programs. Course includes the development of computer literacy, including knowledge of word processing, database and spreadsheet applications as essential to educators, and explores MIDI, the Internet, music software, recording, multimedia and other technologies as educational tools.

**MUED.3940 Choral Repertoire and Rehearsal Techniques** (Formerly 73.394) - Credits: 3

Examination of appropriate choral repertoire for the secondary school level and effective choral rehearsal techniques. Covers auditioning, warmups, choral tone, diction, score preparation, and development of fundamental musicianship skills necessary for a successful choral ensemble. Serves as a choral laboratory setting for the practice of score preparation and rehearsal techniques.

**MUED.4000 Observation Lab 4** (Formerly 73.400) - Credits: 0

All students who are registered to 73.430 General Music Methods 2 are required to sign up for Observation Lab 4 and complete 20 hours of school observations outlined by course Instructor.

**MUED.4100 Global Music for Classroom** (Formerly 73.410/500) - Credits: 3

Focus on the music education profession’s response to multiculturalism in education as evidenced through the National Music Standards and an examination of resources and methodologies for teaching and understanding the music of diverse cultures, styles, and genres. As one of the core professional music education courses, the course includes the component of pre-practicum fieldwork. There will be an additional research project for Graduate Students enrolled in 73.300.

**MUED.4200 General Music Methods 1** (Formerly 73.420/544) - Credits: 3

A course designed to present the basic fundamentals of general music pedagogy, including lesson planning and the writing of instructional objectives. The course discusses basic principles of curriculum and instruction, assessment, learning styles, and developmental psychology. These are related to state curriculum frameworks and National Music Standards 1-5. As one of the core professional music education courses, the course includes the component of pre-practicum fieldwork in selected settings.

**MUED.4300 General Music Methods 2** (Formerly 73.430/545) - Credits: 3

Investigation of some of the most popular methods of teaching general music, including Orff, Kodaly, Dalcroze, and comprehensive musicianship. Discussion of contemporary issues including music in special education, multicultural music education, and National Music Standards 6-9. As one of the core professional music education courses, the course includes the component of fieldwork in selected settings.

**MUED.4920 Instrumental Repertoire and Rehearsal Techniques** (Formerly 73.492/542) - Credits: 3

Examination of appropriate instrumental repertoire for the secondary level and effective instrumental rehearsal techniques. Includes study of rehearsal planning, score preparation, and the development of fundamental musicianship skills necessary for a successful instrumental ensemble.

**MUED.4930 Instrumental Ensemble Lab** (Formerly 73.493) - Credits: 1

Designed to supplement the experiences of the instrumental methods courses. Students gain experience performing on secondary instruments, planning lessons for beginning and intermediate level instrumental ensembles, and conducting in these settings.

**MUED.4940 Choral Ensemble Lab** (Formerly 73.494) - Credits: 1

Designed to supplement the experiences of the choral and vocal methods courses. Students gain experience by planning lessons...
for elementary and secondary school level vocal ensembles and conducting in these settings.

MUED.4960 Directed Study: Music Education
(Formerly 73.496) - Credits: 3
Individual work under the supervision of a member of the music education faculty on a specific topic approved by the instructor and the music education faculty. Permission of Coordinator of Music Education required.

MUED.5000 Global Music for Classroom (Formerly 73.410/500) - Credits: 3
Focus on the music education profession’s response to multiculturalism in education as evidenced through the National Music Standards and an examination of resources and methodologies for teaching and understanding the music of diverse cultures, styles, and genres. As one of the core professional music education courses, the course includes the component of pre-practicum fieldwork. There will be an additional research project for Graduate Students enrolled in 73.500.

MUED.5010 Introduction To Brass Pedagogy 1
(Formerly 73.141/501) - Credits: 1
Intensive class instruction toward the development of basic performance proficiency on brass instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.5040 Introduction to Woodwind Pedagogy 1
(Formerly 73.144/504) - Credits: 1
Intensive class instruction toward the development of basic performance proficiency on woodwind instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.5050 Introduction to Woodwind Pedagogy 2
(Formerly 73.145/505) - Credits: 1
A continuation of 73.144. Intensive class instruction toward the development of basic performance proficiency on woodwind instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.5060 Introduction to Percussion Pedagogy
(Formerly 73.162/5060) - Credits: 1
Intensive class instruction toward the development of basic performance proficiency on percussion instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.5070 Introduction to Strings Pedagogy 1
(Formerly 73.241/507) - Credits: 1
Intensive class instruction toward the development of basic performance proficiency on string instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.5080 Introduction to String Pedagogy 2
(Formerly 73.242/508) - Credits: 1
Intensive class instruction toward the development of basic performance proficiency on string instruments and the development of pedagogical skills and techniques for beginning instruction and demonstration purposes.

MUED.5160 Introduction to Voice Pedagogy 1
(Formerly 73.244/516) - Credits: 1
Intended to cultivate the fundamental principles of singing. The psychology of singing and the psychology of the singing voice are considered as they apply to tone production and resonance.

MUED.5170 Introduction to Voice Pedagogy 2
(Formerly 73.245/517) - Credits: 1
A continuation of Voice Pedagogy 1. Intended to cultivate the fundamental principles of singing. The psychology of singing and the psychology of the singing voice are considered as they apply to tone production and resonance.

MUED.5420 Instrumental Repertoire and Rehearsal Techniques (Formerly 73.492/542) - Credits: 3
Examination of appropriate instrumental repertoire for the secondary level and effective instrumental rehearsal techniques. Includes study of rehearsal planning, score preparation, and the development of fundamental musicianship skills necessary for a successful instrumental ensemble.

MUED.5440 General Music Methods 1 (Formerly 73.420/544) - Credits: 3
A course designed to present the basic fundamentals of general music pedagogy, including lesson planning and the writing of instructional objectives. The course discusses basic principles of curriculum and instruction, assessment, learning styles, and developmental psychology. These are related to state curriculum frameworks and National Music Standards 1-5. As
one of the core professional music education courses, the course includes the component of pre-practicum fieldwork in selected settings.

**MUED.5450 General Music Methods 2 (Formerly 73.430/545) - Credits: 3**

Investigation of some of the most popular methods of teaching general music, including Orff, Kodaly, Dalcroze, and comprehensive musicianship. Discussion of contemporary issues including music in special education, multicultural music education, and National Music Standards 6-9. As one of the core professional music education courses, the course includes the component of fieldwork in selected settings.

**MUHI.1010 European Art Music (Formerly 74.101) - Credits: 1**

An aural introduction to the various types of European concert music from the 18th through the 20th century. This course emphasizes aural acquaintance with literature and genre and consists of in-class listening and discussion designed to enhance the aural experience. Required of all first year music majors as a prerequisite to Music History 1 and 2.

**MUHI.1020 Introduction To Non European Musics (Formerly 74.102) - Credits: 1**

An introduction to selected world musics from a contextual perspective which explores music as an integral part of both society and culture and its function in labor, ritual and celebration. Aspects of instrumental classification, spontaneity and improvisation, as well as elements of music as both organized sound and silence in all cultures will be considered. This includes timbre, melody, rhythm, harmony, form, and texture. Required of all first year music majors as a prerequisite to Music History 1 and 2.

**MUHI.1040 Musical Practices I (Formerly 74.104) - Credits: 1**

Musical Practices I includes the basic study of musical elements, vocabularies, and concepts in Western musical traditions, supplemented with global perspectives. Students will develop critical inquiry skills to study how music is experienced throughout Western culture, broadening the student’s understanding of different musical structures, diverse arenas of production, while exploring professional, creative outlets for this knowledge. At the same time common conventions of musical style will be examined which tie the Western tradition together regardless of when or where the music originated.

**MUHI.1050 Musical Practices 2 (Formerly 74.105) - Credits: 1**

Musical Practices 2 builds upon the basic study of musical elements, vocabularies, and concepts established in Musical Practices 1, extending the exploration of these principles in more depth, with a primary focus on non-western musical traditions and cultural practices.

**MUHI.2161 Music of Western Civilization: Antiquity-Mid 18th Century (Formerly 74.161/MUHI.1610) - Credits: 3**

Students will listen to and learn to understand Western European Art music from the earliest times through the Middle Ages, Renaissance, Baroque, and 18th-century Classical era. We will examine significant composers, forms, and styles, and explore such things as the kinds of music people sang and played, the instruments they played, how music has been used in worship and in the theater, how the historical context influenced composers’ procedures and decisions, how music from several hundred years ago has influenced music of today, and why music has been on of the most enduring forms of community and culture in Europe and America. Open to non-music majors only.

**MUHI.2610 Music History 1 (Formerly 74.261) - Credits: 3**

Studies sacred and secular musical forms from pre-Christianty to 1750.

**MUHI.2620 Music History 2 (Formerly 74.262) - Credits: 3**

Analyses musical forms and styles from 1750 to present.

**MUHI.3010 American Music (Formerly 74.301) - Credits: 3**

An historical, cultural and contextual survey of diverse styles of concert and vernacular music in the United States from the colonial era to the present. Open to music and non-music majors.

**MUHI.3110 American Musical Theatre (Formerly 74.311) - Credits: 3**

An intensive study of the position of the American musical theater, this course examines contributions to musical thought, and traces the development of the musical style from its origins to the present through musical study and analysis, historical research, and critical interpretation.

**MUHI.3550 Jazz (Formerly 74.355) - Credits: 3**
An intense study of the history of jazz from its origins to the present, covering a wide selection of styles and schools of jazz in various ensemble configurations.

MUHI.3860 History of Rock Music (Formerly 74.386) - Credits: 3

Traces the roots of American popular music from its origins and influences from the earliest European song forms to American folk songs, Gospel, Country, Rhythm and Blues, Jazz, and other popular forms up through current trends as related to the development of the music industry and other socio-musical influences of the commercial song from the 1500s to the present.

MUHI.4001 Introduction to Ethnomusicology - Credits: 3

This course is designed to introduce students to the basic principles of ethnomusicology beginning with a survey of the historical development of ethnomusicological thought form the late 19th century to the present. Fieldwork methodology will be examined in depth, and a final project incorporating interviews, field observation, and musical transcription will allow student to put theory into practice. Permission of Instructor.

MUHI.4040 History of Record Production - Credits: 3

This course surveys the emergent technologies and processes of sound recording from the late 19th century to the present, specifically focusing on the techniques and styles record producers and recording engineers utilize in shaping the conception of musical sound and performance for musicians and their audiences.

MUHI.4560 Film Music (Formerly 74.456) - Credits: 3

A study of music in sound cinema from the 1920s to the present. The course focuses on the expressive, formal, and semiotic function that film music serves, either as sound experienced by the characters, as another layer of commentary to be heard only by the viewer, and/or some mixture of the two. Composers to be studied include Max Steiner, Bernard Herrmann, Jerry Goldsmith, John Williams, Danny Elfman, and others, as well as film scores that rely upon a range of musical styles, including classical, popular, and non-Western. The singularly most important goal of the course will be to study how music functions in a given film, regardless of its musical style. In the process, ancillary ideas will emerge including discovering how music establishes psychological moods, guides emotions, and reveals aspects of the narrative structure of the film. By the end of the course, the student will have gained a greater understanding of both music and film and it is likely that students will never watch or listen another movie in quite the same way.

MUHI.4950 Directed Study: Music History (Formerly 74.495) - Credits: 3

Individual work under the supervision of a member of the music history faculty. May be repeated with permission of the chairperson.

MUHI.5940 Graduate Directed Study in Musicology (Formerly 74.594) - Credits: 3

MUHI.5950 Graduate Directed Study In Musicology (Formerly 74.595) - Credits: 3

MUPF.1010 Performance Applied 1 - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUPF.1020 Performance Applied 2 - Credits: 2

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUPF.1320 Introduction To Keyboard 2 (Formerly 75.132) (Last offered Spring 2012) - Credits: 1

A study of more advanced chord progressions, ensemble keyboard playing, patriotic songs, more advanced accompaniment patterns and advanced solo literature and a continuation of the use of improvisational techniques.

MUPF.2000 Mechanics of Movement for Instrumentalists - Credits: 2

Critical study of motion and posture techniques for optimal performance. Topics include Alexander technique, Feldenkrais Method and Mensendieck System. Adjunct approaches for relaxation and recovery will also be explored, including massage, Roling, yoga, and tai chi.

MUPF.2001 Language and Diction - Credits: 2
This course teaches the basics of diction and the International Phonetic Alphabet, as utilized by professional singers. These principles are specifically applied to English, French, Italian and German.

**MUPF.2010 Performance Applied 3 - Credits: 2**

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

**MUPF.2020 Performance Applied 4 - Credits: 2**

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

**MUPF.2110 Health, Wellness, and the Art of Practice - Credits: 2**

This foundational course teaches techniques for effective and efficient practice, examines approaches to injury prevention and management, and discusses strategies for career longevity and long-term healthy music making.

**MUPF.2120 Mindfulness and Optimal Performance - Credits: 2**

In-depth survey of issues related to the mental aspects of performance and preparation, with a focus on practical application for performers. Topics include Performance anxiety, focus, Visualization, available resources and mental wellness.

**MUPF.2330 Conducting 1 (Formerly 75.233) - Credits: 2**

Training in basic baton technique and related study for instrumental and choral conducting.

**MUPF.2340 Conducting 2 (Formerly 75.234) - Credits: 2**

Continuation of 75.233 exploring more advanced choral and instrumental conducting techniques.

**MUPF.2550 Piano Accompanying 1 (Formerly 75.255) (Last offered Fall 2014) - Credits: 1**

This course is designed for both piano and non-piano majors. A discussion of concepts of form with special emphasis on working together with and being sensitive to other musicians will be emphasized. Accompaniments will consist of music for instrumental and vocal soloists and ensembles and will include simple harmonizations and improvisations based on melodies from folk, classical, jazz, and popular music. Techniques of adjustment and cooperation in performance will also be discussed.

**MUPF.3010 Performance Applied 5 - Credits: 2**

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

**MUPF.3020 Performance Applied 6 - Credits: 2**

Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

**MUPF.3410 Creative Performance 1: Preparation - Credits: 2**

Experiential learning environment for the assimilation and practice of performance skills, utilizing "collaborative masterclass" model. Course culminates with a mid-length, shared recital of approximately 15 minutes in duration per student. Various topics and application to performance setting and context will be discussed each semester.

**MUPF.3420 Creative Performance 2: Introductory Recital - Credits: 2**

Experiential learning environment for the assimilation and practice of performance skills, utilizing "collaborative Masterclass" model. Course culminates with the completion of a junior recital of approximately 30-45 minutes in duration. Various topics and application to performance setting and context will be discussed.

**MUPF.3460 Improvisation - Credits: 2**
Study of improvisation techniques as applied to a diverse array of stylistic practice and historical periods.

MUPF.3610 Jazz Improvisation 1 (Formerly 75.361) - Credits: 3
A study of basic jazz structures, motives, chord progressions, scales, melodic analysis, use of some approach techniques, tensions and their application to improvisation. Includes in class performance by small instrumental and/or vocal groups.

MUPF.3620 Jazz Improvisation 2 (Formerly 75.362) - Credits: 3
A continuation of 75.361. Will emphasize the study and performance of more advanced levels of improvisation.

MUPF.3810 The Musician's Toolbox - Credits: 2
This course builds the collection of promotional tools a performing musician needs to secure work in the field (such as biography, photos, audio samples, business cards, etc.), creates a means of dissemination (website), and discusses applications for use. Additionally, strong emphasis is placed upon location, evaluation and effective use of various resources needed to support success in an entrepreneurial music career.

MUPF.3820 Marketing & Media for Performing Musicians - Credits: 2
Addresses modern media strategies utilized by performing musicians to promote music and career interests. Students will design and build a promotional website, craft a professional presence on social media, and learn techniques to advance career. Responsible online conduct is discussed and emphasized, and forward-looking online business models are analyzed.

MUPF.3850 Recording for Performers - Credits: 2
This course addresses techniques and concepts utilized in creating a professional recording, cost-effective solutions for production, and various concerns surrounding sonic media. Course culminates with a high-quality recording of student material.

MUPF.3940 Performance Seminar I (Formerly 75.394) - Credits: 3
The study and performance of selected works from the repertoire of each of the five primary areas of performance; keyboard, voice, woodwinds, strings, and brass/percussion. Emphasis will be placed on student and faculty performance, leading to detailed consideration of the relationship between the demands of the composer and the problems of the performer and the manner in which these concerns influence the musical and artistic judgments necessary to achieve a quality performance.

MUPF.4010 Performance Applied 7 - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUPF.4020 Performance Applied 8 - Credits: 2
Studio instruction in graduated sequence. Applied Lessons consist of private instrumental, vocal, compositional, or technological lessons plus additional instruction in a group setting. Specific materials will be assigned by applied and group instructors based on student needs and abilities. Instruction will focus on technique and style building exercises and performances.

MUPF.4110 Teaching Artistry - Credits: 2
Most performers supplement their incomes by teaching. This course explores the qualities, considerations and skills necessary for students to become excellent educators, and examines various instructional settings emerging professional musicians are likely to experience.

MUPF.4410 Performance Artistry 1: Preparation - Credits: 2
Experiential learning environment for the assimilation and practice of performance skills. Course culminates with a mid-length, shared recital of approximately 15-30 minutes in duration. Various topics and application to performance setting and context will be discussed each semester.

MUPF.4420 Performance Artistry 2: Capstone Recital - Credits: 2
Experiential Learning environment for the assimilation and practice of performance skills, utilizing "collaborative masterclass" model. Course culminates with a full-length, high-quality senior recital of approximately 60 minutes in duration. Various topics and application to performance setting and context will be discussed throughout the semester.

MUPF.4530 Instrumental Pedagogy (Formerly 75.453/553) - Credits: 3
This course is directed toward the development and refinement of instrumental repertoire and pedagogy. The course will examine the application of musical content and learning sequences to the teaching of instrumental music to students at all levels. It will include the study of teaching methods and materials for use in private and group instruction. Observation of studio and class teaching and supervised teaching experience will also be included. This course is directed toward meeting the NASM undergraduate pedagogy component.

MUPF.4630 Vocal Pedagogy (Formerly 75.463/563) - Credits: 3
Course will introduce students to the basics of teaching singing. It will include an overview of the anatomy of the respiratory and vocal mechanism and their application to singing; the categorization of voice types with suggestions for repertoire for young solo singers; an overview of vocal exercises for various technical goals and the diagnosis of common vocal problems and how to treat them. The class will also cover the child and adolescent voice and include in-class supervised teaching.

MUPF.4740 Practical Intonation (Formerly 75.474) - Credits: 3
The study of orchestral and band instruments relative to intonation. The development of conceptual awareness relative to the various characteristics of pitch, which are inherent in the design of the various instruments. Identification of problematic intonation and procedures to alleviate problems through performance.

MUPF.4930 Performance Seminar 1 (Formerly 75.493) - Credits: 3
The study and performance of selected works from the repertoire of each of the five primary areas of performance; keyboard, voice, woodwinds, strings, and brass/percussion. Emphasis will be placed on student and faculty performance, leading to detailed consideration of the relationship between the demands of the composer and the problems of the performer and the manner in which these concerns influence the musical and artistic judgments necessary to achieve a quality performance.

MUPF.4940 Performance Seminar 2 (Formerly 75.494) - Credits: 3
Designed as a "master class" experience for students in each of the five primary areas of performance, keyboard, voice, woodwinds, strings, and brass/percussion, with a separate section for each area wherever possible. Class sessions will consist of student performance of selected literature followed by critical analysis from faculty and peers. Each section will be supervised by the appropriate area coordinator and will also involve invited guest performers selected from faculty, applied faculty and other noted artists.

MUPF.4950 Directed Study: Research In Performance (Formerly 75.495) - Credits: 1-3
Permission of chairperson required.

MUPF.5530 Instrumental Pedagogy (Formerly 75.453/553) - Credits: 3
This course is directed toward the development and refinement of instrumental repertoire and pedagogy. The course will examine the application of musical content and learning sequences to the teaching of instrumental music to students at all levels. It will include the study of teaching methods and materials for use in private and group instruction. Observation of studio and class teaching and supervised teaching experience will also be included. This course is directed toward meeting the NASM undergraduate pedagogy component.

MUPF.5630 Vocal Pedagogy (Formerly 75.463/563) - Credits: 3
Course will introduce students to the basics of teaching singing. It will include an overview of the anatomy of the respiratory and vocal mechanism and their application to singing; the categorization of voice types with suggestions for repertoire for young solo singers; an overview of vocal exercises for various technical goals and the diagnosis of common vocal problems and how to treat them. The class will also cover the child and adolescent voice and include in-class supervised teaching.

MUSR.1100 Introduction to Music Technology - Credits: 2
This is a one semester course exploring the inventive ways today’s musicians incorporate technology for creative, promotional, and education purposes in their careers. This course provides a practical and hands-on approach to notation software, MIDI sequencing and electronic instruments, audio and video applications, the computer as a performance instrument, and other web-based professional resources.

MUSR.1150 SRT Colloquium - Credits: 0
A weekly colloquium series for all Sound Recording Technology majors, providing opportunities for the presentation of student work, masterclasses, and guest lectures, as well as a place to address program-wide topics and issues. Note: Only first-year SRT students enroll in this course. Attendance and participation is required as part of all SRT courses for upperclassmen.
MUSR.1600 Audio Practicum - Credits: 1

Basic training in core practices in the recording studio in preparation for subsequent SRT courses. This will include proper handling of equipment, check-out and check-in procedures, scheduling procedures, lab rules, session etiquette, and PA/Live sound setup and teardown. In addition to the one hour weekly class meeting, each student will work a weekly shift in the SRT office as part of their contact time. This will give them first hand experience in the day-to-day management and practices of our studio facilities.

MUSR.2100 Audio in Theory and Practice - Credits: 2

The theory and usage of audio-recording/reproduction components are explored at a basic level and supplemented by hands-on experience. The aesthetics of recording media and their influence on society are discussed in relation to the artistic and commercial functions of the media.

MUSR.2600 Music Production - Credits: 3

Intermediate audio production. Planning and executing recording sessions which involve a variety of musical ensembles under diverse recording conditions; live-performance/concert recordings; multi-track recording, overdub, and remix procedures; and research in recording techniques. Laboratory required.

MUSR.3010 Music, Technology and Society (Formerly 78.301) - Credits: 3

Examines how recording technology has changed music and the relationships of music and society. The course studies and evaluates the application of technology to making music, to music listening, to styles of music, and to music’s roles in society, other art forms, and media. The evolving importance of technology in music over the past century is charted through the study of musical examples and through viewing how human values are reflected in this century’s timely music. Studies will be based on assigned readings, lectures and discussions, examination of current and historically significant music recordings, motion pictures and media pieces for this artistry, their use of available technology, and their impact on human values and society.

MUSR.3050 Survey: Music Technology (Formerly 78.305) - Credits: 3

The use of technology in music listening, performance, analysis, composition, recording and music study will be presented. The dimensions and applications of technology will be discussed as related to aesthetics, the musician’s experiences, musical style, and the musical experience. Basic introduction to the technologies of audio recording. Course includes required reading, listening, session participation. Music Majors Only.

MUSR.3100 Introduction To Recording (Formerly 78.310) - Credits: 3

The theory and usage of audio-recording/reproduction components are explored at a basic level and supplemented by hands-on experience. The aesthetics of recording media and their influence on society are discussed in relation to the artistic and commercial functions of the media. Individual research on a subject of interest to the student is required.

MUSR.3200 Mixing and Mastering Audio - Credits: 2

This course builds on the material presented in Music Production, following the recording process through post-production tasks including mixing and mastering. Students will explore the application of informed musical judgment to the mixing process, learn about creative and technical uses of signal processing, and gain a basic understanding of the tasks involved in mastering.

MUSR.3500 Video Production for SRT (Formerly 78.350) - Credits: 3

An introductory course in the fundamentals of video technology and production; encompassing signal transmission, tape formats, transduction, optical characteristics of lenses and cameras, production equipment and procedures, and post-production equipment and techniques; hands-on experience via video and audio for video projects. Permission of Coordinator and Chair.

MUSR.3600 Critical and Analytical Listening (Formerly 78.360) - Credits: 3

The recognition and identification of timbral modifications and spatial characteristics. Aural analysis of historically significant and current music recordings for recording techniques, musical balance, performance intensity, sound quality and imaging. Development of critical listening skills and sound evaluation techniques.

MUSR.3900 Acoustics & Psychoacoustics (Formerly 78.390) - Credits: 3

The physical attributes of sound and acoustic measurement; displacement, time, velocity, acceleration, force, energy, resonance, wave shapes and spectral energy distribution are examined for most instruments; acoustic properties of the ear and enclosed environments; acoustic measurements and instruments. The interrelationships and differences of physical acoustics and psychoacoustics are stressed.
MUSR.4010 Music of The Beatles (Formerly 78.401) - Credits: 3
This course will explore how technology shaped, enhanced and defined the music of The Beatles. In doing so their music will also be studied for its musical materials, stylistic content, the sound qualities of recordings, cultural impacts, and extra-musical aspects, as well as the music and cultural ideas that influenced the music of The Beatles. Selected solo recordings and compositions of the artists will also be examined to trace the growth of ideas and materials with their roots in The Beatles’ music.

MUSR.4100 Recording Production (Formerly 78.410) - Credits: 3
Intermediate audio production. Planning and executing recording sessions which involve a variety of musical ensembles under diverse recording conditions; live-performance/concert recordings; multi-track recording, overdub, and remix procedures; application of informed musical judgment to the mixing process; and research in recording techniques. Laboratory required.

MUSR.4110 Audio Theory (Formerly 78.411) - Credits: 3
Advanced audio theory. An in-depth examination of the principles and operating specifications of the major components of the modern recording studio: mastering and multi-track recorders, mixing consoles, microphones, monitoring systems, and signal processing equipment. Recording projects and technical research. Laboratory required.

MUSR.4130 Advanced Audio theory - Credits: 2
Advanced audio theory. An in-dept examination of the principles and operating specifications of the major components of the modern recording studio: mastering and multi-track recorders, mixing consoles, microphones, monitoring systems, and signal processing equipment. Recording projects and technical research. Laboratory required.

MUSR.4200 Sound Synthesis 1 (Formerly 78.420) - Credits: 3
Sound synthesis equipment and techniques are studied and supplemented with sound synthesis studio laboratory work. The course will cover practices and principles of analog and digital sound synthesis and their historic origins, related audio equipment and applications, theories of sound samplers and sequencers, and an introduction to MIDI applications in sound synthesis and recording production.

MUSR.4210 Sound Synthesis 2 (Formerly 78.421/521) - Credits: 3
Advanced sound synthesis techniques are studied and supplemented with sound synthesis studio laboratory work. The course will cover MIDI implementation in analog and digital sound synthesis, the historic origins of computer music and electro-acoustic music, live electronic music performance, audio equipment and applications of MIDI-based and functional devices and processors, advanced music production and sound synthesis via MIDI. Permission of Coordinator and Chair.

MUSR.4300 Computer Applications in Music (Formerly 78.430) - Credits: 3
Applications of computers to audio production is emphasized in studies of computer generated and controlled sound sources and devices, algorithmic composition, computer music, digital signal processing, advanced MIDI applications and programming, and computer synchronization of audio and video. Laboratory work required. SRT majors and minors. Permission of Coordinator and Chair.

MUSR.4400 Multitrack Production (Formerly 78.440) - Credits: 3
24-track recording. Session planning and preparation, tracking process; microphone techniques and applications; incorporating processing; planning the mix and sound stage; MIDI applications, rough mixdown. Recording project required.

MUSR.4410 Advanced Multitrack Production (Formerly 78.441) - Credits: 3
Advanced production techniques; tape machine calibration; automation and final mixdown; digital multitracking; SMPTE applications; premastering and mastering. Recording project required.

MUSR.4500 The Recording Industry (Formerly 78.450) - Credits: 3
A detailed survey of the many career options of the audio-recording industry: position duties and responsibilities. Guest lecturers from diverse careers in the industry share their experiences, disciplines, and backgrounds. Permission of Coordinator and Chair.

MUSR.4550 Careers in Audio - Credits: 2
A detailed survey of the numerous career paths in audio-related industries. Skills required to find and obtain internships and job opportunities are explored. Guest lecturers from diverse careers in the industry share their experiences, disciplines, and backgrounds.

**MUSR.4600 Audio for Visual and Interactive Media**  
(Formerly 78.460) - Credits: 3

This course is designed to introduce students to the theory and practice of audio for visual media including production and post-production sound. Students will study of the aesthetics and philosophies of sound design for visual media through the study of important films and television shows and through applied projects which include the planning and execution of production sound, dialog editing and ADR, the creation and design of sound effects, performance of Foley, sound effects editing, music editing, current and historic synchronization technologies, and re-recording.

**MUSR.4700 Recording Studio Repair and Maintenance**  
(Formerly 78.470) - Credits: 3

Hands-on experience in repair and maintenance techniques. Common minor repairs and routine maintenance of recording equipment; test equipment and tools; power supplies, op-amps, and low-noise amplifiers; distortion; analog and digital hardware; and interface considerations. Permission of Coordinator and Chair

**MUSR.4930 Internship in SRT**  
(Formerly 78.493) - Credits: 6

Practical experience in audio-recording under the supervision of a professional firm. At least twenty hours per week for fifteen weeks is spent working at an entry-level position for a firm involved in audio.

**MUSR.4940 Senior Project In Sound Recording Technology**  
(Formerly 78.494) - Credits: 6

Advanced projects developed in consultation with faculty advisor. Typical projects include production of a complete record album, investigation of experimental recording techniques, and original research in recording technology. To be completed in place of MUSR.4930 by students not choosing an internship. Permission of Coordinator and Chair

**MUSR.4950 Directed Study in Sound Recording Technology**  
(Formerly 78.495) - Credits: 3

Individual work under the supervision of a member of the SRT faculty on a topic or area of production approved by the instructor and the Coordinator of SRT. Permission of Coordinator and Chair

**MUSR.5210 Sound Synthesis 2**  
(Formerly 78.421/521) - Credits: 3

Advanced sound synthesis techniques are studied and supplemented with sound synthesis studio laboratory work. The course will cover MIDI implementation in analog and digital sound synthesis, the historic origins of computer music and electro-acoustic music, live electronic music performance, audio equipment and applications of MIDI-based and functional devices and processors, advanced music production and sound synthesis via MIDI. Permission of Coordinator and Chair.

**MUTH.1000 Fundamentals of Musicianship**  
(Formerly 71.100) - Credits: 3

A study of the visual and aural symbolics of music and their application to the comprehension of the architectural, organizational, and aural elements of music literature.

**MUTH.1010 Music Theory 1**  
(Formerly 71.101) - Credits: 3

An intensive study of the theoretical language of music. Stresses part writing in S.A.T.B. and basso continuo realization with a free instrumental part which utilizes free voice leading relative to the use of non-harmonic activity and the harmonic principles through first and second inversion triads. Instruments of the string section are covered, and appropriate listening assignments are given. Original composition in the style being studied is required.

**MUTH.1020 Music Theory 2**  
(Formerly 71.102) - Credits: 3

Serves as a continuation of the practices of 71.101 relative to part writing (both vocal and instrumental) including secondary triads, the Neapolitan sixth, modal interchange, dominant sevenths in inversion and root position, modulation, and secondary dominants. Instrumentation covers the woodwind section, and original composition in the style being covered is required.

**MUTH.1030 Aural Skills 1**  
(Formerly 71.103) - Credits: 1

Development of basic sight singing, listening, and dictation skills as they relate to music theory and analysis. Activities include singing (using moveable do/tone solmization), listening, and dictation (melodic, harmonic and rhythmic) of diatonic music. Music majors only. Coreq. 710.101
MUTH.1040 Aural Skills 2 (Formerly 71.104) - Credits: 1
Development of basic sight singing, listening and dictation skills as they relate to music theory and analysis. Activities include singing (using moveable do/tonic do solmization), listening, and dictation (melodic, harmonic and rhythmic) of more diatonic music. Music majors only. Prerequisite: 71.101 and 71.103. Coreq. 71.102

MUTH.1050 Freshman Chorus (Formerly 71.105) - Credits: 0
A vocal ensemble consisting of all first-year music students, the Choir aims to build a community among those students by having them all share a common experience. Whether they have an extensive musical background or are novice musicians with little or no formal training, the First-Year Choir is intended to help students overcome the natural apprehensions that are associated with the first year of college. Additionally, the Choir will encourage ALL students to be comfortable singing in front of their peers and instructors, thereby making their experience in Aural Skills less daunting.

MUTH.1080 Musicianship & Analysis 1 (Formerly 71.108) - Credits: 4
An intensive, critical and integrated study of musical concepts. Through applied experiences composing, improvising, writing, performing, listening, and analyzing, students will explore and develop competencies in hearing, understanding and applying concepts of musical sound, timbre, and texture; time, shape, and form; pulse; meter; rhythmic subdivision; melodic contour; plainchant; pentatonic melodies; and interlocking melodic systems.

MUTH.1090 Musicianship & Analysis 2 (Formerly 71.109) - Credits: 4
An intensive, critical and integrated study of intermediate macro, meso, and micro concepts of music and musicianship. Through applied experiences composing, improvising, writing, performing, listening and analyzing, students will explore and develop competencies in hearing, understanding and applying concepts of compound meters; rhythmic subdivision (expanded); major and minor scales; counterpoint; triadic harmony; phrases and cadences; and song forms.

MUTH.1100 Basic Music Theory (Formerly 71.110) - Credits: 3
This beginning music theory course provides an introduction to the basics of sound: reading music in bass and treble clefs; diatonic and chromatic notes; note and rest values; rhythm, meter, and time signatures; intervals; modes and scales; key signatures; and triads. Non-majors only.

MUTH.1110 Basic Music Theory 2 (Formerly 71.111) - Credits: 3
Basic Music Theory 2 builds upon the music theory concepts and skills developed in Basic Music Theory (71.110). This class will include an introduction to the structure of tonality; diatonic chords in keys; counterpoint; chord inversion; figured bass; voice-leading in four voices; seventh chords; phrases and cadences; embellishing tones; principles of harmonic progression, and analysis. Non-Music Majors only.

MUTH.1200 Musicianship and Analysis Keyboard Lab (Formerly 71.120) - Credits: 2
This lab will provide basic keyboard skills required to successfully complete the Musicianship and Analysis sequence including understanding the piano keyboard, notational reading skills in both treble and bass clefs, fingering techniques, left and right hand coordination, and approaches to chord voicings and the execution of melodic improvisation.

MUTH.2010 Music Theory 3 (Formerly 71.201) - Credits: 3
A continuation of practices of Music Theory II relative to part writing both vocal and instrumental including remote modulation and satellite keys, the diminished seventh, augmented sixth, ninth, eleventh, and thirteenth extensions, sequential secondary dominants and secondary sevenths. Instrumentation covers the brass section; original work in the style being covered and in various formal configuration is required.

MUTH.2020 Music Theory 4 (Formerly 71.202) - Credits: 3
A study of twentieth century music theory via a compositional approach relative to tertial, quartal, and secundal vertical sonorities, and linear combinations featuring modal and synthetic scale resources as well as serial and preserial atonality.

MUTH.2030 Aural Skills 3 (Formerly 71.203) - Credits: 1
Presents an intensive application of requisite skills to chromatic and non-diatonic music, changing and composite meters, displaced accents, cross rhythms, and a vertical approach to reading often necessary in the study of scores. Advanced tonal as well as tonal literature is considered. Harmonic dictation continues to follow the sequence and progress of 71.201.
MUTH.2040 Aural Skills 4 (Formerly 71.204) - Credits: 1
A concentration on the techniques employed in solving the notation and musical problems of the music of the 20th century. The consideration include synthetic and nonwestern scales, pitch sets and twelve-tone serialism.

MUTH.2080 Musicianship & Analysis 3 (Formerly 71.208) - Credits: 4
An intensive, critical, and integrated study of intermediate macro, meso, and micro concepts of music and musicianship. Through applied experiences composing, improvising, writing, performing (vocally, on keyboard and on the students primary instrument), listening and analyzing, students will explore and develop competencies in hearing, understanding and applying concepts of pitch modes; syncopation; mixed meters; extended harmony; expanded song forms, and multi-timbral transcription.

MUTH.2090 Musicianship & Analysis 4 (Formerly 71.209) - Credits: 4
An intensive, critical, and integrated study of advanced macro, meso, and micro concepts of music and musicianship. Through applied experiences composing, improvising, writing, performing (vocally, on keyboard and on the students primary instrument), listening and analyzing, students will explore and develop competencies in hearing, understanding and applying concepts of multi-timbral transcription; chromaticism; microtonal intonation; polyrhythm; extended modulations; altered chords and extensions; polytonality; and atonality.

MUTH.3001 Songwriting - Credits: 3
This course is designed to facilitate a greater range of creative expression for aspiring songwriters by analyzing the musical and lyric components of song composition, posing songwriting problems to be solved, and developing an identifiable musical style.

MUTH.3350 Arranging (Formerly 71.335) - Credits: 3
Analysis and practical application of techniques of scoring for vocal and instrumental combinations in varied configurations. Scoring projects for in-class performance, effective arranging of music in a variety of styles, and problem solving for the arranger will be included.

MUTH.4950 Directed Study in Music Theory (Formerly 71.495) - Credits: 3
Individual work under the supervision of a member of the music theory faculty on a wide variety of topics approved by the instructor and the theory faculty. Permission of chairperson required.

MUTH.5950 Graduate Directed Study in Music Theory (Formerly 71.595) - Credits: 3
MUTH.6100 Structure, Context and Style (Formerly 71.610) - Credits: 3
This course will bring the student to a concept of music in its theoretical, historical and cultural contexts, building on the materials and techniques acquired in undergraduate studies. Required for all Master of Music Students.

PHIL.2010 Introduction to Philosophy (Formerly 45.201) - Credits: 3
Examines some of the typical approaches to philosophical questioning and the issues raised in such inquiry: what is true knowledge, what is reality, what is the good, what is the right political order, what is the nature of religious faith? Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS).

PHIL.2020 Introduction to Logic and Critical Reasoning (Formerly 45.202) - Credits: 3
Studies the methods used to distinguish correct from incorrect reasoning. This course will aim at developing (1) an ability to express one’s ideas clearly and concisely; (2) an increased skill in defining one’s terms; and (3) a capacity to formulate arguments vigorously and to scrutinize them critically. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Quantitative Literacy (QL).

PHIL.2030 Introduction to Ethics (Formerly 45.203) - Credits: 3
Examines the basic issues and problems of ethics and values and a survey of some important alternative answers to the questions raised, on both an individual and a social level, by our necessity to act and to live in a rational and human way. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.2060 Introduction to Political Philosophy (Formerly 45.206) - Credits: 3
Political philosophy is concerned with basic questions about community, public life, and social organization. This course will address issues such as the rights of the individual in relation to the power of the state and society; the nature and
legitimacy of political authority and democracy; the
significance of power, economics, justice and equality in social
life; and the duties and responsibilities of citizens. We will also
consider the philosophical meaning of communitarianism,
liberalism, and republicanism, individualism, capitalism, and
socialism, as well as the role of class, race, and gender in
politics.

PHIL.2080 Introduction to Philosophy of Science -
Credits: 3
This course is designed to introduce students to fundamental
questions in philosophy of science. We will cover both
descriptive issues such as how scientific theories become
“facts,” and normative questions that ask how we ought to
structure scientific inquiry. We will cover a range of scientific
disciplines including physics, chemistry, biology, geology, and
even paleontology. We’ll also cover disciplines that are more or
less controversial as “sciences,” such as economics,
mathematics, medicine, and engineering.

PHIL.2200 Philosophy and Christianity (Formerly
45.220) - Credits: 3

PHIL.2250 Introduction to Islam - Credits: 3
The goal of this course is to provide a basic understanding of
Islam, the religion of some one-fifth of humankind, in its
theological, historical, political, social and human dimensions.
The course provides a general introduction to Islam, including the
historical dimension, the theological, and the social/political. We will also address issues regarding the
relevance of Islam to contemporary political events.

PHIL.2960 Introduction to World Religions (Formerly
45.296) - Credits: 3
A study of religious knowledge and the phenomena of religion
from a philosophical standpoint. The course considers
explanations for religious behavior, some central issues in
religious belief, and the values and goals of religious systems.
Various world religions provide specific data for these topics.

PHIL.3010 Ways of Knowing (Formerly 45.301) -
Credits: 3
Studies and analyzes various forms and expressions of human
knowledge (perception, concept-formation and symbolic
functioning, myth, aesthetic creation and interpretation,
scientific discovery and understanding) and the individual,
social, and historical conditions to which they are subject. The
goal of the course is a comprehensive view of the structure of
the human mind and its operations.

PHIL.3040 God and Philosophy (Formerly 45.304) -
Credits: 3
Studies, historically and systematically, the following topics: a)
the origin and content of the idea of God, b) the possibility of
affirming God, philosophically and religiously, c) the complex
nature of religious language and imagery, and d) God’s relation
to the world, history, and the individual.

PHIL.3050 Language Signs and Symbols (Formerly
45.305) - Credits: 3
An examination of the various grammars of human expressions
from the point of view of a general theory of signs. Among the
topics to be treated are: a) the nature of signs, symbols, and
meaning; b) the structures and functions of language; c) the
relations between language, thought, and reality, especially as
manifested in metaphor; d) the social dimensions of
signification and symbolization; and e) the relations between the
different linguistic, sign, and symbol systems.

PHIL.3060 Feminist Theory Politics (Formerly
45.306) - Credits: 3
What is sexist oppression? Is our culture still sexist, or is the
need for feminism over? How should we respond to sexism in
other cultures? Do men and women have different natures? Are
our culture’s sexual representations of women necessarily
degrading, and if so, why? We’ll consider these questions, and
others, by examining the arguments and methodology of
analytic feminism. We’ll start by tracing the historical
development of feminism in the 18th, 19th, and 20th centuries,
and then turn to several contemporary feminist analyses of
sexist oppression. We’ll then use these feminist frameworks to
examine more specific issues. Possible topics include: feminist
analyses of sexual objectification in pornography, feminist
arguments in ethics and social theory, feminist analyses of
science, and feminist criticisms of gendered labour. Meets Core
Curriculum Essential Learning Outcome for Diversity and
Cultural Awareness (DCA).

PHIL.3080 Philosophy of Race and Gender (Formerly
45.308) - Credits: 3
This course will focus on issues of identity and difference. We
will discuss the ways in which group identities are formed and
break down. We will discuss how differences are constituted
and reconstituted. These issues are central to theories of race
and gender, racism and sexism. Some of the questions which
we will raise are these: What motivates forming group
identities? How are they formed? How is identity used within
oppressive social structures? How can it be used to transform
society? Why do some differences make a difference and others
don’t? Can we choose our group identities? Meets Core
Curriculum Essential Learning Outcome for Diversity and
Cultural Awareness (DCA).
PHIL.3100 Philosophy of Creative Imagination (Formerly 45.310) - Credits: 3
Focuses first on imagination as a function of mind, placing it in relation to other functions such as perception, emotion, and conceptualization. Attention is then given to the difference between the reproductive and the creative imagination, with special emphasis on the psychological and social/political dimensions of creativity. Topics to be considered include poetical metaphor, theatrical performance, painting, architecture, or photography.

PHIL.3101 Philosophy of Humor and Comedy - Credits: 3
This course examines the phenomenon of humor, laughter, and comedy, inquiring into its nature and function in human life. We explore the leading theories of humor, in attempting to explain what makes something "funny" and why we enjoy humor so much. We also attempt to relate the idea of humor to the related ideas of laughter and comedy. The course will include analysis of the various forms of humor, including the joke, the dramatic comedy, and stand-up comedy.

PHIL.3105 Philosophy of Disability - Credits: 3
Examines the basic issues and problems in the philosophical study of disability, including engagement with the interdisciplinary field of disability studies. Provides a survey of issues relating to the lived experience of disability, disability and well-being, theories of disability, and the concepts of normality, fitness and ableism as they relate to the practice and institutions of medicine, politics, religion, and society more generally.

PHIL.3110 Philosophy and Literature (Formerly 45.311) - Credits: 3
This course examines the intersection between philosophy and literature. Course content includes detailed study of philosophical works of literature and works of philosophy about Literature. Featured Topics include competing definitions of Literature, silent and performative reading, models for acquiring literary status, Literature and morality, censorship, the role of truth in literary experience, and the relationship between authors, works, fictional characters, readers, and critics.

PHIL.3130 American Philosophy (Formerly 45.313) - Credits: 3
American philosophy provides a historical approach to American intellectual history from 1830 to the present. American Transcendentalism and Pragmatism will be the two focal points in the course and students will be acquainted with authors such as Ralph Waldo Emerson, Margaret Fuller, Henry David Thoreau, C.S. Peirce, William James, Jane Addams and John Dewey. The ideas of freedom, self-reliance, community, and moral life are the abiding threads in this tradition and will be explored in the course of the term.

PHIL.3140 Philosophy of the Gothic Imagination (Formerly 45.314) - Credits: 3
A philosophical inquiry into science fiction, fantasy, and horror, with special emphasis on film. This course will attempt to provide interpretations of some classic examples from these genres, as well as to inquire into the philosophical significance of these literary categories and their relation to mythology and religion. Questions to be addressed will include the problem of knowledge and rationality and its limits, the nature of the human being, and the moral problem of the role of violence in the social order. The class will attempt to identify a continuous tradition between these modern genres and ancient Greek tragedy and mythology.

PHIL.3141 Dante's Way from Fear to Peace - Credits: 3
The course will involve close reading of central cantos from all three books of Dante's Divine Comedy, the Inferno, Purgatorio, and Paradiso. Through we will consider Dante's place in the history of European literature, in particular, his relationship to Virgil and the epic tradition, our primary focus will be on three philosophical concerns, existential/ethical, metaphysical/ontological, and epistemological/Linguistic.

PHIL.3150 Philosophical Topics (Formerly 45.315) - Credits: 3
A close study of some of the great texts of philosophical literature. In general, one or two major works are selected and subjected to a thorough reading.

PHIL.3160 Philosophy and Film (Formerly 45.316) - Credits: 3
This course examines the political and philosophical values and ideas which constitute cinema. It analyzes film as an historical, cultural, commercial, and artistic endeavor. Students will develop the skills to watch film actively and critically.

PHIL.3210 Theories of Ethics (Formerly 45.321) - Credits: 3
This course examines theories of Philosophical ethics. Possible topics include metaethics (which asks questions such as "What do we mean when we call things 'right' or 'wrong'?", "Are there universal ethical truths or is morality fundamentally
relative?”, and “What is the relationship between morality and religion?”), normative ethics (which asks whether the right thing to do is determined by considerations such as rights, duties, intentions, consequences, character, or something else) and applied ethics (which applies normative ethical theories to particular concrete problems).

PHIL.3230 PhilosophyClassics: Nietzsche (Formerly 45.323) - Credits: 3

A detailed introduction to Nietzsche’s thought and its reception. This course will examine Nietzsche’s most important works and central concepts such as the Dionysian and Apollonian, the last man, overman, eternal recurrence, genealogy, and will to power.

PHIL.3270 Environmental Philosophy (Formerly 45.327) - Credits: 3

An examination of the philosophical foundations of environmentalism. Addresses both the question of ethical duties we owe to animals and to nature, and also the question of man’s relation to the natural world.

PHIL.3300 Philosophy of Symbolic Logic (Formerly 45.330) - Credits: 3

The first half of this course examines various axiomatic systems, and the student develops both intrasystematic and metasystematic techniques of proof. During the second half of the course, attention is given to certain important philosophical problems which arise from reflection on logical systems, e.g., the cognitive processes of abstraction and instantiation, the general notion of form, and questions of consistency and interpretation.

PHIL.3310 Philosophy of the Mind (Formerly 45.331) - Credits: 3

The status of consciousness is the central concern of a philosophy of mind. The course takes as its point of departure a reflection upon the nature and significance of consciousness from the perspective of its advocates (Husserl, Sartre) and its adversaries (Ryle, Skinner). The results of this preliminary inquiry is to provide a foundation for the exploration of other issues: the possibility of an unconscious; the temptation of bad faith; the dynamics of concept formation; and the nature of emotion, imagination, and dreams.

PHIL.3340 Engineering and Ethics (Formerly 45.334) - Credits: 3

A philosophical analysis of the ethical dimensions and responsibilities of the engineering profession. Specific case studies and ethical issues are analyzed through the application of some of the basic concepts and principles of traditional and contemporary ethical theories. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.3350 Ethical Issues in Technology (Formerly 45.335) - Credits: 3

This course will examine important ethical issues and value conflicts emerging in contemporary science and technology. Through readings and class discussions students will not only have an opportunity to explore the manner in which ethical and technical problems are related, but to develop insight into areas of ethical philosophy and modes of reasoning essential to an intelligent understanding of such issues. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.3360 Early Modern Philosophy - Credits: 3

Examines Early Modern European Philosophy and its religious and scientific context, including movements such as the Mechanical Philosophy, Rationalism, Empiricism, and Transcendental Philosophy. Topics include knowledge and scientific understanding, the human mind and personal identity, and the debate between faith and reason.

PHIL.3390 Poetry and Philosophy After Plato (Formerly 45.339) - Credits: 3

After defining "Neoplatonism" with reference to Plato’s Phaedo, Symposium, and Phaedrus, the course will consider the relationships among Homer’s Odyssey, Plotinus’s Enneads, Virgil’s Aeneid, Augustine’s Confessions, and Dante’s Divine Comedy. The focus will be on coming home to the "source and origin" after having been away and, as the philosopher Plotinus puts it, having been "a stranger in something strange". Students will be invited to work on other literary and philosophical treatments of this theme in English, Irish or American poetry and writing. A principal concern of the course is language "sung, spoken, and written". Accordingly, the course will applicable to, and count for the Philosophy and Communications track.

PHIL.3400 Mysticism: East and West (Formerly 45.340) - Credits: 3

This course explores the religious and psychological phenomenon known as the mystical experience, both within the context of organized religion and outside it. We will approach this subject from a comparative standpoint, considering examples from Christianity, Judaism, and Islam and also from Eastern religions such as Buddhism and Taoism. We will make use of philosophy, psychology, theology and
literature in order to try to understand mysticism and its relation to religion. Readings include The Upanishads, the Tao Te Ching, the Bible, and Plato. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**PHIL.3410 German Philosophy - Credits: 3**

In this course, students will be exposed to the rich tradition of German philosophy. Beginning with the emergence of philosophical works written in German in the 14th century, the course follows the historical progression of German philosophy up until the mid-20th century. Along the way, students will be introduced to major and minor figures in the German philosophical tradition. Through this course, students will understand the contributions of German philosophy to German culture and shaping German’s national identity. Additionally, students will recognize connections between German philosophy and the wider Western philosophical tradition.

**PHIL.3420 Critical Theory & Society (Formerly 45.342) - Credits: 3**

The nature and methods of a critique of society that focuses on the conflicts between the various modes of rationality and rationalization.

**PHIL.3470 Greek Tragedy & Philosophy (Formerly 45.347) - Credits: 3**

Philosophers such as Plato, Aristotle, Hegel, and Nietzsche have drawn inspiration from, and challenged critically, the great Greek tragedians Aeschylus, Sophocles and Euripides. This course will play off philosophical commentaries against the specific tragedies they have targeted in order to examine the often tense relationship between philosophical discourse and tragic poetry.

**PHIL.3480 Eastern Philosophy and Religion (Formerly 45.348) - Credits: 3**

A comparative study of the major strand and themes of Eastern thought and philosophies, encompassing principally the Japanese, Chinese, and Indian traditions.

**PHIL.3500 World Philosophies (Formerly 45.350) - Credits: 3**

This course will fuse the historical and the thematic approaches in order to undertake a comparative examination of the relations of the great philosophical traditions (Chinese, Indian, Western, Islamic, and Japanese) to the perennial issues of philosophy. The main focus will be the continuing vitality and heuristic fertility of these traditions and their ability to define how human meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**PHIL.3510 Problem of Evil (Formerly 45.351) - Credits: 3**

Why is there evil and suffering in the world? This course looks at the explanations that have been given in the various religions of the world and considers the strengths and weaknesses of each approach.

**PHIL.3520 Existence & Anxiety (Formerly 45.352) - Credits: 3**

Explores basic questions of human existence in 19th and 20th Century philosophy and literature. Topics include anxiety and alienation; freedom and responsibility; authenticity and bad faith; individuality and mass society; rationality and the absurd; values and nihilism; and God and meaninglessness. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

**PHIL.3530 Gender and Religion (Formerly 45.353) - Credits: 3**

This course examines gender in philosophy of religion and philosophy of theology. Issues addressed include the nature of gender, the divine gender, religious oppression and liberation of women, and LGBTQIA+ issues.

**PHIL.3570 Science and Religion (Formerly 45.357) - Credits: 3**

A study of the multiple relations between science and religion focusing on the theme of creativity. The problem of the various truth claims of the two systems will be subjected to a close analysis and principles developed to understand how conflicts between the two can be understood and resolved.

**PHIL.3610 Equality, Justice and the Law (Formerly 45.361) - Credits: 3**

This class investigates the American fascination with the “rule of law.” Questions to be considered include the following: What do we mean by the rule of law? What is the relation between law and morality? How does the rule of law promote justice, and what is its connection with the ideal of equality? What is the role of a written Constitution in protecting the rule of law? Special emphasis will be given to the Equal Protection clause of the Constitution and its role in prohibiting discrimination against disadvantaged groups, including racial minorities, women, and the handicapped. We will also consider in detail some theories of constitutional interpretation, including the Original Intent theory.
PHIL.3620 Democracy and Its Critics (Formerly 45.362) - Credits: 3
Explores the diverse roots of the democratic ideal and the opportunities and dangers associated with democratic politics. The arguments for and against democracy will be analyzed. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.3650 Capitalism and Its Critics (Formerly 45.365) - Credits: 3
This course explores the historical evolution of capitalism, from its early beginnings in the Enlightenment to the most recent debates about the free market and globalization. The focus will be on the debate over the virtues and vices of capitalism as distinct from other modes of economic and political organization. Concepts to be discussed will include freedom, equality and the distribution of wealth. Readings include Adam Smith, Karl Marx, Max Weber, Joseph Stiglitz, and others.

PHIL.3660 Globalization and Its Critics (Formerly 45.366) - Credits: 3
The course explores globalization as the process of transformation of regional and national phenomena into global ones, analyzing its social, economic, political, and cultural aspects. Supporters view it as the progress of liberalization and democratization that develop peaceful international cooperation; critics see globalization as the expansion of the profit-seeking global corporations that abuse the less developed and vulnerable regions. The course readings include the works of Amartya Sen, Samuel Huntington, Joseph Stiglitz, and other leading economists, sociologists, and philosophers.

PHIL.3670 Feminism and Liberalism (Formerly 45.367) - Credits: 3
Liberalism stresses the importance of protecting individual people's right to live their lives however they see fit. Feminism strives to show that women are subject to a variety of injustices that prevent them from being able to live lives that are as good as men's. The aim of this course will be to consider whether liberalism and feminism are compatible, or whether the central ideals of liberalism--ideals like equality, autonomy, and individual rights--actually function to entrench not just sexism but also racism, classism, and other kinds of oppression. Readings will include both historical and contemporary writers such as Isaiah Berlin, Thomas Hobbes, John Locke, Catherine MacKinnon, John Stuart Mill, Martha Nussbaum.

PHIL.3680 The Politics of Food (Formerly 45.368) - Credits: 3
This class will examine the moral and political implications of the food we eat. Topics we’ll cover include genetically modified organisms, factory farming, animal rights and welfare, agricultural pollution, agricultural subsidies, third world hunger, the obesity epidemic, and the industrial food system and its alternatives.

PHIL.3690 History of Moral Philosophy (Formerly 45.369) - Credits: 3
This course explores the history of moral philosophy by examining the writings of key thinkers in the Western philosophical canon, including Leibniz, Hume, Kant and Hegel. We will focus on four basic types of moral reasoning: perfectionism, utilitarianism, intuitionism, and Kantian constructivism. Our goal will be to understand how these thinkers from the modern period of moral philosophy have influenced the way contemporary philosophers think about morality. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.3700 Metaphysics (Formerly 45.370) - Credits: 3
This course examines fundamental issues and topics in contemporary metaphysics. Broadly construed, metaphysics refers to the nature of existence and reality, or more basically, being. Topics in the course include: persistence, personal identity, human ontology, free will, possible worlds and modality, causation and paradoxes.

PHIL.3710 Buddhist and Zen Philosophy (Formerly 45.371) - Credits: 3
Explores Buddhist and Zen philosophy and practice from ancient India through its developments in China and Japan to contemporary America. Attention is given to significant philosophical movements such as Abhidharmika, Madhyamika, Yogacara, Huayan, and Chan (Zen).

PHIL.3720 Chinese Philosophy (Formerly 45.372) - Credits: 3
An introduction to the Chinese philosophical tradition in translation, especially the classical schools of Confucianism, Daoism, Mohism, and Legalism. Later developments in Buddhist and Neo-Confucian thought will also be explored.

PHIL.3730 Arabic and Islamic Philosophy (Formerly 45.373) - Credits: 3
An introductory survey of selected philosophical topics and figures in the Arabic-speaking world, focusing on the development of classical Arabic philosophy (falsafa) through its proponents and critics from al-Kindi (9th century) to Averroes (12th century). The course can also include speculative theology (kalam), mystical philosophy (Sufism), later developments, and contemporary issues.

PHIL.3740 Myth, Ritual and Festival (Formerly 45.374) - Credits: 3

This course aims to analyze the social, cultural, and religious phenomena of the festival or holiday in its connection with myth and ritual. We focus in particular on the groundbreaking work of the Russian literary theorist Mikhail Bakhtin and his analysis of the cross-cultural features of the idea of the festival, for example the Roman Saturnalia, the British May Day festival, and our modern thanksgiving, Christmas, and New Year festivals. We will also consider other important contributions to the study of ritual and festival, including those of James Frazer, mircea Eliade, and Joseph Campbell. A substantial part of the class will be focused on the sociological and historical aspects of the role of festival in modern society. We will also attempt to place the festival and holiday tradition within a larger framework of the role of myth and ritual in religion.

PHIL.3750 Philosophy of Sex and Love (Formerly 45.375) - Credits: 3

The aim of this course is to introduce students to both historical and contemporary discussions surrounding the topics of sex and love. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PHIL.3760 The Ethics of War and Peace (Formerly 45.376) - Credits: 3

This course examines theories about why human beings engage in mass killing, the history of moral deliberation about war in major religious traditions, and modern philosophical analyses of the diverse moral principles that those traditions have bequeathed to us. The course comprises three broad ethical questions. First when, if ever, is recourse to arms legitimate (jus ad bellum)? Second, what constraints should apply to military conduct (jus in bellos)? And third, how should wars end (jus post bellum)? These three questions will be systematically discussed by critically examining a selection of writings by historical and modern secular and religious thinkers.

PHIL.3780 Philosophy of Peace and Nonviolence (Formerly 45.378) - Credits: 3

This course examines philosophical theories of peace, pacifism, and nonviolence. We will study ancient and modern accounts, secular and religious traditions, as well as feminist perspectives in the philosophy of peace and nonviolence. We will explore philosophical applications of nonviolence toward nonhuman animals and the natural environment, along with specific cases of nonviolent resistance in contemporary global conflicts.

PHIL.3830 Philosophy of Death and Dying (Formerly 45.383) - Credits: 3

This course is a philosophical and interdisciplinary examination of prominent issues concerning the meaning of life and death and the ethical concerns involved with life, death and end of life issues. Topics in the course include: definitions of death, metaphysics and death, cultural meanings of death, the ethics of killing vs. letting die, euthanasia and suicide, and rights of the dying. Meets Core Curriculum Essential Learning Outcome for Social Responsibility &Ethics (SRE).

PHIL.3840 Philosophies of Art and Beauty (Formerly 45.384) - Credits: 3

Examines the views of major philosophers on the beautiful and the nature of artistic creativity. An attempt is made to correlate the views of the thinkers with the works of poets, artists, and composers and the statements the latter have made about their work.

PHIL.3850 Philosophy of Popular Culture (Formerly 45.385) - Credits: 3

This course analyzes those forms of art/entertainment commonly referred to under the umbrella term "popular culture" through a variety of philosophical lenses. After seeking to establish a categorization of "popular culture," students will examine the mediums of music, film, television, advertisements and sports. Throughout the course, students will read/listen/watch various examples of the mediums listed above and attempt to answer various questions about them such as: what societal values make these examples popular at a current moment? What cultural assumptions do these examples reflect? What is the artistic/aesthetic merit of these examples?

PHIL.3860 Ancient Philosophy (Formerly 45.386) - Credits: 3

A survey of the beginnings of philosophy, mainly western, from the Presocratics to Augustine. Studies the emergence of philosophy out of mythical forms of thinking and the development of rational thought in the work of Plato, Aristotle, the Stoics, the Epicureans, and the Neoplatonists.

PHIL.3870 Plato and Beginning of Philosophy (Formerly 45.387) - Credits: 3
It is Plato who first uses the words ‘philosopher’ and ‘philosophy’, and who, in his dialogs or dramatic discussions, establishes for all subsequent Western thought just was the enterprise of philosophy will be. In our study of these dialogs we will trace the origins in Plato of philosophy’s primary questions concerning what is real and true as opposed to mere appearance (ontology, metaphysics), what is knowledge as opposed to mere opinion (epistemology), what is valid argument (logic), what is beautiful (aesthetics), and what is good, just and fair (ethics, politics). Plato foregrounds speech and language in all these considerations. Hence language, as the medium of thought and communication, will be a fundamental concern throughout our study.

PHIL.3880 Latin American Philosophy - Credits: 3

Students in this course will be introduced to current and longstanding debates within Latin American Philosophy. They will also be exposed to many of the principle texts and thinkers within this burgeoning tradition. The class includes a survey of Latin American philosophy ranging from pre-colonial Aztec thought to the debates over the struggle for Latin American independence, and also the question of identity: what constitutes Latin American philosophy.

PHIL.3890 Immigration and Global Justice - Credits: 3

This course addresses the question of justice in regards to immigration policy. We consider a variety of views including Communitarianism, Liberalism, Nationalism, Cosmopolitanism, and Democratic Theory. We will look at how these different positions have answered the following sorts of questions: Do we have duties to strangers of foreigners that are of equal weight to the duties we owe to members of our family, our circle of friends or our nation? Does part of the definition of "self-determined state" include the right to unilaterally reject petitions of inclusion from non-citizens? Does a commitment to equality demand that borders be open?

PHIL.4010 Bioethics and Genetics Research (Formerly 45.401) - Credits: 3

This course addresses ethical issues that arise in biomedical research and practice including autonomy in the doctor-patient relationship, the duty of confidentiality, the right to refuse treatment, the right to death with dignity, the ethics of experimentation with human subjects, the ethics of genetic enhancement, and justice in health care distribution. The course will combine theoretical perspectives and concrete case studies that illustrate actual dilemmas that the health care profession has in fact encountered over the years.

PHIL.4910 Directed Studies (Formerly 45.491) - Credits: 1-4

The student, through regular and frequent consultation with an instructor, pursues a special problem in philosophy, the results of which are presented in a 25-30 page paper.

PHIL.4951 Senior Capstone - Credits: 3

This course is designed to provide philosophy majors with a capstone project involving integration of their coursework in philosophy in the form of an independent research project under the supervision of a faculty member. The capstone will be taken during the senior year (students in the Communications program may take the Practicum instead of the Capstone). The class is designed to meet the Essential Learning Outcomes of Written and Oral Communication, Applied and Integrative Learning, and Information Literacy.

PHIL.4960 Practicum (Formerly 45.496) - Credits: 3

The practicum is a 3-credit internship at a professional site relevant to the student’s course of study. Students are required to write a term paper at the end of their internship.

THEA.2010 Introduction to Theatre (Formerly THEA 201) - Credits: 3

This course explores the arts and practices of theatre from classical to contemporary times. Students are introduced to the basic concepts and forms of theatre as well as to theories of its origins and purposes. Replaces 42.219 and 59.219; credit may not be earned for both 42/59.219 and THEA 201.

THEA.2210 Stagecraft (Formerly THEA 221) - Credits: 3

Survey of the materials, skills, and techniques of technical theatre (including scenic construction, scene painting, lighting, and sound production) through reading, lecture, and hands-on experience. Replaces 42.252; credits may not be earned for both 42/59.252 and THEA 221.

THEA.2300 Foundations of Theatrical Design (Formerly THEA 230) - Credits: 3

Basic principles and techniques in scenic, lighting and costume design for theatre. Replaces 42.260 and 59.386; credits may not be earned for both 42/59.260 and THEA 230 or for 59.386 and THEA 230.

THEA.2610 Acting 1 (Formerly THEA 261) - Credits: 3

Theory and practice of acting including exercises in the elements and methods of acting and the preparation of a public performance. Replaces 42.261 and 59.261; credits may not be earned for both 42/59.261 and THEA 261.
THEA.3110 Play Production (Formerly THEA 311) - Credits: 3

Introduction to the design and technical aspects of theatre through hands-on experience working on campus productions. Focus on basic principles of set, lighting, props, costume, makeup, and sound production. May be repeated for credit.

THEA.3400 Directing Workshop (Formerly THEA 340) - Credits: 3

Study of the process of directing plays of different styles. Students will direct scenes with other members of the workshop and their work will be analyzed by the instructor and fellow students. Replaces 42.343 and 59/343; credits may not be earned for both 42/59.343 and THEA 340.

THEA.3620 Acting 2 (Formerly THEA 262) - Credits: 3

A continuation of THEA 261 emphasizing techniques of scene study and characterization. Pre-requisite THEA 261 or the equivalent. Replaces 42/59.262; credits may not be earned for both 42/59.262 and THEA 262.

THEA.3650 Voice and Movement (Formerly THEA 265) - Credits: 3

To discover the possibilities of your unique voice and physicality, to gain techniques to free up tension, release habitual blocks and inhibitions, and to explore creative expression through the voice and body, ultimately applying all of these elements to performance. This course uses techniques designed for voice, movement, and physical acting including Linklater, Alexander, Viewpoints, Grotowski, Yakim and others.

THEA.4010 Topics in Theatre (Formerly THEA 401) - Credits: 3

Advanced study of a selected area of theatrical production, history, texts, or theory. Repeatable for credit when topics differ. Replaces 42.414 and 59.414; repeated credit may only be earned when topics differ.

THEA.4900 Performance Practicum (Formerly THEA 490) - Credits: 1-3

THEA.4920 Technical Theatre Practicum (Formerly THEA 492) - Credits: 1

One-credit practicum in technical theatre (scenic construction, lighting, sound, costuming), consisting of work on a campus production under the supervision of Theatre Arts faculty.

THEA.4930 Practicum in Theatre (Formerly THEA 493) - Credits: 1-3

Part-time, full-semester internship at a professional theatre. Program director’s permission required. Replaces 42.495 and 59.495; may be repeated for credit with permission.

THEA.4940 Directed Study in Theatre (Formerly THEA 494) - Credits: 3

Supervised independent project in theatre. Instructor’s permission required. Replaces 42.494 and 59.494; may be repeated for credit with permission.

THEA.4950 Senior Seminar in Theatre (Formerly THEA 495) - Credits: 1

Capstone-experience seminar focusing on advanced projects (in performance, dramaturgy, or design/tech) in the service of portfolio building and preparation for graduate study and/or work in the professional world of theatre. To be taken during the student’s final year in the program. Instructors Consent required.

UTCH.2040 Perspectives on Mathematics and Science (Formerly UTL.204) - Credits: 3

This course examines the history and philosophy of mathematics and science. Students will explore a selection of topics and episodes in the history of science and mathematics recognizing that many gains in knowledge have emerged through struggle, and in spite of resistance from cultural, religious and social structures. Students will learn that ideas in science and mathematics are dynamic and that disagreement can often lead to major breakthroughs. Students must think critically about how K-12 STEM education texts portray the history and philosophy of science and mathematics. This course is required for the STEM TEACHING MINOR.
3 - Credits: 3
Directed Studies World Languages Level 3. Permission of the instructor and department chair required.

WLAN.2992 Directed Studies World Languages Level 4 - Credits: 3
Directed Studies World Languages Level 4. Permission of the instructor and department chair required.

WLAN.4000 Senior Capstone in World Languages and Cultures - Credits: 1
The purpose of this course is to help students document and critically analyze their experience abroad, in an internship or in a community project. Through the creation of a digital portfolio, this course validates our major students' linguistic hands-on experience through study abroad or community-based practicum experience and it establishes consistency in our major curriculum by ensuring that all our majors are getting a high-quality linguistic experience abroad or at home. This course is conducted in the target language in which the student majors. For those students majoring in French/Spanish and Italian/Spanish options, the student chooses the target language in which the coursework is completed.

WLAR.1150 Arabic 1 and Culture (Formerly 53.115) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 115, 116 and 215, 216 levels must be elected in the prescribed sequence.

WLAR.1160 Arabic 2 and Culture (Formerly 53.116) - Credits: 3
This course is for students who have completed 53.115 Arabic 1 and Culture. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 115, 116 and 215, 216 levels must be elected in the prescribed sequence.

WLAR.2150 Arabic 3 and Culture (Formerly 53.215) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 117, 118 and 215, 217 levels must be elected in the prescribed sequence.

WLAR.2160 Arabic 4 and Culture (Formerly 53.216) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 115, 116 and 215, 216 levels must be elected in the prescribed sequence.

WLAR.4940 Directed Study in Arabic (Formerly 53.494) - Credits: 3
Individual research projects on Arabic or Islamic culture. Students, through regular and frequent consultation with instructor, pursue a special topic of research.

WLCH.1050 Chinese 1 and Culture (Formerly 53.105) - Credits: 3
Continuation of 53.105 Chinese 1 and Culture. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 103, 104 and 205, 206 levels must be elected in the prescribed sequence.

WLCH.1060 Chinese 2 and Culture (Formerly 53.106) - Credits: 3
Continuation of 53.105 Chinese 1 and Culture. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 103, 104 and 205, 206 levels must be elected in the prescribed sequence.

WLCH.1080 Business Chinese I and Culture - Credits: 3
This introductory language and culture course prepares non-Chinese speakers for potential future business engagements either in China or with Chinese speakers in the United States. Effective communication and cultural competency in standard/Mandarin Chinese are emphasized. Students will be exposed to various aspects of Chinese culture appropriate for informal as well as business social settings. Topics include, but are not limited to, self-introduction, traveling, lodging, dining, shopping, banking, seeing a doctor, making friends, and doing business. Authentic language materials (vocabulary, Pinyin, sentence structures, conversations) are presented and taught in a second language acquisition environment with interactive activities that are relevant to proper social etiquette.
WLCH.1090 Business Chinese II - Credits: 3
This language and culture course is a continuation of Business Chinese I. The course prepares non-Chinese speakers for potential future business engagements either in China or with Chinese speakers in the United States. Effective communication and cultural competency in standard/Mandarin Chinese are emphasized. Students will be exposed to various aspects of Chinese culture appropriate for informal as well as business social settings. Topics include, but are not limited to, self-introduction, traveling, lodging, dining, shopping, banking, seeing a doctor, making friends, and doing business. Authentic language materials (vocabulary, Pinyin, sentence structures, conversations) are presented and taught in a second language acquisition environment with interactive activities that are relevant to proper social etiquette.

WLCH.2050 Chinese 3 and Culture (Formerly 53.205) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 105, 106 and 205, 206 levels must be elected in the prescribed sequence.

WLCH.2060 Chinese 4 and Culture (Formerly 53.206) - Credits: 3
This course is a continuation of 53.205 Chinese 3 and Culture, which is a pre-requisite. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 105, 106 and 205, 206 levels must be elected in the prescribed sequence.

WLCH.3000 Modern Chinese Literature and Culture (Formerly 53.300) - Credits: 3
This course offers an insight into Chinese culture and society by examining different genres of modern and contemporary Chinese Literature -- the novel, poetry, essay, and drama -- since the early Twentieth Century. Readings in English translations of representative works by major writers/essayists/poets/playwrights will be complemented by selected feature films and documentaries. The survey of Chinese literature will be put in the context of a series of sociopolitical changes in China that informed the production of these works.

WLCH.3100 Special Topic in Chinese Studies - Credits: 3
An in-dept study of the culture, civilization, or literature from the Chinese-speaking world. Class discussions, readings, oral and written work all in English. Other materials could be in target language with translations or subtitles. May be repeated once for credit, if content changes, and with written consent of the instructor.

WLCH.3150 Chinese Culture and Civilization (formerly 53.215) - Credits: 3
An in-depth study of culture, civilization, and literature from the Chinese-speaking world. The emphasis of the course is not only on understanding China's history in general chronological terms, but also on understanding the cultural qualities that have made China a great yet distinctive country. Course taught in English.

WLCH.4900 Directed Study in Chinese Culture (formerly 53.490) - Credits: 3
Students through regular consultation with the Instructor develop a course of directed study or independent study in Chinese Culture. Students findings are presented in a paper of significant proportion.

WLCH.4950 Advanced Tutorial in Chinese Culture (formerly 53.495) - Credits: 3
A program of directed study to give an opportunity to a student to explore problems in Chinese Culture in greater dept or to initiate additional problems in Chinese Culture.

WLFR.1010 French 1 and Culture (formerly 50.101) - Credits: 3
Develops French speaking, listening, reading and writing skills through the discovery of French and Francophone culture in a communicative approach (instruction occurs in French with clarification in English). This class is the 1st of the 4-course French language program offered at UML. Language courses are sequential and must be taken accordingly.

WLFR.1020 French 2 and Culture (formerly 50.102) - Credits: 3
Continuation of French 1 and Culture (or equivalent), which is a pre-requisite. Strengthens French speaking, listening, reading and writing skills acquired in French 1 and Culture through the discovery of French and Francophone culture in a communicative approach (instruction occurs in French with some clarification in English). This class is the 2nd of the 4-course French language program offered at UML. Language courses are sequential and must be taken accordingly.
WLFR.2110 French 3 and Culture (Formerly 50.211) - Credits: 3
Enhances the four skills acquired in French 2 and Culture (or equivalent), which is a pre-requisite: speaking, listening, reading and writing through the discovery of French and Francophone culture in a communicative approach (instruction occurs in French with minimal use of English). This class is the 3rd of the 4-course French language program offered at UML. Language courses are sequential and must be taken accordingly.

WLFR.2120 French 4 and Culture (Formerly 50.212) - Credits: 3
This course has French 3 and Culture (or equivalent) as a pre-requisite and is the 4th and last of the 4-course French language program offered at UML. The course strengthens the four skills acquired in prior levels. It emphasizes increased accuracy and depth of students' abilities and knowledge of French and Francophone culture and language in a communicative approach (instruction occurs in French with almost no use of English). Students express themselves orally and in writing at the national standards level of high-intermediate and understand key-concepts when spoken clearly at native speed.

WLFR.3000 Quebec Literature and Culture - Credits: 3
This course explores the culture and literature of French-speaking Quebec. Through essays, literary readings, songs, works of art, and film, students will follow the development of this province of Canada from its origins as a French colony through the exodus of French-Canadians in the early twentieth century and the Revolution Tranquille of the 1960's, up to the present day. Conducted entirely in French.

WLFR.3010 Survey of French Literature (Formerly 50.301) - Credits: 3
A panoramic survey of French Literature based on the history and civilization of France from the Middle Ages to the XXth (20th) Century, through readings in the original French language of excerpts from milestone novels, theater and poetry. Class conducted in French.

WLFR.3020 Survey of Francophone Literature (Formerly 50.302) - Credits: 3
A survey of contemporary Francophone Literature of African, European, and North American French speaking countries since 1960 until today.

WLFR.3030 Special Topics: in Francophone Studies (Formerly 50.303) - Credits: 3
An in-depth study of a specific topic in literature, culture, civilization or cinema from the French-speaking world. Class discussions, readings, oral and written work all in French. May be repeated once for credit, if content changes, and with written consent of the Instructor.

WLFR.3050 World Ready Topic for French Track - Credits: 3
This course, taught in English, is for non French majors and minors. It is offered for students who are completing their language requirement through the World Ready option, and have chosen the French track. The course covers a topic of the French-speaking world's culture, civilization, cinema or literature. Class discussions, readings, oral and written work all in English. Other materials could be in target language with translations or subtitles. May be repeated once for credit, if content changes, and with written consent of the instructor.

WLFR.3100 French Speaking World (Formerly 50.310) - Credits: 3
Designed for prospective majors and minors in French as well as for those who have completed four years of high school or two years of college French. The course examines similarities and differences in the ethos of nations of the French-speaking world and in the life-styles of the individuals and groups that make them up. Conducted in French.

WLFR.3150 Francophone Communities in North America (Formerly 50.315) - Credits: 3
This course introduces the concept of "Francophonie" and describes the origins of the main francophone communities left in North America: Quebec, Acadia and New-Foundland in Canada, and Louisiana and New England (including Lowell) in the U.S. The primary focus of this class is Culture, history and language (different varieties of French spoken by those communities). Class conducted in French.

WLFR.3200 Contemporary French Civilization and Culture (Formerly 50.320) - Credits: 3
In this course we look closely at some fundamental issues reflecting the rapidly changing parameters of French culture and society today; the question of national identity and cultural hybridite, the relationship between the evolving types of family relations and new forms of social and political contracts; the crucial personal problems faced by the young, the poor, the immigrant and the elderly in an increasingly multicultural Hexagone attempting to define its place, role and function.
within the recently defined Europe unit and the new global world order; the current status of women; the relationship between cities and ghettos, violence and crime; the nature of emerging forms of cultural production within new trends and styles of modernite.

WLFR.3400 Contemporary French Cinema (Formerly 50.340) - Credits: 3

Provides a critical appreciation of contemporary French cinema (1985-today) aiming at sorting out its eclecticism and focusing on the following aspects: 1) French cultural exception in the European Union: cultural integration and national identity; 2) Representation of the ongoing social and moral changes in contemporary France; 3) The new generation of French filmmakers. Class taught in French.

WLFR.3440 Advanced French Grammar (Formerly 50.344) - Credits: 3

A systematic study of grammatical and syntactical structures. Review of more advanced structures.

WLFR.3460 Advanced French Conversation (Formerly 50.346) - Credits: 3

Advanced oral practice in rapid and idiomatic speech. Topics of contemporary significance are selected from contemporary prose.

WLFR.3480 Advanced French Conversation and Composition (Formerly 50.348) - Credits: 3

Designed to improve and reinforce proficiency in spoken and written French through regular exercises of oral communication and free composition, through the analysis of literary texts and authentic written and oral materials. Taught in French.

WLFR.3760 French Cinema & Society (Formerly 50.376) - Credits: 3

Covers the dramatic presentation French society gives of itself during the period of profound social and economic change, from the New Wave and the May 68 events to today’s younger generation facing an uncertain tomorrow. Each screening (in French with subtitles) is preceded by an introduction placing the film in its historical context. In English.

WLFR.3800 Francophone Identity through Cinema (Formerly 50.380) - Credits: 3

Provides a critical appreciation of the notion of Francophone identity through modern and contemporary (1970-today) Francophone cinema from diverse places such as but not limited to North Africa, West Africa (especially Senegal), Canada (especially Quebec) the Caribbean, Belgium, and Switzerland. The course is aiming at showing the evolution of the Francophone identity in the postcolonial period until now and is focusing on the following aspects: 1) The emergence and importance of postcolonial Francophone cinema in the 1970s as a “cinema engage” (especially Sembene Ousmane in Senegal); 2) Contemporary issues of the postcolonial Francophone societies through films; 3) Representations of the cultural diversity in Francophone films; 4) Identity, race and immigration, women’s status issues.

WLFR.3810 The Negritude Movement in African Francophone Lit. - Credits: 3

This course examines the work of prominent Francophone writers who launched the Negritude movement, a literary and ideological philosophy, developed by Francophone African intellectuals, writers, and politicians in France during the 1930s.

WLFR.3815 Francophone Caribbean Studies through Lit & Film - Credits: 3

This course explores major works from French Caribbean authors. Through novels, films, short stories, poetry, and play, we will uncover the historical, intellectual and social dynamics that define the French Caribbean world. A special emphasis will be placed on topics such as Ngritude, Antillanit, Crolit, and Migration.

WLFR.3940 Enhancing and Advancing your Knowledge of French (Formerly 50.394) - Credits: 3

Designed for students who need/wish to enhance and advance their linguistic skills in French. Conducted entirely in French, the course will focus on the vocabulary of contemporary French as well as selected grammatical and syntactical structures through the analysis of French-speaking Media (newspapers, Radios, TVs) available on the Web.

WLFR.4910 Directed Studies in French Literature (Formerly 50.491) - Credits: 3

Individual research projects in French literature. Students, through regular and frequent consultation with their instructor, develop a course of directed study in French literature and define a problem for individual research. The student’s findings are presented in a paper of significant proportions.

WLFR.4920 Directed Studies French Composition (Formerly 50.492) - Credits: 3
Students, through regular and frequent consultation with their instructor, pursue a special program of composition or creative expression.

WLFR.4950 Advanced French Tutorial (Formerly 50.495) - Credits: 3
A program of directed study which affords the advanced student with an additional opportunity to pursue a previously explored problem in greater depth or to initiate a new problem. The purpose of the course is to sharpen and refine techniques for scholarly research, presentation and creative expression.

WLFR.4960 French Practicum Experience (Formerly 50.496) - Credits: 1-9
A program of on-campus and/or off-campus experiences (for French and Modern Language Majors only). Specific requirements vary depending upon faculty policies and the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural, or artistic area and for applying techniques of problem solving and/or skills which are appropriate to the student’s major discipline. May be repeated for a maximum of nine credits. Students are graded "satisfactory" or "unsatisfactory." The practicum experience may not be substituted for a required course in the major.

WLGE.1010 German 1 and Culture (Formerly 51.101) - Credits: 3
Develops German speaking, listening, reading and writing skills through the discovery of the culture of German speaking countries in a communicative approach (instruction occurs in German with clarification in English). This class is the 1st of the 4-course German language program offered at UML. Language courses are sequential and must be taken accordingly.

WLGE.1020 German 2 and Culture (Formerly 51.102) - Credits: 3
Continuation of German 1 and Culture (or equivalent), which is a pre-requisite. Strengthens German speaking, listening, reading and writing skills acquired in German 1 and Culture through the discovery of the culture of German speaking countries in a communicative approach (instruction occurs in German with some clarification in English). This class is the 2nd of the 4-course German language program offered at UML. Language courses are sequential and must be taken accordingly.

WLGE.2110 German 3 and Culture (Formerly 51.211) - Credits: 3
Enhances the four skills acquired in German 2 and Culture (or equivalent), which is a pre-requisite: speaking, listening, reading and writing through the discovery of the culture of German speaking countries in a communicative approach (instruction occurs in German with minimal use of English). This class is the 3rd of the 4-course German language program offered at UML. Language courses are sequential and must be taken accordingly.

WLGE.2120 German 4 and Culture (Formerly 51.212) - Credits: 3
This course has German 3 and Culture (or equivalent) as a pre-requisite and is the 4th and last of the 4-course German language program offered at UML. The course strengthens the four skill acquired in prior levels. It emphasizes increased accuracy and depth of students' abilities and knowledge of the culture of German speaking countries in a communicative approach (instruction occurs in German with almost no use of English). Students express themselves orally and in writing at the national standards level of high-intermediate and understand key-concepts when spoken clearly at native speed.

WLGE.3000 Grimms' Fairy Tales (Formerly 51.300) - Credits: 3
This course will provide a study of the Grimms’ fairy tales, their collection and publication by Jacob and Wilhelm Grimm in the contest of 19th century German Romanticism, and their enduring relevance to modern social commentary. Reading the texts in English translation, students will gain a critical understanding of the content and structure of the tales, of their cultural components, and their function through time to entertain, edify, and inform about life in the social milieu. The course is taught in English.

WLGE.3010 German Culture and Civilization - Credits: 3
This course examines the cultural and social development of Germany, from the end of World War II until now. This course analyzes the radical transformation of Germany through a deep identity crisis and the rising of new German generations. Germany’s cultural, political and economical reconstruction will be discussed in readings, films, documentaries, architecture, pictures, and paintings. Course materials are in English or in German with English subtitles. This course is conducted in English.

WLGE.4920 Direct ed Study in German Composition (Formerly 51.492) - Credits: 3
Individual research projects for modern language majors. Students, through regular and frequent consultation with their
instructor, develop a course of directed study in literature and culture and define a subject for individual research. The student’s findings are represented in a paper of significant proportion.

WLGE.4950 Advanced German Tutorial (Formerly 51.495) - Credits: 3

A program of directed study which affords Modern Language majors an additional opportunity to pursue a previously explored topic in greater depth or to initiate an additional topic. The purpose of this tutorial is to sharpen and refine techniques of scholarly research, presentation and creative expression.

WLIT.1010 Italian 1 and Culture (Formerly 52.101) - Credits: 3

Develops Italian speaking, listening, reading and writing skills through the discovery of the culture of Italy in a communicative approach (instruction occurs in Italian with clarification in English). This class is the 1st of the 4-course Italian language program offered at UML. Language courses are sequential and must be taken accordingly.

WLIT.1020 Italian 2 and Culture (Formerly 52.102) - Credits: 3

Continuation of Italian 1 and Culture (or equivalent), which is a pre-requisite. Strengthens Italian speaking, listening, reading and writing skills acquired in Italian 1 and Culture through the discovery of the culture of Italy in a communicative approach (instruction occurs in Italian with some clarification in English). This class is the 2nd of the 4-course Italian language program offered at UML. Language courses are sequential and must be taken accordingly.

WLIT.2110 Italian 3 and Culture (Formerly 52.211) - Credits: 3

Enhances the four skills acquired in Italian 2 and Culture (or equivalent), which is a pre-requisite: speaking, listening, reading and writing through the discovery of the culture of Italy in a communicative approach (instruction occurs in Italian with minimal use of English). This class is the 3rd of the 4-course Italian language program offered at UML. Language courses are sequential and must be taken accordingly.

WLIT.2120 Italian 4 and Culture (Formerly 52.212) - Credits: 3

This course has Italian 3 and Culture (or equivalent) as a pre-requisite and is the 4th and last of the 4-course Italian language program offered at UML. The course strengthens the four skill acquired in prior levels. It emphasizes increased accuracy and depth of students’ abilities and knowledge of the culture of Italy in a communicative approach (instruction occurs in Italian with almost no use of English). Students express themselves orally and in writing at the national standards level of high-intermediate and understand key-concepts when spoken clearly at native speed.

WLIT.3000 Modern & Contemporary Italian Civilization and Culture (Formerly 52.300) - Credits: 3

This interdisciplinary and multimedia course will provide a comprehensive view of Italian civilization from the Unification to the present. Through readings, movies, documentaries, pictures, and paintings, students will gain a critical understanding of many of the key events that have shaped Italian history, politics, and economy, and will be guided to discover questions of national identity, language, religion, gender and sexuality, ethnicity, immigration, media and fashion. Conducted in English (English reading material; film screenings In Italian with English subtitles.)

WLIT.3100 Special Topics in Italian Studies - Credits: 3

A limited topic of special interest in culture, civilization, or literature. May be taught in English or Italian. Course content and approach varies depending on instructor. The faculty post and distribute a detailed course description each semester, and students are urged to use this information in making their selections.

WLIT.3200 Special Topics: Italian Study (Formerly 52.320) - Credits: 3

Depends on faculty and student interests associated with Italian literature, composition and culture.

WLIT.3250 Italian American Literature and Culture (Formerly 52.325) - Credits: 3

Discusses the most prominent authors and works of Italian-American Literature as they, by using the ethnic setting, are able to convey universal human concerns and themes. The discussion on Italian-American ethnic issues will include such films as The Godfather, Moonstruck, The Sicilian, Goodfellas, and The Untouchables. Conducted in English.

WLIT.3300 Italian Women Writers (Formerly 52.330) - Credits: 3

Studies women writers of Italy by giving attention to the genres of narrative, poetry, theater and autobiography. Authors are selected according to their impact on issues affecting women,
gender studies, feminism, avant-garde, modernism, social relations and psychological discourse. Conducted in English.

WLIT.3400 Readings in Contemporary Italian Literature - Credits: 3
This course covers selected works from contemporary Italian prose and poetry, with particular attention to texts written in the last twenty years. It focuses on textual analysis and interpretation, and is intended to improve students' familiarity with idioms and vocabulary of contemporary Italian language. The course is taught in Italian and will advance students' skills in all areas of Italian language and culture.

WLIT.3450 Advanced Italian Conversation (Formerly 52.345) - Credits: 3
Advanced oral practice in rapid and idiomatic speech. Topics of contemporary significance are selected from contemporary prose.

WLIT.3500 Italian Language and Culture Through Films - Credits: 3
This course offers a systematic approach to learning Italian language and culture through films. It is designed to improve students' language skills and enrich their knowledge of Italian contemporary society. This class is taught in Italian.

WLIT.3600 Advanced Italian Conversation and Composition - Credits: 3
The course aims at developing advanced written and oral proficiency. Topics of contemporary significance are selected for discussions. This class is taught in Italian.

WLIT.3730 Italian Humanism (Formerly 52.373) - Credits: 3
A study of the waning of the Middle Ages and the dawning of the Renaissance as seen through the work of Petrarch and Boccaccio. Emphasis is on the study of sources and the influence of Petrarch and Boccaccio upon the literatures of western Europe. Conducted in English.

WLIT.3780 Italian Cinema and Culture (Formerly 52.378) - Credits: 3
A guide to contemporary Italian studies through literary and cultural approaches. The works of central figures in contemporary Italian letters are examined in view of their impact on Italian life. Emphasis is given to poets, novelists, the new cinema, the influences of existentialism, and the impact of America on Italian literature. Conducted in Italian/English.

WLIT.3800 Italian Cinema: Directors and Themes (Formerly 52.380) - Credits: 3
A study of Italian film history and its accomplishment by exploring the relationship of cinema to sociopolitical, economic, cultural, and literary events. The course will discuss in depth either a) one or two major and well known directors; b) a major thematic and stylistic division in a century of cinematic creativity.

WLIT.4910 Directed Study in Italian Literature (Formerly 52.491) - Credits: 3
Individual research projects for modern language majors. Students, through regular and frequent consultation with their instructor, develop a course of directed study in Italian literature and define a subject for individual research. The student's findings are presented in a paper of significant proportions.

WLIT.4920 Directed Studies Italian Composition (Formerly 52.492) - Credits: 1-6
Individual research projects for modern language majors. Students, through regular and frequent consultation with their instructor, pursue a special topic of composition or creative expression.

WLIT.4950 Advanced Italian Tutorial (Formerly 52.495) - Credits: 1-6
A program of directed study which affords Language majors an additional opportunity to pursue a previously explored topic in greater depth or to initiate an additional topic. The purpose of this tutorial is to sharpen and refine techniques of scholarly research, presentation and creative expression. Permission of Instructor.

WLIT.4960 Italian Practicum Experience (Formerly 52.496) - Credits: 3
A program of on-campus and/or off-campus experiences (for Italian and Language Majors only). Specific requirements vary depending upon faculty policies and the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural, or artistic area and for applying techniques of problem solving and/or skills which are appropriate to the student's major discipline. The practicum experience may not be substituted for a required course in the major. Permission of Instructor.
WLKH.1040 Elementary Cambodian for Heritage Speakers - Credits: 3
This intensive, 3-credit Cambodian language and culture course is intended for heritage Cambodian speakers who already have a basic command of the spoken and written language. The course covers the reading, writing, speaking and listening skills comprising the Cambodian Language & Culture 1 & 2 course in a single semester. Contemporary news information is also presented on a weekly basis.

WLKH.1350 Cambodian 1 and Culture (Formerly 53.135) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 135, 136 and 235, 236 levels must be elected in the prescribed sequence.

WLKH.1360 Cambodian 2 and Culture (Formerly 53.136) - Credits: 3
This course continues the oral practice, reading, writing, grammar and cultural studies begun in 53.135. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 135, 136 and 235, 236 levels must be elected in the prescribed sequence.

WLKH.2040 Intermediate Cambodian for Heritage Speakers - Credits: 3
This intensive 3-credit Cambodian language and culture course is intended for heritage Cambodian speakers who already have successfully completed WLKH.1040, Elementary Cambodian for Heritage Speakers, or its equivalent. The course covers the reading, writing, speaking and listening skills comprising the Cambodian Language & Culture 3 & 4 courses in a single semester. Contemporary news information is also presented on a weekly basis.

WLKH.2100 Introduction to Cambodian Culture (Formerly 59.210) - Credits: 3
This 3-credit course focuses on the culture of Cambodia from ancient times to present. Specifically, this course provides an overview of the geography, demographics, monarchy, religion, architecture, dance & music, literature and performing arts in historical context. The course also requires students to examine contemporary Cambodia in terms of change continuity.

WLKH.2350 Cambodian 3 and Culture (Formerly 53.235) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 135, 136 and 235, 236 levels must be elected in the prescribed sequence.

WLKH.2360 Cambodian 4 and Culture (Formerly 53.236) - Credits: 3
This course is a continuation of 53.235 Cambodian 3 and Culture, which is a pre-requisite. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 135, 136 and 235, 236 levels must be elected in the prescribed sequence.

WLKH.3100 The Literary Cultures of Cambodia - Credits: 3
This course provides a survey of the role and function of literature and literary institutions in Cambodia. Selections of literature in translation from various genres (poetry, the short story, novels) are analyzed in terms of the development of the particular genre and its function vis-a-vis Cambodia’s cultural institutions. Similarly, the course examines the role of these cultural institutions in supporting the production of these literatures in different historical periods (classical to modern). Particular emphasis is given to the role of literature and literary institutions in the development of national and cultural identity during and after colonial rule.

WLKH.3200 Cambodian Culture in Lowell - Credits: 3
This course examines the emergence and growth the Cambodian American culture in Lowell from the early 1980s until the present. The course focuses on cultural and artistic organizations and events, such as the Angkor dance troupe and the Southeast Asian Water Festival within the changing political and historical context of Lowell during that period. Particular attention is given to the role of Cambodian cultural organizations and events in Lowell’s cultural economy, which includes Lowell’s art district and city organizations like the Cultural Organization of Lowell (COOL), the Merrimack Repertory Theater and the Lowell National Historical Park.

WLKH.3250 Contemporary Cambodian Cinema - Credits: 3
This 3-credit course examines Cambodian cinema and filmmakers from the 20th and 21st centuries. The course will include films in English or with English subtitles made by Cambodian filmmakers, as well as films about Cambodia made by foreign filmmakers. The course will be organized
chronologically and thematically beginning with the first documentary films from the 1290’s produced by foreign filmmakers, to Cambodia’s “golden age” of cinema in the 1960’s, to films from the 1980’s about the genocide, to the fast-growing contemporary film scene in Cambodia. Students will view and examine the films in terms of their cultural context and how this context is reflected in the films’ plot, characters and perspective.

WLKH.3490 Literature, Politics and Genocide in Cambodia (Formerly 59.349) - Credits: 3
This course will examine various literary and political responses to the Cambodian genocide, particularly personal accounts or literary testimony by survivors and government sanctioned legal proceedings. The course will consider how the literary and political responses to the Cambodian genocide have at different times paralleled, complimented and opposed each other. The course will also ask whether their overall effect contributes to or detracts from the serving of justice and the process of healing for the survivors. To pursue these questions, we will read selections from novels and poetry written by Cambodian survivors side by side with accounts of political activities of the Cambodian government and the international community to bring the perpetrators of the genocide to justice.

WLKH.4930 Directed Study in Cambodian Culture (Formerly 53.493) - Credits: 1-6
Students through regular and frequent consultation with their instructor develop a course of directed study in Cambodian (Khmer) culture, and define a problem for individual research. The student’s findings are presented in a paper of significant proportions.

WLLA.3200 Special Topics in Latin Study (Formerly 56.320) - Credits: 3
Depends on faculty and student interests associated with Latin literature, composition and culture.

WLLA.4910 Directed Studies in Latin (Formerly 56.491) - Credits: 3
Individual research projects on Latin language and/or culture. Students, through regular and frequent consultation with instructor, pursue a special topic of research or translation. Permission of Instructor.

WLPO.1100 Portuguese for Spanish Speakers I (Formerly 53.110) - Credits: 3
Taught at a faster pace than a regular beginning course in Portuguese, is an introduction to the foundations of the Portuguese language and the cultural diversity of the Lusophone world for speakers of Spanish. Specific attention is devoted to the advantages and challenges that Portuguese presents to native or near-native speakers of Spanish. The course acknowledges that, in spite of the similarities between the two languages, there are important differences in pronunciation, vocabulary and grammatical structures. The course gives emphasis to all four language skill-listening, speaking, reading, writing—in order to achieve communicative goals. Portuguese is the language of instruction.

WLPO.1130 Portuguese 1 and Culture (Formerly 53.113) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 113, 114 and 213, 214 levels must be elected in the prescribed sequence.

WLPO.1140 Portuguese 2 and Culture (Formerly 53.114) - Credits: 3
A continuation of 53.113 Portuguese 1 and Culture, which is a pre-requisite. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 113, 144 and 213, 214 levels must be elected in the prescribed sequence.

WLPO.2130 Portuguese 3 and Culture (Formerly 53.213) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 113, 114 and 213, 214 levels must be elected in the prescribed sequence.

WLPO.2140 Portuguese 4 and Culture (Formerly 53.214) - Credits: 3
A continuation of 53.213 Portuguese 3 and Culture, which is a pre-requisite. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 113, 114 and 213, 214 levels must be elected in the prescribed sequence.

WLPO.3011 Special Topics: in Lusophone Studies (Formerly 53.301) - Credits: 3
An in-depth study of a specific topic in literature, culture, civilization from the Lusophone world. Class discussions,
readings, oral and written work all in Portuguese or in English. May be repeated once for credit, if content changes, and with written consent of the Instructor.

WLPO.3020 Special Topics: in Portuguese Studies (Formerly 53.302) - Credits: 3
An in-depth study of a specific topic in literature, culture, civilization or cinema from Portugal. Class discussions, readings, oral and written work all in Portuguese or in English. May be repeated once for credit, if content changes, and with written consent of the Instructor.

WLPO.3030 Survey of Brazilian Cinema - Credits: 3
An introduction to Brazilian cinema and society, focusing on the Cinema Novo (New Cinema) of the 1960s and 1970s as well as more contemporary films influenced by the ideals of this movement. Films will be analyzed via reference to historical and theoretical texts. Topics to be addressed include Brazilian history as reflected in film and the formation of a distinct Brazilian aesthetic sensibility. Taught in English.

WLPO.3040 Survey of Brazilian, Portuguese and Lusophone African Cinema (Formerly 53.304) - Credits: 3
This course is designed as an introduction to film studies and to Brazilian, Portuguese and Lusophone African cinema and cultures. Taught in English. College Writing 1 (421 01) and College Writing 2 (42102).

WLPO.3050 Culture and Civilization of Brazil - Credits: 3
This course is an introduction to Brazilian culture and society. Attention is given to history, geography, cinema, literature, art, and issues of race, gender, and social inequality as they lead toward a fuller understanding of Brazil. This course will cover major aspects of Brazilian society. The main texts review significant events and forces that have helped shape Brazil today. A variety of films and videos will be used. Course will be taught in English.

WLPO.3060 The Short Story in the Lusophone World - Credits: 3
This course will introduce students to the development of the short story in the Portuguese-speaking world from the 19th century to today. Through theoretical readings, discussion and writing activities, students will learn to analyze, ask critical questions of, and develop critical arguments about short fiction. Readings will be chosen from a variety of canonical authors from Brazil, Portugal, Cabo Verde, Mozambique, Angola, and Macau. Conducted in English.

WLPO.3070 The City in Contemporary Lusophone Literature and Film - Credits: 3
This course provides a comprehensive view of contemporary Lusophone urban space through literature and film. The course will explore the histories and cultures of the Portuguese-speaking countries by analyzing fictional texts and films related to their cities. Through readings and films, students will gain a critical understanding of many key events that have shaped Lusophone history, politics, and economy, and will be guided to discover, among others, themes related to national identity, language, ethnicity, migration, economic injustice, unhealed wounds of war, dictatorship, and colonialism. Conducted in English (English reading material; film screenings will be in Portuguese with English subtitles).

WLPO.3080 Lusophone Music and Culture - Credits: 3
This course will study the role of music and song in Lusophone cultures, including Brazil, Portugal, and Lusophone Africa. We will examine the historical and cultural evolution of some iconic music genres, including fado, samba, bossa nova, morna, and kizomba. Students will examine the social and political importance of music, including the politically engaged song from the 1960s and 1970s to today. Conducted in English.

WLPO.3090 Luso-Brazilian Women Writers in Translation - Credits: 3
This course studies a diverse selection of texts by women writers from Brazil and Portugal. This course further examines the differing strategies deployed by female-authored fiction, poetry, autobiography and essay as these negotiate genre and gender, and issues affecting feminism, social relations and psychological discourses. Conducted in English.

WLPO.3370 Portuguese Literature in Translation (Formerly 53.237) - Credits: 3
This course offers a broad overview of Portuguese literature, in English translation, from the Middle Ages to the contemporary period, placing literary movements and major authors in their historical and aesthetic context. It focuses on promoting a basic level of cultural literacy about Portugal based on representative reading drawn from the last seven centuries of the country's history situated in their social, cultural and historic contexts. Course assignments lead students to develop skills in textural interpretation, critical thinking, and academic writing.

WLPO.3440 Advanced Portuguese Grammar - Credits: 3
A systematic review of Portuguese grammar and syntax, and the study and practice of the basic principles of writing in Portuguese. Taught in Portuguese.

WLPO.3450 Advanced Portuguese Conversation and Composition - Credits: 3

The course aims at developing advanced written and oral proficiency in Portuguese. Topics of contemporary significance are selected for discussions. Taught in Portuguese.

WLPO.4810 Directed Studies in Portuguese Composition (Formerly 53.481) - Credits: 3

Students, through regular and frequent consultation with their instructor, pursue a special program of composition or creative expression in Portuguese.

WLPO.4830 Independent Studies in Portuguese (Formerly 53.483) - Credits: 3

This course allows students to undertake research on non-literature related topic on the Portuguese speaking world that is not made available through normal course offerings. The syllabus for the independent study will specify the topic and readings for the course, as well as dates by which readings and written work must be completed, the frequency of required meetings, and how the grade for the course will be determined. As an independent study is an upper level course, there is substantial writing component.

WLPO.4850 Advanced Portuguese Tutorial (Formerly 53.485) - Credits: 3

A program of directed study affords advanced student to provide an additional opportunity to pursue a previously explored problem in greater depth or to initiate and additional problem. The purpose is to sharpen and refine techniques for scholarly research and presentation and for creative expression.

WLSP.1010 Spanish 1 and Culture (Formerly 54.101) - Credits: 3

Develops Spanish speaking, listening, reading and writing skills through the discovery of the culture of Spanish speaking countries in a communicative approach (instruction occurs in Spanish with clarification in English). This class is the 1st of the 4-course Spanish language program offered at UML. Language courses are sequential and must be taken accordingly.

WLSP.1020 Spanish 2 and Culture (Formerly 54.102) - Credits: 3

Continuation of Spanish 1 and Culture (or equivalent), which is a pre-requisite. Strengthens Spanish speaking, listening, reading and writing skills acquired in Spanish 1 and Culture through the discovery of the culture of Spanish speaking countries in a communicative approach (instruction occurs in Spanish with some clarification in English). This class is the 2nd of the 4-course Spanish language program offered at UML. Language courses are sequential and must be taken accordingly.

WLSP.1030 Medical Spanish (Formerly 54.103) - Credits: 3

This course is designed to develop basic conversational skills necessary to communicate with patients in a health care setting. Students will acquire a basic linguistic and cultural foundation enabling them to interview and manage patients in clinical settings using Spanish; to take a history and perform a physical exam using Spanish, and to interpret health concerns of Spanish-speaking populations. The course is designed for health care professionals.

WLSP.2110 Spanish 3 and Culture (Formerly 54.211) - Credits: 3

Enhances the four skills acquired in Spanish 2 and Culture (or equivalent), which is a pre-requisite: speaking, listening, reading and writing through the discovery of the culture of Spanish speaking countries in a communicative approach (instruction occurs in Spanish with minimal use of English). This class is the 3rd of the 4-course Spanish language program offered at UML. Language courses are sequential and must be taken accordingly.

WLSP.2120 Spanish 4 and Culture (Formerly 54.212) - Credits: 3

This course has Spanish 3 and Culture (or equivalent) as a pre-requisite and is the 4th and last of the 4-course Spanish language program offered at UML. The course strengthens the four skill acquired in prior levels. It emphasizes increased accuracy and depth of students' abilities and knowledge of the culture of Spanish speaking countries in a communicative approach (instruction occurs in Spanish with almost no use of English). Students express themselves orally and in writing at the national standards level of high-intermediate and understand key-concepts when spoken clearly at native speed.

WLSP.2110 Reading and Conversing in Spanish I (Formerly 54.221) - Credits: 3

Emphasizes Spanish grammar review and the development of reading and conversational skills. Selected contemporary works provide the basis for developing conversational comprehension
and conversational and composition skills. This course is intended for students with a solid foundation in the Spanish language which had been gained from at least three years of high school study immediately prior to admission to the University.

WLSP.3005 LGBTQ and the Hispanic World - Credits: 3
This course will examine relevant works of 20th and 21st century LGBTQ+ Spanish speaking literature and visual representations, including selections from well-known authors and a new generation of writers. We will explore these works within broad social and political contexts that extend from the beginning of the twentieth century to the present day. In this course, we will study how literature serves as a tool both for the expression of same-sex desire and for questioning political and social practices that have traditionally silenced non-heteronormative identities. Finally, we will discuss how LGBTQ+ literature defies aesthetic conventions to expand existing cultural frameworks and to create new ones that align with social and political progress. Taught in Spanish.

WLSP.3010 Introduction to Spanish Literature (Formerly 54.301) - Credits: 3
This course studies representative literary texts of Spain form its beginnings to present times. The readings exemplify various genres and reveal the complicated series of interactions, conflict, and influences which have contributed to its cultural diversity and relevance in today’s global context. Conducted in Spanish.

WLSP.3020 Survey of Latin American Literature (Formerly 54.302) - Credits: 3
A study of the major writers of Latin America from Native American literature to the modernist period. The authors and their works are placed in their historical, sociological, and literary perspective, thus introducing students to the Latin American World. Conducted in Spanish.

WLSP.3030 Modern and Contemporary Latin American Literature (Formerly 54.303) - Credits: 3
A continuation of WLSP 53.3020, Survey of Latin American Literature and Culture I. Conducted in Spanish.

WLSP.3040 Special Topics: in Latin American Studies (Formerly 54.304) - Credits: 3
An in-depth study of a specific topic in literature, culture, civilization or cinema from Latin American countries. Class discussions, reading, oral and written work all in Spanish. May be repeated once for credit, if content changes, and with written consent of the Instructor.

WLSP.3050 World Ready Topic Spanish Track - Credits: 3
This course, taught in English, is for non Spanish majors and minors. It is offered for students who are completing their language requirement through the World Ready option, and have chosen the Spanish track. The course covers a topic of the Spanish-speaking world's culture, civilization, cinema or literature. Class discussions, readings, oral and written work all in English. Other materials could be in target language with translations or subtitles. May be repeated once for credit, if content changes, and with written consent of the instructor.

WLSP.3100 Spanish Civilization and Culture (Formerly 54.310) - Credits: 3
Considers Spanish culture and civilization up to the present. Through audiovisual aids, current newspapers and selected readings, the student will explore the Spanish way of being, thinking, and living. Emphasis is placed on the main contributions of Spain to the Western world. Conducted in Spanish only.

WLSP.3110 Contemporary Spanish Culture and Society - Credits: 3
Contemporary Spanish Culture and Society (1975-present) is a 3 credit course specifically designed for the UML summer faculty-led on-site program in Cadiz, Spain, over a period of 3 weeks (Dates TBA in July and August). Throughout our stay, as a group, we will discuss and exchange about the readings posted in advance on Blackboard (all in English) specifically reflecting upon the connections between what you learned, what you experienced personally in Spain and how different/similar this is from what you expected or imagined. Class is taught in English.

WLSP.3130 Fieldwork in the Spanish Community (Formerly 54.313) - Credits: 3
Involves individual assignments under the sponsorship of local service agencies servicing the Spanish-speaking community involving individual family and group contact. Written and oral reports will be in Spanish.

WLSP.3150 Latin American Civilization and Culture (Formerly 54.315) - Credits: 3
Considers significant intellectual, artistic, historical, and sociopolitical aspects of Latin America from the beginning of its history. Through audiovisual aids and selected readings, the
student will explore the Latin American way of being and expressing.

WLSP.3200 Special Topics in Spanish Studies
(Formerly 54.320) - Credits: 3
Focuses on a limited topic of special interest in culture, civilization, or literature. May be taught in English or in Spanish. Course content and approach will vary depending on instructor.

WLSP.3300 Spanish and Latin-American Women Writers (Formerly 54.330) - Credits: 3
Studies women writers of the Spanish speaking world. Emphasis is given to their contribution to the development of Spanish literature and culture as well as their vision of the world and their concerns for the rights of women and humanity. Conducted in Spanish only.

WLSP.3330 Advanced Spanish Grammar (Formerly 54.333) - Credits: 3
A systematic study of complex grammatical structures in Spanish. Conducted in Spanish only.

WLSP.3340 Advanced Spanish composition
(Formerly 54.334) - Credits: 3
The purpose of this course is to help students make their writing more accurate, organized and to develop students' abilities in composition tasks. Specifically, students will learn how to approach the act of writing successfully by focusing on the interaction between writer, reader, purpose, and message. Students will also learn to manage important writing resources such as grammar, vocabulary, rhetorical techniques for organizing information, and strategies for writing through problems, reading critically, revising, and rewriting. Required for Spanish Majors.

WLSP.3470 Advanced Spanish Conversation
(Formerly 54.347) - Credits: 3
The course aims at developing advanced oral proficiency in rapid idiomatic speech. Topics of contemporary significance are selected for discussions. Required for Spanish Majors.

WLSP.3500 Introduction to Literary Analysis
(Formerly 54.350) - Credits: 3
In this course, students examine the various definitions and functions of literary language, and the formal aspects of diverse genre: narrative, poetry and essay. In this course, students also study the concept of literature as aesthetic phenomenon and its socio-cultural implications, through concepts such as author, reader, narrator and discourse. Major authors, themes, and genres from both Latin America and Spain are included, with basic concepts of contemporary literary criticism and theory. Taught in Spanish.

WLSP.3510 Latin American Theater (Formerly 54.351) - Credits: 3
Examines Latin American theatrical works as forms of socially accepted resistance and politically charged art forms. The course will consider plays and performances that challenge governments, inequities, and the status quo. In this course, students will study a variety of Latin American plays, as well as performances an political acts that explore these issues.

WLSP.3520 Hispanic Perspectives (Formerly 54.352) - Credits: 3
In this course we will explore some of the foundational texts of Hispanic literature while discussing the intersections of political, literary, and cultural traditions that connect the United States with Spain and Latin America.

WLSP.3710 Hispanic Literature & Film (Formerly 54.371) - Credits: 3
This course examines the relationship between the Hispanic narrative discourse and cinema, including film adaptations of literary works. Modern social and cultural issues, as well as Hispanic self-images. The selected works provide an array of genres and perspectives that reflect the cultural, historical, and socio-political aspects of each period. Taught in Spanish.

WLSP.3750 Latin American and Spanish Cinema
(Formerly 54.375) - Credits: 3
An exploration of representative Spanish and Latin American films from a variety of major directors. Areas of investigation include the cinematic representation of nationality, ethnicity, identity, gender, history and politics. This course will be taught in English. Knowledge of Spanish is desirable but not required. Spanish majors and minors will complete written assignments, reviews, quizzes, and exams in Spanish.

WLSP.3940 Enhancing your Knowledge of Spanish - Credits: 3
Designed for students who need/wish to enhance and advance their linguistic skills in Spanish. Conducted entirely in Spanish, the course will focus on the vocabulary of contemporary Spanish as well as selected grammatical and syntactical structures through the analysis of authentic audio, visual and
printed texts. Spanish-speaking media (newspapers, radio, podcasts, TV) are readily available on the Web.

WLSP.4010 Spanish Selected Authors (Formerly 54.401) - Credits: 3
Presents an intensive study of the works by a few Spanish and/or Latin American authors.

WLSP.4040 Cervantes (Formerly 54.404) - Credits: 3
In this study of the works of Cervantes participants will complete analysis and readings of either the Don Quijote and/or other works including but not limited to the short stories and the one-act plays.

WLSP.4045 Cervantes’ Don Quijote in translation - Credits: 3
Cervantes’ Don Quijote will examine new ideas and concepts concerning one of the world’s greatest novels. Taught in English, there is no language requirement for this course; however, this course is designed to engage student interest in historically and culturally significant events in Golden Age Spain and to - more importantly - expand student interest in literary criticism of the Spanish Golden Age and of Cervantes’ masterwork in particular. Because it is taught in English, this course does not count toward the Spanish major or minor.

WLSP.4090 20th-221st Century Spanish Literature (Formerly 54.409) - Credits: 3
This course explores the most relevant literary movements of 20th and 21st century Spanish peninsular literature through some of its most renowned authors. We will analyze a selection of literary texts in relation to the literary movements in which they are conceived, such as modernism, avant-garde, tremendism, realism, experimentalism, etc. This course also examines key social and cultural issues related to literature of this period, such as the Spanish Civil War (1936-39) and the emergence of new identities and subjectivities in democratic Spain. This course will help students develop a solid understanding of 20th and 21st century Spanish literary and culture, and its relevance within a larger European and global context.

WLSP.4100 Realism and the Nineteenth Century Spanish Novel (Formerly 54.410) - Credits: 3
Offers a study of fundamental aspects of life, thought, land itself and its sense of history as reflected in the literary masterpieces of Valera, Galdos, Alarcon, Pereda, and others. An analysis of the literary techniques and fiction of the Realism will be included.

WLSP.4160 The Latin American Novel (Formerly 54.416) - Credits: 3
A study of the development of the Latin American novel. Three major works of Latin American short story writers such as Borges, Cortazar, Marquez, Rulfo.

WLSP.4910 Directed Studies in Spanish Literature (Formerly 54.491) - Credits: 3
Individual research projects in Spanish literature. Students, through regular and frequent consultation with their instructor, develop a course of directed study in Spanish literature and define a problem for individual research. The student’s findings are presented in a paper of significant proportions. Permission of Instructor.

WLSP.4920 Directed Study in Latin America (Formerly 54.492) - Credits: 1-4
Individual research projects in Latin American topics. Students, through regular and frequent consultation with their instructor, develop a course of directed study in a specific Latin American topic and define a problem for individual research. The student’s findings are presented in a paper of significant proportions. Permission of Instructor.

WLSP.4930 Directed Studies in Spanish Composition (Formerly 54.493) - Credits: 3
Students, through regular and frequent consultation with their instructor, pursue a special program of composition or creative expression.

WLSP.4940 Independent Study in Spanish (Formerly 54.494) - Credits: 1-6
Students, through regular and frequent consultation with their instructor, develop a course of independent study in Spanish culture and define a problem for individual research. The student’s findings are presented in a paper of significant proportions.

WLSP.4950 Advanced Spanish Tutorial (Formerly 54.495) - Credits: 3
A program of directed study which affords advanced students an additional opportunity to pursue a previously explored problem in greater depth or to initiate an additional problem. The purpose is to sharpen and refine techniques for scholarly research and presentation and for creative expression.
WLSP.4960 Spanish Practicum Experience (Formerly 54.496) - Credits: 1-9

A program of on-campus and/or off-campus experiences for Spanish or Modern Language majors only. Specific requirements vary depending upon faculty policies and the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural, or artistic area and for applying techniques of problem solving and/or skills which are appropriate to the student’s major discipline. May be repeated for a maximum of nine credits. Students are graded satisfactory, or unsatisfactory. The practicum experience may not be substituted for a required course in the major.
ATMO.1020 Weather Forecasting Seminar (Formerly 85.102) - Credits: 1
Introduction to forecasting techniques including use of upper air observations and numerical forecast guidance. This course is intended primarily for students majoring in the various options of environmental science. It does not satisfy specific science requirements for majors in the Division of Science.

ATMO.1200 The Nature of Science (Formerly 85.120) - Credits: 3
In this course students are introduced to the role of critical thinking in the development of scientific theories. Several major areas of science are explored with a focus on the link between conceptual thought and the resulting physical laws. The importance to society of scientists and citizens making informed decisions on science/technology issues are examined. Methods to gather and assess data are discussed and a number of examples of the use of scientific principles to prove fact or fraud are studied. The students will learn how to question propositions put before them.

ATMO.1240 Scientific FORTRAN Programming (Formerly 85.234) - Credits: 3
A basic course in computer programming using FORTRAN 90/95. Topics include programming arithmetic, decisions, repetition, input/output structures, arrays and array processing, and simple algorithms for searching and sorting.

ATMO.1410 Weather and Climate (Formerly 85.141) - Credits: 3
General meteorology course. Topics include atmospheric composition, solar radiation, temperature, moisture and condensation relationship between air pressure and wind, weather patterns, severe weather, optical phenomena in the atmosphere, and the behavior and possible change of climate. Appropriate for KCS major science elective.

ATMO.1430L Weather and Climate Laboratory (Formerly 85.143) - Credits: 1
The laboratory encourages students to apply knowledge from the lectures to a variety of atmospheric and climatic phenomena developed from data analysis, experimentation, and maps. Synthesis and critical thinking are encouraged in the solution of problems.

ATMO.1500 The Physical Science of Climate Change - Credits: 3
Due to the complexity of climate change, there are many important dimensions to the problem, including political, economic, social, and ethical. This course focuses on the physical science dimension of climate change: what are the key scientific principles that are needed to understand the causes and physical impacts of climate change, and to evaluate possible responses and their likely effectiveness. The class is offered for both science and non-science majors.

ATMO.1520L The Physical Science of Climate Change Lab - Credits: 1
This laboratory is designed to accompany the lecture material of The Physical Science of Climate Change (ATMO.1500), which focuses on the key scientific principles that are needed to understand the causes and physical impacts of climate change, and to evaluate possible responses and their likely effectiveness. The course is offered for both science and non-science majors.

ATMO.1990L Atmospheric Sciences 1000 level elective Lab (Formerly 85.199) - Credits: 1
Atmospheric Sciences 1000 level elective Lab.

ATMO.2130L Atmospheric Science Laboratory (Formerly 85.213) - Credits: 1
The plotting and analysis of meteorological data is introduced, with the goal of understanding the basis for various ways of looking at weather systems. After each technique is introduced, students will see the computer counterpart using the workstations in the weather lab. Both the strengths and weaknesses of automated displays are made clear to students, thus making them better able to interpret the computer images on a daily basis.

ATMO.2140L Meteorology Analysis Laboratory (Formerly 85.214) - Credits: 1
The use of the skew-T diagram to understand the vertical structure in the atmosphere is the main focus of this course. Students will learn to plot and analysis atmospheric sounding data, and to recognize various structures in the analyzed data. Both hand and computer-aided analysis will be compared.

ATMO.2340 Scientific FORTRAN Programming (Formerly 85.234) - Credits: 3
A basic course in computer programming using FORTRAN 90/95. Topics include programming arithmetic, decisions, repetition, input/output structures, arrays and array processing, and simple algorithms for searching and sorting.
ATMO.2910 Practicum in Meteorology (Formerly 85.291) - Credits: 1-3
ATMO.3010 Atmospheric Thermodynamics (Formerly 85.301) - Credits: 3


ATMO.3040 Methods in Meteorology (Formerly 85.304) - Credits: 3

The application of vector analysis to dynamic meteorology. Three-dimensional divergence and vorticity, circulation, and solenoids. Selected ordinary and partial differential equations of fluid mechanics and their solutions. Spectral decomposition of hemispheric wave motion.

ATMO.3050 Methods in Meteorology II (Formerly 85.305) - Credits: 3

Fundamentals of numerical weather prediction. Data analysis methods in meteorology using the techniques of curve fitting, correlation, and power spectrum analysis. Solution of stability problems.

ATMO.3080 Synoptic Meteorology (Formerly 85.308) - Credits: 3

Explores techniques of synoptic analysis including graphical subtraction, thickness analysis, isentropic analysis, streamlines and trajectories, divergence and vorticity. The use of a computer to perform these computations is explored through student projects.

ATMO.3090 Forecasting and Synoptic Techniques II (Formerly 85.309) - Credits: 3

Explores three-dimensional structure and dynamics of mid-latitude storm systems; capabilities and limitations of the barotropic model; quasi-geostrophic model; and operational primitive equation models. Some mesoscale phenomena are covered as time permits including coastal cyclogenesis, thermal lows, and sea-breeze circulations.

ATMO.3130 Physical Climatology (Formerly 85.313) - Credits: 3

Atmospheric processes determining the climate: solar and terrestrial radiation, elevation and thermal properties of surfaces, atmospheric circulations and eddy conduction between the atmosphere and land or sea surfaces, heat and water balance of earth's surface and the atmosphere; hydrologic cycle; and climatic simulation models.

ATMO.3400 Tropical Meteorology (Formerly 85.340) - Credits: 3

An introduction to the tropical atmosphere including tropical climatology, structure and dynamics of easterly waves, tropical cyclones and monsoonal circulations.

ATMO.3500 Satellite and Radar Meteorology (Formerly 85.350) - Credits: 3

Explores theory and applications of radar, satellites, and lidar. Use of satellite imagery as a forecasting aide, theory and use of satellite profiling, and application of conventional and Doppler radar to severe weather and short term forecasting. Use of lidar and other profiling techniques to determine vertical temperature structure and turbulence.

ATMO.4030 Physical Meteorology (Formerly 85.403) - Credits: 3

Explores solar and terrestrial radiation processes and the heat balance of the atmosphere; fundamentals of radiation theory; radiative transfer processes in the atmosphere; atmospheric condensation processes; and nucleation theory and the growth of water drops and ice crystals by condensation, sublimation and accretion.

ATMO.4080 The Climate System (Formerly 85.408) - Credits: 3

The course covers the main elements of the climate system—the atmosphere, ocean, biosphere, solid earth, and cryosphere—and the primary source of energy, the sun. The elements are examined in terms of observed structure and important physical processes, the ways in which they interact, and how they can be modeled. The global energy budget is discussed and both natural and human-caused climate change are considered.

ATMO.4100 Advanced Forecasting (Formerly 85.410) - Credits: 3

Advanced analysis techniques and their use as forecasting tools are explored in both manual and computer formats. Techniques include moisture advection, moist isentropic trajectories, boundary layer destabilization, and other state-of-the-art techniques. Application of techniques to small and mesoscale phenomena.
ATMO.4120 Synoptic Weather Patterns (Formerly 85.412) - Credits: 3
This course is focused on applying meteorological theory to real weather patterns, with an emphasis on how the theory helps to understand the broad forcing mechanisms for each pattern as well as gaining an appreciation for the individual characteristics of each example. Topics will include nor'easters, back-door cold fronts, Alberta clippers, upper-air blocking, snow squalls, and stationary fronts. Analysis techniques will use digital display software as well as manual analysis of plotted weather data. In addition to individual homework, some case studies will be examined in small groups.

ATMO.4150 Atmospheric Dynamics (Formerly 85.415) - Credits: 3

ATMO.4160 Advanced Atmospheric Dynamics (Formerly 85.416) - Credits: 3

ATMO.4200 Introduction to Operational Numerical Weather Prediction (Formerly 85.420) - Credits: 3
In this class, the student will learn the structure and science behind modern numerical weather prediction models and how to use them to solve real-world issues facing modern meteorological consultants. The student will learn how to operate and apply a modern numerical weather prediction model to study such issues as offshore wind farm siting, solar power prediction, and energy load forecasting. Students should be prepared to use Linux-based PC's (supplied) to perform and submit projects.

ATMO.4500 Satellite and Radar Meteorology (Formerly 85.450) - Credits: 3
This course explores the theory behind the operation of radar, satellites, and lidar. It demonstrates the use of satellite imagery as a forecasting aid, and the application of conventional and Doppler radar to severe weather and short term forecasting. Additional topics include the techniques used to determine vertical profiles of temperature, moisture and turbulence using lidar and satellite data.

ATMO.4710 Air Pollution (Formerly 85.471) - Credits: 3
ATMO.4840 Space Weather (Formerly 85.484) - Credits: 3
Space Weather is an emerging field of space science focusing on understanding the conditions and processes on the sun, in the interplanetary space, and in the Earth's magnetosphere, ionosphere and thermosphere that can influence the performance and reliability of space-borne and ground-based technological systems and can endanger human life or health. This course is an introduction level course. It applies knowledge learned in Physics I and II in particular in electromagnetics to a real situation: space. The course introduces the present knowledge of space phenomena and the physical understanding of the plasma environment from the sun to the earth's ionosphere and in the heliosphere. Regions in space to be discussed include solar surface, solar wind, bow shock, magnetosheath, magnetosphere, magnetotail, radiation belts, ring currents, and ionosphere. Among space plasma physics theories, single particle theory, kinetic theory, and magnetohydrodynamics, which describe charged particle motion in electromagnetic fields and its consequences, are introduced and applied to space environment.

ATMO.4870 Cloud Physics (Formerly 85.487) - Credits: 3
The course considers the physical processes involved in the formation of clouds and precipitation, and the properties of clouds. Topics include the thermodynamics of dry and moist air, with emphasis on moist air saturation; atmospheric dynamics leading to instabilities, convection, and air mixing; the formation and growth of air droplets, ice crystals, clouds, and the initiation of precipitation.

ATMO.4910 Directed Study (Formerly 85.491) - Credits: 1-3
Students, through regular and frequent consultation with the instructor, undertake independent study of a particular area of meteorology.

ATMO.4930 Internship: Atmospheric Science (Formerly 85.493) - Credits: 1-3
Work experience with private or public employer. Written report and supervisor evaluation required.
ATMO.4950 Honors Research: Atmospheric Science (Formerly 85.495) - Credits: 3
An individual or team research project carried out by qualified students with the approval of and supervision by a faculty member.

ATMO.4960 Practicum Experience in Meteorology (Formerly 85.496) - Credits: 1-3
A program of on-campus and/or off-campus experiences developed by the student in consultation with a faculty member and, when appropriate, a member of the staff of an off-campus firm. May be repeated up to a maximum of six credits. The practicum may not be substituted for a nonelective course in the major.

ATMO.4970 Research: Atmospheric Science - Credits: 3
An independent scientific research project carried out by a qualified senior under the supervision of a faculty member.

BIOL.1110 Principles of Biology I (Formerly 81.111) - Credits: 3
Introduces topics such as the chemical and physical basis of life, its evolution, diversity, distribution, and interrelationships of life forms. The central theme of genetic replication, translation, expression, and selection will be emphasized as a unifying principle which determines and integrates structure and function at the cellular, individual population, and community levels of organization. Designed for those students who intend to pursue career options in the biological sciences, biotechnology or related areas such as medicine, biomedical research, radiological sciences or environmental sciences. It is the first-semester course of a two-semester sequence.

BIOL.1110L Principles of Biology I Laboratory (Formerly 81.117) - Credits: 1
A laboratory course covering introduction to scientific inquiry in the biological sciences for majors in biology and related fields. Techniques that are important in biology (ex: microscopy, spectrophotometry and pipetting) are taught and these techniques are applied to the investigation of biological principles emphasizing basic cell and molecular biology, metabolism and fundamental processes of life.

BIOL.1120 Principles of Biology II (Formerly 81.112) - Credits: 3
Serves as a continuation of the 81.111/81.112 sequence for those students who intend to pursue career options in the biological sciences or related professional areas such as medicine, biomedical research or environmental sciences. Molecular energy exchange in organisms (photosynthesis and respiratory metabolism), the common functional needs of support, locomotion, nutrition, internal communication and the maintenance of homeostasis are considered. Control and regulation of organisms at levels beyond the individual are considered through discussions of population and community ecology.

BIOL.1120L Principles of Biology II Laboratory (Formerly 81.118) - Credits: 1
A laboratory course covering introduction to scientific inquiry in the biological sciences for majors in biology and related fields. Techniques that are important in biology (ex: microscopy, dissection) are taught and these techniques are applied to the investigation of basic biological principles emphasizing plant and animal diversity and organ systems.

BIOL.1160 Freshman Seminar in Biology (Formerly 81.116) - Credits: 1
This course is designed to acclimate incoming students to their new University environment. Students will learn about the Biology program, its faculty and staff members, University resources, and other information useful for success.

BIOL.1170L Principles of Biology I Laboratory (Formerly 81.117) - Credits: 1
A laboratory course covering introduction to scientific inquiry in the biological sciences for majors in biology and related fields. Techniques that are important in biology (ex: microscopy, spectrophotometry and pipetting) are taught and these techniques are applied to the investigation of biological principles emphasizing basic cell and molecular biology, metabolism and fundamental processes of life.

BIOL.1180L Principles of Biology II Laboratory (Formerly 81.118) - Credits: 1
A laboratory course covering introduction to scientific inquiry in the biological sciences for majors in biology and related fields. Techniques that are important in biology (ex: microscopy, dissection) are taught and these techniques are applied to the investigation of basic biological principles emphasizing plant and animal diversity and organ systems.

BIOL.1220 Biology for Scientists (Formerly 81.122) - Credits: 3
Develops a basic understanding of biological topics relevant to students in the health sciences. Course will introduce students to biochemistry, cell biology, cellular respiration, cell replication, genetics, inheritance and molecular biology. Introduction to prions, viruses, prokaryotic and eukaryotic biology will also be covered.

BIOL.1240L Biology for Scientists Lab (Formerly 81.124) - Credits: 1
Develops a basic understanding of biological topics relevant to students in the health sciences. Course will introduce students to biochemistry, cell biology, cellular respiration, cell replication, genetics, inheritance and molecular biology. Introduction to prions, viruses, prokaryotic and eukaryotic biology will also be covered.

BIOL.2010 General Microbiology (Formerly 81.201) - Credits: 3
A study of the general properties of bacteria and viruses
(anatomy, physiology, genetics, metabolism, cultivation, and growth); discussions include major microbial infections in man (etiologic agent, antibiotics and chemotherapy) and an examination of the role of the microbes in the environment.

**BIOL.2030L General Microbiology Laboratory**  
(Formerly 81.203) - Credits: 2

A series of laboratory exercises covering basic qualitative and quantitative techniques commonly employed in a microbiology laboratory.

**BIOL.2055 Introduction to Bioinformatics**  
(Formerly BIOL.3050) - Credits: 3

An introduction to the field of bioinformatics with some hands-on exploration of applications. Specific areas include scientific archives and information retrieval, genome organization and evolution, phylogenetic analysis, comparative genomics, transcriptomics, proteomics, structural bioinformatics, and systems biology. In addition to covering the biological principles underpinning the bioinformatic approaches to study the biology and evolution of genomes and systems, this course also imparts basic computational skills in data retrieval from databases in molecular, functional, and structural biology.

**BIOL.2100 Biology for Engineers**  
(Formerly 81.210) - Credits: 3

Develops a basic understanding of the science of biology for engineering students, including and introduction to biochemistry, cell biology, metabolism, genetics, genomics, molecular biology, cell growth, and nutrition. Both eukaryotic and prokaryotic biology will be covered.

**BIOL.2120L Biology for Engineers Laboratory**  
(Formerly 81.212) - Credits: 1

This laboratory course will build on BIOL.2100. It will provide an introduction to several basic biological techniques and approaches used in biological engineering laboratories.

**BIOL.2200 Principles of Cellular Biology**  
(Formerly 81.220) - Credits: 3

This course will cover basic topics in cell and molecular biology, including structures of proteins, lipids, carbohydrates and nucleic acids, structure of DNA and it replication and repair, transcription, and cell-cell communication. The molecular biology of cells and the regulation of cellular processes will be emphasized.

**BIOL.2330L Experimental Methods in Biology**  
(Formerly 81.233) - Credits: 2

This is a project-based course designed to introduce students to the methods of general biological laboratory research. Techniques will be introduced in the context of interrelated experiments during a semester-long project. Techniques will include, but are not limited to: making solutions, pipetting, using sterile technique, gel electrophoresis, DNA transformations, minipreps, and other molecular and microscopic methods.

**BIOL.2350 Genetics**  
(Formerly 81.235) - Credits: 4

The theories of both classical and molecular genetics are explored with emphasis on the experimental evidence which has laid the foundation for contemporary understanding of genetics, included is the nature of the genetic material, gene action, genetic recombination, gene regulation, gene interaction, the production and inheritance of genetic phenotypes, chromosomal mechanics, and the behavior of genes in populations.

**BIOL.2400 Evolution, Ecology and Conservation**  
(Formerly 81.240) - Credits: 3

Over 5 million species thrive in amazingly diverse habitats on Earth ranging from the extreme freezing cold of the poles to the lush warmth of the tropics. How did this fantastic diversity arise on our earth? How are these species intimately interconnected with one another, their communities and their ecosystem? How can we save this remarkable biodiversity from extinction? This course will address these key questions by examining the fundamental concepts of evolution, ecology and conservation biology. Students will be expected to attend a discussion section in which they will examine case studies and primary scientific literature.

**BIOL.2520 Physiology**  
(Formerly 81.252) - Credits: 3

Presents a comprehensive study of the fundamental mechanisms governing mammalian physiology. The role of cell physiology in determining systemic functions and coordinating biological control systems will be emphasized. Maintenance of homeostasis will be discussed in terms of biochemical, cytological, anatomical, and physical principles.

**BIOL.3000L Directed Research Experience II**  
(Formerly 81.300) - Credits: 2

**BIOL.3010 Microbiology**  
(Formerly 81.301) - Credits: 3

General properties of bacteria and viruses including anatomy, physiology, genetics, metabolism, cultivation, growth, control and their role in the ecosystems, and industry.
BIOL.3030L Microbiology Laboratory (Formerly 81.303) - Credits: 2
A series of laboratory exercises covering basic qualitative and quantitative techniques commonly employed in a microbiology laboratory including sterile technique, microscopy, enrichment and isolation, and prevention.

BIOL.3050 Introduction to Bioinformatics - Credits: 3
An introduction to the field of bioinformatics with some hands-on exploration of applications. Specific areas include scientific archives and information retrieval, genome organization, comparative genomics, transcriptomics, proteomics, structural bioinformatics, and systems biology. This course also imparts basic computational skills in data retrieval from the databases in molecular and structural biology.

BIOL.3060 Invertebrate Zoology (Formerly 81.306) - Credits: 3
A survey of the phyla of invertebrate animals. Discussions include their physiology, development, morphology, behavior, ecology and adaptations. Corequisite: 81.308

BIOL.3080L Invertebrate Zoology Lab (Formerly 81.308) - Credits: 1
Emphasizes material covered in 81.320 using field and laboratory exercises.

BIOL.3150 Principles of Ecology (Formerly 81.315) - Credits: 3
A series of lectures concerned with the interrelationships of organisms with their abiotic environment with emphasis on the New England area. Selected current topics will supplement the text.

BIOL.3170L Principles of Ecology Laboratory (Formerly 81.317) - Credits: 2
A series of laboratory exercises to supplement and illustrate lectures of 81.315. Field trips are an integral part of the course involving sampling and analysis of such ecosystem components as water, soil, invertebrate fauna and characteristic flora of various habitats. Directed readings, quizzes, practical exam and oral presentation of a research topic are integral parts of the course.

BIOL.3200 Botany (Formerly 81.320) - Credits: 3
Serves as an introduction to the study of the plant kingdom dealing with the structure, function, and diversity of plants with an emphasis on seed plants. The physiology, morphology, and taxonomy of plants is emphasized.

BIOL.3220L Botany Laboratory (Formerly 81.322) - Credits: 1
Emphasizes material covered in 81.320 using field and laboratory exercises.

BIOL.3240 Economic Botany (Formerly 81.324) - Credits: 3
Discussions on how humans use plants. Topics will include: Structure and characteristics of woods and their uses in construction of various items, agricultural uses of food plants and spices, poisonous plants, medicinal plants, plants used in religious ritual and plants used as hallucinogens, plants that have altered human history.

BIOL.3420 Comp Vertebrate Anatomy (Formerly 81.342) - Credits: 3
This course is designed to provide students a broad understanding of the anatomy of vertebrates with an emphasis on comparison between taxa and their evolutionary significance. Students will acquire knowledge and understanding of anatomical structure and terminology of vertebrates and an understanding of how these structures have evolved from ancestral forms. There will also be some reference to the fields of embryology, histology and paleontology in the course. This course may interest students who might want to go into various animal/human focused fields (e.g. veterinary science, medicine or graduate studies with more organismal focus), and students who simply want a course focused on vertebrates. However, students should note that this course does not focus on human nor veterinary anatomy. This course could also help undergraduates in the General Biology and Ecology Option satisfy free elective requirements.

BIOL.3440L Comp Vertebrate Anatomy Laboratory (Formerly 81.344) - Credits: 2

BIOL.3620 Development and Evolution - Credits: 3
This course will introduce the concepts and methods of the field of evolutionary developmental biology. We will cover gene regulation and evolution. Through primary literature, discussion and presentation, we will explore how genetic changes to developmental processes contribute to evolutionary change.

BIOL.4010L Supervised Teaching Biology I (Formerly
Through observation, preparation of material and presentation of demonstrations in selected courses offered by the Department of Biological Sciences, the student becomes familiar with the materials and teaching/learning situations in biology.

BIOL.4020L Supervised Teaching Biology II (Formerly 81.402) - Credits: 1

Through observation, preparation of material and presentation of demonstrations in selected courses offered by the Department of Biological Sciences, the student becomes familiar with the materials and teaching/learning situations in biology.

BIOL.4050L Bioinformatics - Credits: 4

There is a growing need for bioinformaticians in research and industry as datasets are getting bigger and complex, making computational methods necessary for analysis. This hands-on course introduces principles, databases, software, and programming for the analysis and interpretation of molecular datasets. Emphasis is on practical assignments using computational approaches from a biologist's perspective. Topics include genome assembly, variant detection, comparative genomics and transcriptomics, metagenomics, as well as data retrieval from databases and basic programming using Bash and R. A term project and computer-based exercises are designed to showcase the capabilities and limitations of bioinformatics tools used in genome research, as well as to develop skills in coding literacy.

BIOL.4090 Photobiology (Formerly 81.409) - Credits: 3

Biological process involving light in plants and animals. Topics include mechanisms of light absorption, energy transduction, light reactions in photosynthesis, functions of color in flowering plants, visual systems and structural and pigment coloration in animals, pigmentation in animals affecting camouflage and reproductive strategies. In addition, the genetics involved in responses to light such as photoperiods, circadian rhythms, and seasonal cycles will be covered.

BIOL.4110L Senior Research Biology (Formerly 81.411) - Credits: 4

An individual, directed one-year research program for senior biology majors selected on the basis of previous academic performance at the end of the junior year. A topic will be chosen after consultation with a faculty member. A report of the research in the form of a thesis is required.

BIOL.4120L Senior Research: Biology (Formerly 81.412) - Credits: 4

An individual, directed one-year research program for senior biology majors selected on the basis of previous academic performance at the end of the junior year. A topic will be chosen after consultation with a faculty member. A report of the research in the form of a thesis is required.

BIOL.4190 Biochemistry (Formerly 81.419) - Credits: 3

Studies the structure and properties of proteins, carbohydrates, and lipids which combined with a discussion of elementary enzymology allows for detailed descriptions of several important degradative and biosynthetic pathways, their integration and regulation. Throughout the course, emphasis is on methods and practical application of fundamental information to the solution of problems of current biomedical interest.

BIOL.4200 Biochemistry II (Formerly 81.420) - Credits: 3

This course will focus on protein dynamics where students will gain facility with thermodynamics of protein folding/misfolding, catalysis, kinetics and binding equilibria as they apply to proteins and other molecules in biological systems. The central theme of this course is that living systems can be understood in terms of the fundamental principles defining the structure and energetics of biological molecules. Attention will be given to quantitative aspects of enzyme kinetics and molecular binding. Examples of how these principles apply to the understanding and treatment of human disease will be discussed.

BIOL.4210L Biochemistry Techniques (Formerly 81.421) - Credits: 2

A series of discussions and "hands on" laboratory exercises emphasizing techniques and use of equipment most commonly employed in biochemical-biomedical research laboratories. Techniques to be mastered include: cell culture, cell fractionation, enzyme purification, ultracentrifugation, UV-visible spectrophotometry, spectrofluorometry, various types of chromatography (thin layer, gas, gel exclusion, ion exchange), electrophoresis, liquid scintillation spectrometry, and the safe handling and application of radioisotopes to problems in biochemistry. Wherever possible, the principles presented in 81.419 will be used as a basis for experimentation using the above techniques. Meets Core Curriculum Essential Learning Outcome for Written & Oral Communication (WOC).

BIOL.4230 Biology of Global Change (Formerly 81.423) - Credits: 3

This course will focus on protein dynamics where students will gain facility with thermodynamics of protein folding/misfolding, catalysis, kinetics and binding equilibria as they apply to proteins and other molecules in biological systems. The central theme of this course is that living systems can be understood in terms of the fundamental principles defining the structure and energetics of biological molecules. Attention will be given to quantitative aspects of enzyme kinetics and molecular binding. Examples of how these principles apply to the understanding and treatment of human disease will be discussed.
An examination of the role of life processes in controlling the cycling of elements on the surface of the Earth and atmosphere from the molecular to the global level. Students will learn how the different physical components of Earth interact, how these interactions are influenced by life, and how they affect Earth’s habitability now and in the future.

BIOL.4260 Evolutionary Biology (Formerly 81.426) - Credits: 3
Examines the patterns and processes of biological evolution that have led to the diversity of life. Topics covered include the history of evolutionary thought, the evidence for evolution, the generation and maintenance of population-level variation, natural selection, adaptation, sexual selection, speciation, phylogenetics, molecular evolution, the fossil record and extinctions. In addition to lecture and textbook material, students will read and discuss classic and contemporary primary literature from evolutionary biology.

BIOL.4280 Molecular Biotechnology: Recombinant Protein Production (Formerly 81.428) - Credits: 3
Proteins are major targets of pharmaceuticals, and are themselves increasingly used as therapeutics. However both basic research and the pharmaceutical industry depends on availability of purified proteins that are often difficult to isolate from native sources. In this lecture course, students will learn basic and advanced theoretical background in expression and purification of recombinant proteins. It will cover a variety of expression systems including prokaryotic and eukaryotic cells. The course will also address traditional and new methods in recombinant protein purification. Furthermore, students will be introduced to some downstream applications such as crystallization screens and biochemical/biophysical studies.

BIOL.4290 Recombinant Protein Production Techniques (Formerly 81.429 & 81.529) - Credits: 4
This course introduces students to the principles and practice of recombinant protein expression and purification. Proteins are major targets of pharmaceuticals, and are themselves increasingly used as therapeutics. However both basic research and pharmaceutical industry depends on availability of purified proteins that are often difficult to isolate from native sources. This course will provide both didactic and laboratory instruction. It is comprised of a series of lecture and laboratory exercises, with an emphasis on practical techniques and hands-on experience of recombinant protein purification. The course will cover a variety of expression systems, including prokaryotic and eukaryotic cells, and address traditional and new methods in protein purification.

BIOL.4320 Genomics (Formerly 81.432) - Credits: 3
This course surveys the field of genomics, examining current technologies and their biological applications. Lectures cover genome organization, genome sequencing and annotation, functional genomics, evolutionary genomics, transcriptomics, proteomics and the role of bioinformatics in organizing and interpreting genomic data.

BIOL.4340L Genomics Laboratory (Formerly 81.434) - Credits: 1
A series of molecular laboratory and computer-based bioinformatics exercises providing practical experience in the collection and analysis of genomic-level data.

BIOL.4370 Biology and Evolution of Arthropoda (Formerly 81.437) - Credits: 3
A detailed examination of phylum Arthropoda from developmental, ecological, genetic, morphological and paleontological perspectives. Specific topics include the relationships of arthropods to protoarthropod-like groups including tardigrades and onychophorans, the evolution of segmentation, and current perspectives on relationships within the phylum.

BIOL.4390L Biology and Evolution of Arthropoda Laboratory (Formerly 81.439) - Credits: 1
An exploration of protoarthropod and arthropod diversity using live and preserved specimens of the major taxa including Tardigrada, Onychophora, Chelicerata, Crustacea, Myriapoda and Hexapoda. Students will learn to collect, dissect, identify, handle and care for live specimens.

BIOL.4420 Advanced Cell Biology (Formerly 81.442) - Credits: 3
This is an advanced course in cell biology. In this course we will examine different areas of eukaryotic cell biology including: membrane structure and function, cell adhesion, intercellular communication, signal transduction, chemotaxis, receptor-mediated endocytosis and intracellular trafficking. Mechanisms underlying relevant human diseases will also be discussed. Upon completion of the course the student will have a strong understanding of cell biology, develop critical thinking processes, proficiency in scientific reading and how to communicate material succinctly.

BIOL.4480 Form Feeds Function in Vertebrate Evolution - Credits: 4
This course will provide you with a solid comparative knowledge of how vertebrates including humans have evolved, focusing on how anatomy (form) feeds function (physiology,
biomechanics) in movement biology (Cardiorespiratory, sensing, locomotion, feeding). It is only by understanding our evolutionary history that you understand e.g. how vertebrates became Olympian movers, how humans became bipedal, why we use parts of the ancestral jaw to hear, and how we avoid choking when we swallow. Such knowledge is key for medical and veterinary school, but will also support you in biomedical and biotechnology fields as well as in various general science disciplines. This course emphasizes modes of thought, including the differences between evidence and inference, and between correlation and causality.

BIOL.4490L Biology of Muscle - Credits: 4

This course takes integrative approaches to exploring architecture, physiology and mechanics of vertebrate skeletal muscle as the main driver of movements in organisms including humans. Combining presentations and discussions of important publications with simple experiments and report-writing, the course hones a specialist-level understanding of how the organ structure is constructed, how cell-level phenomena govern contraction, how the nervous system controls muscle function, how muscle contractions are constrained by physics, and how muscle as an organ structure is able to mitigate those constraints. We will also build and use actuators inspired by muscle function.

BIOL.4510 Senior Seminar in Biology (Formerly 81.451) - Credits: 2

This course instructs students in developing effective writing and speaking skills required for preparation of scientific manuscripts and presentations, and communicating in the scientific world. Students will be required to prepare and present oral presentations and to submit written reports.

BIOL.4570 Metazoan Parasitology (Formerly 81.457) - Credits: 3

An introduction to the diversity of metazoans (animals) that parasitize humans, livestock, other animals (both vertebrate and invertebrate), and plants. Lectures emphasize the morphology, form and function, physiology, systematics, evolution, life cycles and pathogenesis of several major parasitic groups. Formerly: Advanced Invertebrate Zoology.

BIOL.4590L Metazoan Parasitology Laboratory (Formerly 81.459) - Credits: 1

The purpose of the laboratory is to provide students an opportunity to identify and work with a variety of parasites that we discuss in lecture. We will work with preserved specimens, slide material, necropsies, and live specimens. Students will learn how to identify parasites and understand how they affect host biology.

BIOL.4600 Stem Cell Biology (Formerly 81.460) - Credits: 3

The molecular and genetic characteristics of stem cells and their developmental potential will be explored. Lectures and readings will cover the development of embryonic, fetal and adult stem cells, and will examine their use in treating human disorders receiving widespread attention, including neurodegenerative diseases, heart disease, spinal cord injury and leukemia. The ethical, legal and social implications of stem cell research will also be discussed. Additional library investigation and a term paper or seminar will be required.

BIOL.4620 Cardiovascular Physiology (Formerly 81.462) - Credits: 3

This course will focus on human cardiovascular physiology in normal and diseased states. The objective of Cardiovascular Physiology is to reinforce the concept that the cardiovascular system can be understood in terms fundamental biophysical and cellular physiological principles. Quantitative aspects will be reinforces with problem sets in the accompanying lab course 81.463. Key concepts in the course will be placed in a medical context showing the underlying physiological concepts that lead to disease states such as; altered blood pressure, heart failure, valvular disease and arrhythmias.

BIOL.4630L Cardiovascular Physiology Lab (Formerly 81.463) - Credits: 1

Cardiovascular Physiology Lab is designed to supplement Cardiovascular Physiology 81.462. The objective of the course is to teach cardiovascular system function using problems sets as well as clinical and pathophysiological examples.

BIOL.4670 Molecular Biology (Formerly 81.467) - Credits: 3

A study of the principles and specialized techniques of cloning, purifying, and manipulating recombinant DNA molecules.

BIOL.4690L Molecular Techniques (Formerly 81.469) - Credits: 4

Laboratory experiments and independent projects designed to illustrate current techniques and instrumentation used in genetic engineering. Included are restriction mapping, cloning, plasmid purification, blot hybridization, PCR, and DNA sequencing. Students are introduced to computer software utilized for DNA sequence analysis and manipulation.

BIOL.4720 Virology (Formerly 81.472) - Credits: 3
A study of bacterial, animal, and plant viruses, including viral structure, modes of replication, biochemistry of the infected cell, genetic properties, and viral oncogenesis. Emphasis is on virus cell interaction at the molecular level.

BIOL.4760 Cell Culture (Formerly 81.476) - Credits: 4

A series of lecture and laboratory exercises that will focus on the in vitro culture and analysis of multiple cell type commonly used in biomedical research laboratories. The lecture component will review methodologies used to establish immortalized cell lines, medium component for specific cell types, and techniques for genetically manipulating and analyzing cell lines. The laboratory exercises will emphasize the mastery of sterile techniques used to grow both established cell line and primary cultures, and molecular tools used for introducing recombinant genes and for analyzing cell growth and differentiation.

BIOL.4800 Developmental Biology - Credits: 3

This course covers the current understanding of the genetic, molecular, and cellular mechanisms that regulate animal development. Variation in developmental processes, including those involved in evolutionary change as well as disease, are discussed. Specific topics include: fertilization, determination of cell fate and differentiation, establishment of body plans, cell migration, organogenesis, morphogenesis, stem cells, and regeneration.

BIOL.4810L Developmental Biology Lab - Credits: 1

This course provides hands on experience in current methods and model systems used to investigate questions in developmental biology. Students will be exposed to a wide variety of embryonic systems, including intensively studied genetic model systems (e.g., C. elegans, zebrafish, mouse) and others with well-established experimental attributes (e.g., Chick, sea urchin). Analytical and experimental techniques used to explore invertebrate and vertebrate development include embryological manipulation, molecular and cell biology approaches. Conceptual topics include cell specification and differentiation, pattern formation, morphogenesis, and comparative embryology. This lab supplements the Developmental Biology lecture (BIOL.4800).

BIOL.4820 Cancer Biology (Formerly 81.482) - Credits: 3

A study of the genes and proteins implicated in the cause of human cancer and discussion of the complex behaviors of cancer cells that differ from their normal counterparts in human tissue. Lectures and original research papers will be used.

BIOL.4840 Comparative Vertebrate Embryology - Credits: 3

A comparative study of vertebrate embryological development focusing on the morphological development (e.g., Differentiation of tissues, organs, and systems) of vertebrates. Evolutionary relationships of the classes of vertebrates will be investigated through their anatomy. This course builds on concepts taught in Developmental Biology, providing more detailed analysis of tissue development in a comparative context.

BIOL.4880 Structural Biology (Formerly 81.488) - Credits: 3

Structural basis of the molecular biology of cells and the regulation of cellular processes will be discussed. This course will cover the fundamental knowledge about protein, nucleic acid and membrane structure in relation to central systems in biology. Topics to be discussed include structural enzymology, macromolecular assemblies for replication transcription, translation, membrane proteins, signal transduction, cell motility and transport, cell-cell interactions, the immune system, and virus structure.

BIOL.5290 Recombinant Protein Production Techniques (Formerly 81.429 & 81.529) - Credits: 4

This course introduces students to the principles and practice of recombinant protein expression and purification's. Proteins are major targets of pharmaceuticals, and are themselves increasingly used as therapeutics. However both basic research and pharmaceutical industry depends on availability of purified proteins that are often difficult to isolate from native sources. This course will provide both didactic and laboratory instruction. It is comprised of a series of lecture and laboratory exercises, with an emphasis on practical techniques and hands-on experience of recombinant protein purification. The course will cover a variety of expression systems, including prokaryotic and eukaryotic cells, and address traditional and new methods in protein purification.

CHEM.1010 Applied Chemistry for Non-Scientists (Formerly 84.101) - Credits: 3

Provides an understanding of basic chemical principles -- atomic structure, bonding and interparticle forces, physical and chemical properties of matter through hands-on examination of matter and the application of principles to understanding the chemistry of current issues (e.g., environmental chemistry, biochemistry, food and drug chemistry) and the analysis of problems dealing with these issues. This course is not available for credit for Science or Engineering majors.

CHEM.1020 Forensic Science for the Non-Scientist
(Formerly 84.102) - Credits: 3

This course presents the inherently fascinating topics of crime and criminal investigations as a pathway for teaching the fundamental chemical concepts most often covered in an introductory non-majors course. This course capitalizes on the surge of interest in the scientific investigation of crime (as sparked by CSI and other television shows) and will collate the theme of forensic science with the fundamentals of chemistry. The course material will be continually updated with each offering.

CHEM.1040 Consumer Science 4-1-1: An Essential Guide - Credits: 3

This course introduces chemical principles through the context of examining current and topical consumer items such as drugs, food, dietary supplements and personal care products. Information presented will enhance awareness and confidence in understanding the products, scientific reports, news articles and making decisions about the utilization of available products. Chemistry 1040 is a combined lecture and lab demonstration course for non-science majors designed to fulfill the science with lab perspective (SCL) breadth of knowledge degree requirement.

CHEM.1050 Intro to the Discipline of Chemistry (Formerly 84.105) - Credits: 1

This course provides an introduction to chemistry as a career. Required of chemistry majors, it discusses historical aspects of the field and modern career paths, including academic and industrial chemistry. Students are presented with information regarding career opportunities in chemistry, including: analytical/environmental, forensics, inorganic, organic, materials, pharmaceutical/biochemistry, polymer, and theoretical/physical. They are also given an introduction to graduate school and teaching opportunities often pursued following the B.S. degree. In addition to lectures by the instructor, guests from industry and government laboratories are invited to discuss "what it means to be a chemist".

CHEM.1110 General Chemistry I (Formerly 84.111) - Credits: 3

Provides a one-semester survey of inorganic chemistry: the structure and properties of matter, chemical reactions, stoichiometry, gas laws, solution chemistry, kinetics, equilibrium, and acid-base chemistry.

CHEM.1120 General Chemistry II (Formerly 84.112) - Credits: 3

Surveys the basic principles of organic chemistry and biochemistry with emphasis on biochemical aspects of carbohydrates, lipids, proteins and nucleic acids. Various metabolic pathways are also emphasized.

CHEM.1130L General Chemistry Laboratory I (Formerly 84.113) - Credits: 1

Lab experiments designed to illustrate the principles covered in 84.111.

CHEM.1140L General Chemistry Laboratory II (Formerly 84.114) - Credits: 1

Uses laboratory experiments designed to illustrate the principles discussed in 84.112.

CHEM.1150 Principles of Chemistry (Formerly 84.115) - Credits: 3

The course provides an introduction to the basic concepts of Chemistry with an emphasis on critical thinking, problem-solving, and computational skills required for more advanced Chemistry courses. Topics include measurement, chemical calculations, problem solving logic, units analysis, chemical reactions, the periodic table, basic bonding theory and solutions. No previous Chemistry experience is assumed. There is no lab component to this course.

CHEM.1210 Chemistry I (Formerly 84.121) - Credits: 3

Provides an introduction to the basic concepts of chemistry through classroom discussions and demonstrations. Topics include chemical calculations, atomic structures, the periodic table, basic bonding theory, solutions, liquids, and gases. Restricted to science, engineering, and engineering technology majors.

CHEM.1220 Chemistry II (Formerly 84.122) - Credits: 3

Serves as a continuation of CHEM.1210. Topics include thermodynamics; kinetics, acids and bases; an introduction to organic chemistry; chemical equilibrium; precipitation reactions; and electrochemistry. Restricted to science, engineering, and engineering technology majors.

CHEM.1230L Chemistry I Laboratory (Formerly 84.123) - Credits: 1

Studies experimental chemical principles and chemical transformation that is coordinated with topics considered in 84.121. Some of the more important reactions of elements, oxides, acids, bases, and salts are examined. Other topics include chemical separation, purification, preparation of
inorganic salts, quantitative determinations dealing with the formula of a compound, gas laws, and colligative properties. Careful techniques and precise measurements are stressed. Restricted to science, engineering, and engineering technology majors.

CHEM.1240L Chemistry II Laboratory (Formerly 84.124) - Credits: 1

Serves as a continuation of the laboratory study begun in CHEM.1230L that is coordinated with topics of CHEM.1220. Topics include: thermochemistry, kinetics, spectroscopy, titration, pH, equilibrium reaction and constants. Some aqueous solution reactions and organic reactions are examined. Accurate measurements and precise instrumental and apparatus operation are expected. Restricted to science, engineering, and engineering technology majors.

CHEM.1350 Honors Chemistry I (Formerly 84.135) - Credits: 3

A more in-depth view of the topics covered in Chemistry I, (84.121). Topics include chemical reactions and calculations, atomic history and structures, the behavior of gases and bonding theory. Open to students enrolled in the Honors Program, and may be taken instead of 84.121.

CHEM.1360 Honors Chemistry II (Formerly 84.136) - Credits: 3

A continuation of 84.135. A more in-depth view of the topics covered in Chemistry II (84.122). Topics include solutions, kinetics, thermodynamics, acids and bases, chemical equilibrium, electrochemistry and solubility. Open to students enrolled in the Honors Program, and may be taken instead of 84.122.

CHEM.2040 Introduction to Organic and Polymer Chemistry (Formerly 84.204) - Credits: 3

This course is a one-semester overview of organic chemistry for plastics engineering majors. Organic chemistry and its associated principles underscore a broad component of the plastics engineering curriculum. It is desirable therefore for such students to develop a basic appreciation of the fundamental reactions in organic chemistry, as well as an understanding of the interaction of organic compounds with their environment. Students will therefore be expected to secure a basic understanding of, e.g., chemical bonding, the chemistry of alkanes, alkenes, alkynes, aromatic compounds, substitution and elimination reactions, reactions of organic alcohols, ethers, epoxides, aldehydes and ketones, carboxylic acids, and amine compounds. When appropriate, examples will be provided that relate to those typical polymerization reactions (e.g. free-radical or ionic) employed to manufacture commercial polymer materials. Coverage will include synthesis of organic chemicals and polymers from natural and sustainable materials.

CHEM.2050L Principles Of Organic Chemistry Laboratory (Formerly 84.205) - Credits: 1

Introduction to the basic skills and techniques used in the synthesis, purification, and characterization of representative organic compounds. Open to Chemical Engineering students only.

CHEM.2210 Organic Chemistry I (Formerly 84.221) - Credits: 3

CHEM.2210 is the first course of a two-semester sequence of organic chemistry for students majoring in Chemistry, Chemical Engineering, Biological Sciences as well as pre-medical, pre-dental, pre-pharmaceutical and pre-veterinary students. The course focuses on acid-base properties, functional group labels, conformational analyses, stereochemistry, substitution, elimination and addition reactions of organic molecules. Curved arrow mechanisms and the relationship between organic structure and reactivity are emphasized. Aspects of organic spectroscopy are also introduced.

CHEM.2220 Organic Chemistry IIA (Formerly 84.222) - Credits: 3

A continuation of CHEM.2210 including an introduction to infrared and NMR spectroscopy and biochemistry. The application of organic reactions in multi-step synthesis is stressed.

CHEM.2230 Organic Chemistry IIB (Formerly 84.223) - Credits: 3

The course covers the chemical and mechanistic principles of organic reactions utilized in biological systems. Spectroscopy, organic reactions and related mechanisms of bio-molecules or small molecules in biological systems will be discussed from a functional group perspective. Multiple examples from medicinal chemistry, chemical biology and biochemistry will be used to illustrate the concepts. Knowledge of organic mechanistic arrow-pushing formalism is required.

CHEM.2270L Organic Chemistry Laboratory IA (Formerly 84.227) - Credits: 2

Laboratory work designed to emphasize the techniques of organic synthesis and the use of instrumentation for identification and characterization of organic compounds. Required for chemistry majors.
CHEM.2280L Organic Chemistry Laboratory IIA  
(Formerly 84.228) - Credits: 2
A continuation of 84.227 including an introduction to semimicro organic techniques. Planning and successfully carrying out reactions published in the chemical literature are emphasized. Required for chemistry majors.

CHEM.2290L Organic Chemistry Laboratory IB  
(Formerly 84.229) - Credits: 1
Reviews techniques, skills, and heuristic approaches in the synthesis, purification, and identification of organic compounds. IR, GC, and NMR instrumental methods are included. For Biology and Health Science majors.

CHEM.2300L Organic Chemistry Lab II B  (Formerly 84.230) - Credits: 1
A continuation of 84.229/CHEM 2290L. Biology and Health Science Majors.

CHEM.2600 Information Retrieval  (Formerly 84.260) - Credits: 2
An introduction to the important chemical and chemical-related reference sources including journals, patents, technical publications, and compiled reference works, and instructions in their use. Assignments require the use of each source discussed. On-line searching using computerized chemical and chemical related databases is also introduced. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

CHEM.3010 Special Topics: Chemistry  (Formerly 84.301) - Credits: 3
CHEM.3030 Forensic Science I  (Formerly 84.303) - Credits: 3
CHEM.3040 Forensic Science II  (Formerly 84.304) - Credits: 3
CHEM.3050L Forensic Science I Laboratory  (Formerly 84.305) - Credits: 1
CHEM.3060L Forensic Science II Laboratory  (Formerly 84.306) - Credits: 1
CHEM.3130 Analytical Chemistry I  (Formerly 84.313) - Credits: 3
CHEM.3140 Analytical Chemistry II  (Formerly 84.314) - Credits: 3
CHEM.3150L Analytical Chemistry Laboratory I  (Formerly 84.315) - Credits: 2
CHEM.3160L Analytical Chemistry Laboratory II  (Formerly 84.316) - Credits: 2
CHEM.3390 Physical Chemistry Principles  (Formerly 84.339) - Credits: 2
A one-semester course designed for plastics engineering majors. Physical chemical concepts of importance to plastics and
polymeric materials are emphasized and include kinetics, spectroscopy, phase rule, and statistical thermodynamics.

CHEM.3440 Physical Chemistry I (Formerly 84.344)  
- Credits: 3

Covers basic physical chemical topics: laws of thermodynamics, solutions, chemical and phase equilibria, electrochemistry, kinetics, atomic, and molecular structure. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

CHEM.3450 Physical Chemistry II (Formerly 84.345)  
- Credits: 3

CHEM.3450 serves as a continuation of CHEM.3440. Topics covered include the failures of classical physics that led to the rise of quantum mechanics, the postulates of quantum mechanics, the particle-in-a-box, the harmonic oscillator, the rigid rotator, the hydrogen atom and multi-electron atoms. Applications of these quantum mechanical models to chemistry and spectroscopy are discussed, along with aspects of chemical bonding.

CHEM.3460L Physical Chemistry Laboratory I  
(Formerly 84.346) - Credits: 2

Laboratory work designed to exemplify principles covered in 84.344. Required for chemistry majors. Meets Core Curriculum Essential Learning Outcome for Critical Thinking &Problem Solving (CTPS).

CHEM.3470L Physical Chemistry Laboratory II  
(Formerly 84.347) - Credits: 1

Provides laboratory work designed to exemplify the principles of chemical kinetics, equilibrium, and spectroscopy.

CHEM.3500L Physical Bioinorganic Laboratory  
(Formerly 84.350) - Credits: 2

Coordination compounds are utilized in a core of experiments to illustrate basic physiochemical techniques and analysis of experimental data in electrochemistry and kinetics. A project lab is carried out to apply and extend techniques learned.

CHEM.3600 The Responsible Chemist (Formerly 84.360) - Credits: 3

This course is required of chemistry majors and addresses ethical, regulatory, and environmental aspects of their profession. Students are exposed to a wide range of research integrity issues that include TSCA (Toxic Substance Control Act), SOPs (Standard Operating Procedures) and quality management. Compliance issues include an overview of OSHA (Occupational Safety and Health Administration) and EPA (Environmental Protection Agency), as well as an introduction to patent law. The importance of maintaining integrity in their discipline is emphasized, and case studies are presented for study and discussion. Meets Core Curriculum Essential Learning Outcome for Social Responsibility &Ethics (SRE) and Essential Learning Outcome for Written &Oral Communication (WOC).

CHEM.4020L Organic Synthesis and Characterization Lab - Credits: 3

An advanced project-based organic chemistry laboratory course. Students will separate mixtures of compounds by chromatographic methods, elucidate structures using spectroscopic techniques and consult the chemical literature to design and execute a multi-step synthesis. Emphasis on laboratory work with discussion of theoretical background.

CHEM.4030 Polymer Science I (Formerly 84.403) - Credits: 3

Coverage of step and chain growth polymerizations, kinetics and mechanism, copolymerization, ionic and free radical polymerizations, and industrially important polymers.

CHEM.4070 Undergraduate Thesis (Formerly 84.407) - Credits: 3

Research in biochemistry, electrochemistry or analytical, organic, inorganic, physical or polymer chemistry. Progress report required.

CHEM.4080 Undergraduate Thesis II (Formerly 84.408) - Credits: 3

A continuation of 84.407. Both semesters must be taken and not more than six credits may be used in meeting degree requirements. A written thesis and seminar are required. The written thesis is to follow the conventional form of introduction, literature survey, data, results, and conclusions. One copy of the thesis must be filed in the Department office.

CHEM.4430 Advanced Inorganic Chemistry  
(Formerly 84.443) - Credits: 3

The chemical behavior, structure and methods of preparation and nomenclature of the more common elements and their compounds.

CHEM.4450L Advanced Inorganic Lab (Formerly...
CHEM.4500 Introduction To Biochemistry (Formerly 84.450) - Credits: 3
An introductory study of the fundamental principles of biochemistry including the chemistry of proteins, carbohydrates, nucleic acids and lipids, thermodynamics, kinetics and mechanisms of enzyme action, intermediary metabolism and selected topics in molecular biology.

CHEM.4550L Laboratory in Modern Biochemistry and Biophysics - Credits: 2
This is a laboratory course designed to teach basic biochemistry techniques using a series of well-characterized proteins in a research-like setting. The course will meet twice a week throughout the semester. The first half of the semester will be focused on teaching specific biochemical techniques. In the second half of the semester, students will develop an independent research question using protein(s) from a list using the techniques that were learned in the first half of the semester. Students will produce a report using an ACS journal style based on their results and they will also present their results to the class at the end of the semester.

CHEM.4850 Advanced Organic Chemistry - Credits: 3
This course aims to provide deepened and widened knowledge of concepts, reactivity, and synthesis in organic chemistry. It encompasses: carbonyl/enol/enolate chemistry, frontier molecular orbital theory, pericyclic reactions, rearrangements, fragmentations, reactive intermediates, main group elements (boron, silicon, phosphorous, sulfur, etc.), heterocyclic compounds, organometallic chemistry, stereochemistry, selectivity, catalysis, asymmetric synthesis, and multi-step synthesis.

CHEM.4880 Computational Chemistry - Credits: 3
The field of computational chemistry involves the quantitative treatment of the quantum and classical depiction of atoms and molecules. The first part of the class will involve the quantum chemistry approach which will include semi-empirical theory, the Hartree-Fock model, post-Hartree-Fock models, and Density Functional Theory. Quantum chemistry calculations will be performed using the Gaussian software package. The second part will include classical dynamics of molecules using Molecular Mechanics concepts and empirical force-fields. Students will be introduced to numerical algorithms for the calculation of atomic forces and numerical schemes for the integration of Newton’s equations of motion. Students will learn how to set up, initialize, and run Molecular Dynamics simulations.

COMP.1010 Computing I (Formerly 91.101) - Credits: 3
Introduction to computing environments: introduction to an integrated development environment; C, C++, or a similar language. Linear data structures; arrays, records, and linked lists. Abstract data types, stacks, and queues. Simple sorting via exchange, selection, and insertion, basic file I/O. Programming style documentation and testing. Ethical and social issues. Effective Fall 2013, Co-req 91.103 Computing 1 Lab.

COMP.1030L Computing I Lab (Formerly 91.103) - Credits: 1
This is the lab class for COMP.1010 Computing I. This class must be taken with COMP.1010 Computing I in the same semester.

COMP.1080 Intro to App Des & Mobile Comp (Formerly 91.108) - Credits: 3
This course is an introduction to design principles of applications ("apps") that run on mobile devices (smart phones and tablet computers). The course focuses on software interaction design and computational thinking. Students will gain theoretical knowledge and design skills in these domains by building a series of apps that run on the Android platform using MIT App. Inventor software. The course will also include discussion of societal impacts of computing.

EECE.2140 Fundamentals of Sound Recording (Formerly 16.214) - Credits: 3
This course serves to instruct sound recording technology through the concepts of voltage, current, power, resistance and Ohm's law; series, parallel and resonant circuits, Kirchhoff's voltage and current laws; the Wheatstone bridge, Thevenin equivalent circuits and maximum power transfer theorem; magnetism, electromagnetism, electromagnetic devices, and transformers; a.c. current, RF signals, capacitors, and inductors; RC, RL, and RLC circuits; d.c. power sources; diodes, transistors, tubes (thermonic emission), and amplifiers. Use of voltmeters, ammeters, ohmmeters, and oscilloscopes are discussed and used in lab throughout the course. Not for ECE students.

EECE.2330 History of Radio (Formerly 16.233) - Credits: 3
Intended primarily for students majoring in the liberal arts. The
course develops the theory of electricity from an historical perspective. Sufficient background in circuit theory, resonance, field theory and radio waves is given to provide an understanding of the principles of radio from its antecedents in the nineteenth century through the invention of the transistor in the mid twentieth century. The fundamental contributions of, for example Volta, Oersted, Morse, Maxwell, Faraday, Hertz, Lodge, and Marconi are considered. In the present century the technical advances of such figures as de Forest, Fleming, Fessenden, Armstrong and Shockley are studied. The growth, regulation and culture of American broadcasting are also central to the course. Laboratory work is required and students may use this course toward fulfilling the General Education (science/experimental component) requirement of the University. Not open to students in the College of Engineering.

ENVI.1020 Environmental Problems Seminar (Formerly 87.102) - Credits: 1
A survey of environmental problems and issues. Topics include air, water, and noise pollution; solid and liquid waste disposal; and the social, political, and economic implications of these issues. Readings, discussions, guest speakers, and field trips. This course is intended primarily for students majoring in the various options of environmental science. It does not satisfy specific science requirements for majors in the Division of Science.

ENVI.1020 Global Environmental Studies - Credits: 3
This course investigates how human activities impact the earth’s environment on a local, national, and global scale. Topics covered include the scientific method, population, fresh water resources, air and water pollution, climate change, energy, biodiversity, food security, solid waste management and sustainable living. Suitable as a Science elective for a degree in the College of Sciences.

ENVI.1100 Sustainable Solutions for People and the Planet - Credits: 3
This course explores some of the most challenging questions of our times: How can modern society thrive on a finite and changing planet? In what ways is our climate changing and what is causing those changes? How will human society be impacted: What could a transition to a sustainable, green, low-carbon economy consists of? We will explore these questions through a combination of simulations, serious games, and ‘systems thinking’ - building a skill set to think strategically about complex, dynamic problems. The course considers current events as they relate to climate change and sustainability and introduces students to real-world, interactive tools that allow them to explore scenarios and solutions for themselves.

ENVI.1120L Global Environmental Studies Lab - Credits: 1
This laboratory course will complement the material covered in the Global Environmental Studies Lecture. Topics include ecological footprints, nutrient cycling, water, and air quality, soil characteristics, ocean pollution, environmental justice, and climate change.

ENVI.1150 Astronomy (Formerly 87.115) - Credits: 3
Offers an introduction to the study of astronomy including historical development, instruments, solar system dynamics, planetary evolution, stellar systems and stellar evolution. Several field trips are included. This course satisfies the Gen Ed science requirement, but not specific science requirements for majors in the Division of Science.

ENVI.1170L Astronomy Lab (Formerly 87.117) - Credits: 1
Intended to develop a deeper understanding of astronomy through an exposure to the methods and materials used in astronomical analysis. Corequisite: 87.115 I,II(0,2)1

ENVI.1200 Principles of Environmental Science - Credits: 3
In this course, we will approach Environmental Science from an interdisciplinary viewpoint and use quantitative approaches to understand the physical, chemical, and biological environment and their interactions. A critical emphasis through this course will be on ecosystem services and how climate change, land use change, and pollution affect these. We will further review environmental law and policies and address concepts of sustainability and resource conservation.

ENVI.1990L Envi. Science 1000 level elec. - Credits: 1
Envi. Science 1000 level elec.

ENVI.2010 Earth Systems: Geosphere (Formerly 87.201) - Credits: 3
Earth Systems: Geosphere deals with the origin of the universe, solar systems and planet earth, the solid earth and processes at the earth’s surface, geological hazards, coastal processes, deep sea sediments and the climate record, and contamination of water and soil.

ENVI.2020 Earth Systems: Atmosphere and Oceans ( Formerly 87.202) - Credits: 3
Earth Systems: Atmosphere and Oceans deals with the atmosphere, and oceans, as well as the important role they play within Earth’s vital systems. These interactions will address atmospheric structure, processes, and pollution. It will also address ocean-atmosphere exchange, ocean structure, processes, pollution, and coastal and deep sea sedimentation processes.

ENVI.2030L Earth Systems: Geosphere Laboratory
(Formerly - Credits: 1)

The Laboratory component Earth Systems: Geosphere requires the student to make measurements, analyze and plot data, draw conclusions from the data plots, characterize and identify earth materials, and interpret geospatial representations. These skills will follow lecture material and increase understanding through active learning.

ENVI.2040L Earth Systems: Atmosphere and Oceans Laboratory (Formerly 87.204) - Credits: 1

Earth Systems: Atmosphere and Oceans Lab is designed to complement the lecture material from ENVI.2020 - Earth Systems Atmosphere and Oceans. This course, along with the other Earth Systems courses and corresponding labs use a systems-based approach for the topic of Earth and Environmental Science. This laboratory will concentrate on the Atmosphere and Oceanography.

ENVI.2050 Earth Systems: Biosphere and Global Change - Credits: 3

Earth Systems: Biosphere and Global Change explores the origin and evolution of life on Earth, its history, and how life has interacted with Earth systems throughout its history. Students will become familiar with the biomes of the world, ecological processes within those biomes, the biological communities that inhabit them, and how ecological processes lead to evolution over time. Throughout the course, we will examine how human society interacts with the biosphere, including how global change is both generated by and responds to the interaction.

ENVI.2070L Earth Systems: Biosphere and Global Change Lab - Credits: 1

This lab is designed to complement the lecture material from ENVI.2050 - Earth Systems: Biosphere and Global Change. This course, along with the other Earth Systems courses and corresponding labs use a systems-based approach for the topic of Earth and Environmental Science. This laboratory will concentrate of the Biosphere and Global Environmental Change.

ENVI.2990L Envi. Science 2000 Level Elective - Credits: 1


ENVI.3010 GIS in Earth and Environmental Sciences (Formerly 87.301) - Credits: 3

This course introduces earth and environmental science students to applications of geographic information systems, emphasizing hands-on field experience in collecting spatial location data and in mapping environmental data using GIS software. Covers fundamentals of: geodesy; spherical and plane coordinate systems; spatial data concepts, including error, accuracy, and precision; location measurement technologies including GPS; vector and raster GIS data structures and file types, basic GIS operations, including georeferencing of raster files and editing of vector files; assembly of field data over a base map; analysis of spatial relationships using GIS tools; symbology and methods of map presentation.

ENVI.4000 Senior Seminar in Environmental Sciences - Credits: 1

The Senior Seminar in Environmental Sciences includes speaker presentations by invited external and internal faculty, as well as student presentations. The class includes interdisciplinary topics in Atmospheric Sciences, Geosciences, and Environmental Sciences. The goals are to improve oral communication skills and expand knowledge of stat-of-the-art research approaches and research themes.

ENVI.4100 Soil Science - Credits: 3

This class provides a fundamental understanding of the formation, structure, and functioning of soils. Topics include soil formation and history, soil chemistry and physics, soil endangerment and protection, and distribution and characteristics of soils across the world.

ENVI.4120L Soil Science Laboratory - Credits: 1

This lab is designed to complement the lecture material from ENVI.4100 - Soil Science. The lab includes field and laboratory measurements of soil structure and soil physical and chemical characteristics. As the outermost layer of the Earth’s crust, soils are at the interface between earth, air, water, and life. Soils provide important ecosystem services and are critical for the sustenance of humanity.

ENVI.4150 Biogeochemical cycles - Credits: 3

This class will explore the origins, transport, and transformations of elements in the global environment. We will
us quantitative approaches to understand physical, chemical, and biological controls on elemental cycles. Many of these elements cycle between the geosphere, atmosphere, hydrosphere, and biosphere, and quantifying exchanges and fluxes between compartments is a critical component of understanding their distribution. We will also emphasize microbial processes that are critical in shaping biogeochemical cycles.

ENVI.4160 Climate Change: Science, Communication, and Solutions (Formerly 81.416/BIOL.4160) - Credits: 3

Like many of the ‘grand challenges’ currently facing society, climate change is a complex problem that cuts across academic disciplines, including the physical sciences, biology, engineering, economics, political sciences, and behavioral psychology. In this course, we integrate recent research from many of these disciplines to explore the scientific basis of climate change, its impacts on the natural world and human society, and societal responses to it. Through interactive simulations, class discussions, lectures, current scientific literature, and student-led projects (such as video production and dynamic modeling), the goal of this course is to empower students to come to their own decisions about how society can address the climate change challenge.

ENVI.4170L Climate Change: Science, Communication, and Solutions Lab - Credits: 1

This course is designed to integrate closely with the lecture course, Climate Change: Science, Communication, and Solutions. Students will use interactive simulations, build models, and create media projects that explore climate change and sustainability. Topics include the physical climate system and carbon cycle, human energy systems, and climate policy and economics.

ENVI.4930 Internship: Environmental Studies (Formerly 87.493) - Credits: 1-3

Work experience with private or public employer. Written report and supervisor evaluation required. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Written &Oral Communication (WOC).

ENVI.4960 Practicum (Formerly 87.496) - Credits: 1-3

A program of on-campus and/or off-campus experiences developed by the student in consultation with a faculty member from the Department and, when appropriate, a member of the staff of an off-campus firm. May be repeated to a maximum of six credits. The practicum may not be substituted for a required course in the major.

ENVI.4970 Research: Environmental Studies - Credits: 3

An independent scientific research project carried out by a qualified senior under the supervision of a faculty member.

GEOL.2150 Forensic Geology (Formerly 89.215) - Credits: 3

This course deals with the application of geological and related principles to the solution of various types of crimes. The course will explore the use of evidence (rocks and minerals, soils, geochemistry, etc.) to identify the source and hence the potential perpetrator of the crime. Meets Core Curriculum Essential Learning Outcome for Critical Thinking &Problem Solving (CTPS) and Quantitative Literacy (QL).

HSCI.1010 Human Anatomy and Physiology I (Formerly 35.101) - Credits: 3

This course provides a basic knowledge of the structure and function of the human body. An overview of the general organization of the body introduces the course. Following a discussion of basic human chemistry, the anatomy and physiology of cells, tissues, organs, and organ systems are studied with special emphasis placed on homeostasis and interaction among the various systems. The topics treated are body plan, chemistry, cytology, histology, the integumentary system, the skeletal system, the muscular system, and the nervous system. Clinical applications will be presented.

HSCI.1020 Human Anatomy and Physiology II (Formerly 35.102) - Credits: 3

A continuation of the basic knowledge of human structure and function. The topics treated are cardiovascular system, lymphatic system, respiratory system, endocrine system, digestive system, metabolism, urinary system, and reproductive system.

HSCI.1030 Human Anatomy and Physiology
Laboratory I (Formerly 35.103) - Credits: 1

Laboratory exercises are designed to reinforce didactic material by providing hands-on experience with the subject matter. Students actively participate in simple chemical analysis, microscopic observations, and studies of anatomical models and preserved specimens. Students perform simple physiological tests on themselves and work in small groups to discuss conclusions.

HSCL.1040 Human Anatomy and Physiology

Laboratory II (Formerly 35.104) - Credits: 1

Laboratory exercises are designed to reinforce didactic material by providing hands-on experience with the subject matter. Students actively participate in simple chemical analysis, microscopic observations, and studies of anatomical models and preserved specimens. Students perform simple physiological tests on themselves and work in small groups to analyze results and discuss conclusions.

LIFE.1000 Introduction to Biology (Formerly 83.100) - Credits: 3

Presents environmental and organismal structural interrelationships and relates these to the chemical evolutionary basis of life. Not suitable for credit towards any degree in the Division of Sciences.

LIFE.1010 Life Science I (Formerly 83.101) - Credits: 3

Presents environmental and organismal structural interrelationships and relates these to the chemical evolutionary basis of life. Suitable as a Natural Science Elective for a degree in the Division of Sciences.

LIFE.1020 Life Science II (Formerly 83.102) - Credits: 3

Emphasis is on systems structure and function. The cellular organization of plants and animals leads into physiological processes of higher organisms with great emphasis on humans. Among topics considered are nutrition and digestion, cellular metabolism, circulation, respiration, excretion, nervous and skeletal-muscular systems. Also considered are the chemical interactions of these systems with immunity, hormonal and reproductive processes. Suitable as a Natural Science Elective for a degree in the Division of Sciences.

LIFE.1030L Life Science I Laboratory (Formerly 83.103) - Credits: 1

Concerned with experimentation and interpretation of some of the concepts of Life Science I. Suitable as a Natural Science Elective for a degree in the Division of Sciences.

LIFE.1050L Introduction to Biology Lab (Formerly 83.105) - Credits: 1

Introduction to Biology Laboratory is a co-requisite course for the Introduction to Biology online lecture course - 83.100. The two courses together fulfill a GenEd Science requirement. The lab course can be taken concurrently with the lecture course or subsequent to it. Weekly labs correspond directly with the chapter assignments provided by the 83.100 instructors.

LIFE.1060 Human Biology (Formerly 83.106) - Credits: 3

Human Biology is designed to be an accelerated online summer course for non-science majors. This course will cover the major organ systems of the human body (cardiovascular, digestive, nervous, excretory, etc.), how they function and the disorders that arise when these systems don’t function as they were intended.

LIFE.1080 Biochemistry in the Kitchen - Credits: 3

This course is an integrated lecture and laboratory course for non-science majors and is designed to fulfill the core laboratory science requirement. The course will present fundamental principles of biochemistry in the context of cooking and foods to explain everyday phenomena. Class periods will include lecture and discussion and there will be laboratory assignments to be completed by the student.

LIFE.1250 Plants and Human Society (Formerly 83.125) - Credits: 3

This course is designed to introduce undergraduate students to the fascinating world of plants and their significance in our everyday world. The use of plants in medicine, agriculture, and industry and their importance to humans and our environment will be emphasized. This course is also designed to fulfill the core science elective requirement for the non-science major. Not suitable for credit towards any degree in the Division of Sciences.

LIFE.1270 Plants & Human Society Lab (Formerly 83.127) - Credits: 1

Plants and Human Society Laboratory is a co-requisite course for the Plants and Human Society online lecture course LIFE.1250. The two courses together fulfill the core science with laboratory requirement. The lab course can be taken concurrently with the lecture course or subsequent to it. Weekly labs correspond with the chapter assignments in the lecture course. Not suitable for credit towards any degree in the Division of Sciences.

Elective for a degree in the Division of Sciences.
the Division of Sciences.

**LIFE.2140 Human Ecology (Formerly 83.214) - Credits: 3**

Designed to reveal and discuss the increasing problems of overpopulation in regard to environmental deterioration, living space, limits of natural resources and the adverse effects of human alteration on destruction of the natural ecosystem. The implications of current literature and news items will be emphasized. Not suitable for credit towards any degree in the Division of Sciences.

**NUTR.1100 Nutrition and Wellness (Formerly 35.210 and NUTR.2100)) - Credits: 3**

This course is an introductory course to the science of nutrition as it applies to everyday life and health. Focus will include the six major nutrients: carbohydrates, lipids (fats), protein, vitamins, minerals, and water and their importance in the human body. Digestion, absorption, and metabolism in the human body will be introduced. The course will also examine energy balance and weight management as they relate to nutrition and fitness. The impact of culture, demographics and ethnicity on nutritional intake will be discussed. Students will explore the relationship between nutrition and health through laboratory experiences. Students should not be taking NUTR.1100 if they already took NUTR.2060.

**PHYS.1010 Introductory Physics (Formerly 95.101) - Credits: 3**

A survey course for students majoring in sound recording technology. Topics covered include one and two dimensional motion, Newton's Laws of dynamics, statics, circular motion, work and energy, linear and angular momentum, electrostatics, electric and potential fields, magnetic fields, vibrations, waves, sound, Faraday's Law and AC circuits.

**PHYS.1010L Introductory Experimental Physics (Formerly 96.101) - Credits: 1**

Experimental physics with topics correlated with the corequisite lecture course.

**PHYS.1030 General Physics I (Formerly 95.103) - Credits: 3**

Serves as the first semester of a one-year course which surveys the field of experimental physics with topics correlated to the corequisite lecture course.

**PHYS.1030L General Physics I Lab (Formerly 96.103) - Credits: 1**

Presents the first semester of a one-year course which surveys the field of experimental physics with topics correlated to the corequisite lecture course.

**PHYS.1040 General Physics II (Formerly 95.104) - Credits: 3**

Provides a continuation of PHYS.1030 Topics include electricity and magnetism, geometrical and physical optics, atoms, and nuclei.

**PHYS.1040L General Physics II Lab (Formerly 96.104) - Credits: 1**

Serves as a continuation of 96.103 with topics correlated with the corequisite lecture course.

**PHYS.1050L Sounds of Music (Formerly 96.105) - Credits: 3**

Examines the physical process that makes musical sounds from acoustic instruments. Hands-on laboratory experiences explore how the vibrations of strings, air columns, membranes, plate and bars are transformed into musical sounds, how these propagate and are transformed by the listening space, and how these are received by ears and perceived by the brain. In addition harmonic series, the mean-tempered scale, the use of decibels, sonic interference and diffraction are explained.

**PHYS.1120 Freshman Physics Seminar (Formerly 95.112) - Credits: 0-1**

An introduction to the scientific methods of physics and the exploration of research opportunities for undergraduates.

**PHYS.1210 Exploring the Universe (Formerly 95.121) - Credits: 3**

Addresses topics that include: Planet Earth, its structure, plate tectonics, greenhouse effect, ozone layer, craters and dinosaurs; our satellite Moon; other planets; our star Sun and its energy source; other stars, the HR diagram and stellar evolution, white dwarfs, neutron stars, supernovae, black holes; our galaxy, the Milky Way, its structure; other galaxies; the universe, its structures and expansion; evolution of galaxies, quasars, cosmology, the Big Bang and Unification of the forces of nature. Satisfies Gen Ed science requirements for non-science majors. Does not satisfy science requirements for Science majors but may be used as a free elective by Science majors.
PHYS.1210L Exploring the Universe Laboratory (Formerly 96.121) - Credits: 1

Provides laboratory exercises to illustrate the basic principles and measurement techniques of astronomy. Quantitative techniques, properties of angles, modeling the earth-sun system, comparative planetology, the constellations, the inverse square law, blackbody radiation and spectra, the Hertzsprung-Russell diagram, distances to the stars, the Andromeda galaxy, cosmology. Satisfies Gen Ed science requirements for non-science majors. Does not satisfy science requirements for Science majors but may be used as a free elective by Science majors.

PHYS.1310 Technical Physics I (Formerly 99.131) - Credits: 3

Presents material in both the class and laboratory format. Topics include: vectors; one- and two-dimensional motion; Newton’s laws of motion; translational and rotational equilibrium; work and energy; linear momentum; and circular motion and gravitation. Two additional Friday night classes are required.

PHYS.1320 Technical Physics II (Formerly 99.132) - Credits: 3

Covers material in both the class and laboratory format. Rotational dynamics; mechanical vibrations and waves; sound; solids and fluids; thermal physics; heat and law of thermodynamics will be discussed. One session per week. Two additional Friday night classes are required.

PHYS.1410 Physics I (Formerly 95.141) - Credits: 3

First semester of a two-semester sequence for science and engineering majors. Mechanics including vectors, kinematics in one and two dimensions, Newton’s laws of dynamics, work and energy, energy conservation, linear momentum conservation, rotational kinematics and dynamics, Newton’s Universal Law of Gravitation, oscillatory motion and mechanical waves.

PHYS.1410L Physics I Lab (Formerly 96.141) - Credits: 1

Serves as an introductory course on methods and techniques of experimentation in physics with experiments in mechanics selected to support the concepts of the corequisite lecture course.

PHYS.1410SI Supplemental Instruction for Physics I - Navitas Only (Formerly 95.141SI) - Credits: 1

Supplemental Instruction for Physics I - Navitas Students Only. Credits do not count toward degree requirements.

PHYS.1440 Physics II (Formerly 95.144) - Credits: 3

Continuation of 95.141, Physics I. Electricity and magnetism including Coulomb’s Law, electric field, Gauss’ Law, electric potential, Ohm’s law, DC circuits with resistors, magnetic field, Ampere’s Law, Faraday’s Law, inductance, Maxwell’s equations, and electromagnetic waves. Optics including Wave Optics (interference, diffraction) and Ray Optics (reflection, refraction, dispersion, ray tracing).

PHYS.1440L Physics II Lab (Formerly 96.144) - Credits: 1

Serves as a continuation of 96.141 with experiments in optics, electricity and magnetism, and modern physics to support the concepts of the corequisite lecture course.

PHYS.1610 Honors Physics I (Formerly 95.161) - Credits: 4

Introductory mechanics at a more challenging level and the first semester of a sequence for physics majors. Mechanics of particles in one dimension, kinematics, forces, dynamics; particles in two and three dimensions, vectors, curvilinear and oscillatory motion; conservation principles, work, energy, linear momentum, collisions; rotational mechanics, angular momentum, torque and static equilibrium; gravitation and planetary orbits; wave motion, transverse and longitudinal, standing waves.

PHYS.1610L Honors Physics I Laboratory (Formerly 96.161) - Credits: 2

An introductory laboratory course at the honors level on the methods and techniques of experimental physics. Lectures on measurement uncertainties and error analysis are included and experiments are selected principally in mechanics.

PHYS.1640 Honors Physics II (Formerly 95.164) - Credits: 4

Geometrical optics, reflection, refraction, flat and curved mirrors, thin lenses; physical optics, interference and diffraction; electrostatics, charge, electric forces, fields and flux, electric potential, capacitance and field energy; electric charge in motion, currents, DC and RC circuits; magnetic fields, forces on moving charges, magnetic field of an electric current, electromagnetic induction, inductance, changing currents, AC circuits; electromagnetic radiation; the limits of classical electromagnetic theory.
PHYS.1640L Honors Physics Lab II (Formerly 96.164) - Credits: 2
A continuation of 96.161 with experiments selected principally in optics, electricity and magnetism.

PHYS.2010L Health Physics Internship I (Formerly 96.201) - Credits: 3
Applied work experience as a health physics technician at a government laboratory or a radiation facility of some industry, hospital, or education and research institution.

PHYS.2040 Introduction to Radiological Sciences (Formerly 95.204) - Credits: 3
This course is designed to introduce students to the working practices encountered in health physics. This is accomplished through field trips to local facilities that use radioactive materials, laboratory exercises, and class discussions. This class exposes the student to basic health physics procedures, vocabulary, and equipment.

PHYS.2100 Introductory Modern Physics (Formerly 95.210) - Credits: 3
Special theory of relativity, experimental basis of quantum theory, structure of the atom, wave properties of matter, quantum theory, hydrogen atom, atomic nucleus, nuclear interactions and applications, and semiconductors.

PHYS.2450 Physical Properties of Matter (Formerly 95.245) - Credits: 3
Fluid statics, dynamics of fluids, properties of solids, advanced topics in waves and vibrations, temperature and heat flow, kinetic theory of gases, thermodynamics, and the limits of classical physics.

PHYS.2450L Physics III Lab (Formerly 96.245) - Credits: 1
Experiments are selected principally in properties of solids, vibrations, waves, heat, and thermodynamics.

PHYS.2610L The Physics of Materials and Devices (Formerly 96.261) - Credits: 3
Investigating the phenomenology of materials involve sensing devices in which electrical signals must be evaluated. Observing physical phenomena with an electrical sensing device enables one to calibrate the dynamics of the electrical signal associated with the changes in the physical phenomenology observed with that device. Applications in these laboratory-based measurement techniques include the Wheatstone bridge, current/voltage device characterization, the operational amplifier as an active filter, stress-strain, Newton's law of cooling, Stefan/Boltzman's law and the ideal gas law.

PHYS.2620L Principles in Laboratory Automation (Formerly 96.262) - Credits: 3
This is an introduction to the principles of automating today's research laboratory. A foundation of the Labview-based software and hardware tools required to conduct computer-controlled experiments will be presented, demonstrated and then used to acquire, display and analyze data on some typical physical phenomena. Students will be fully involved in designing the control and acquisition software as well as setting up the experimental hardware. Applications of the automated acquisition environment include AC characterization of RC and LRC circuits, the use of thermistors and thermocouples along with acquiring the temperature dependent resistivity of high Tc superconductors.

PHYS.2690 Honors Physics III (Formerly 95.269) - Credits: 4
Statics and dynamics of fluids, pressure, viscosity, Archimedes and Bernoulli principles, mechanical properties of solids, stress and strain, shear, electric and magnetic properties of materials, para-dia- and ferromagnetism, electro-mechanical and magneto-mechanical effects, hysteresis, advanced topics in waves and vibrations, damping, resonance in mechanical and AC oscillators, thermodynamics, Maxwell's velocity distribution, blackbody radiation, and the limits of classical physics, introduction to special relativity.

PHYS.3010L Health Physics Internship II (Formerly 96.301) - Credits: 1-3

PHYS.3020L Health Physics Internship II (Formerly 96.302) - Credits: 3

PHYS.3040 Vibration and Sound (Formerly 95.304) - Credits: 3
The course serves to integrate the various sub-topics of physics that undergraduate majors have experienced by exploring the physical processes of vibrations of lumped and continuous electrical mechanical and acoustic systems: the damped harmonic oscillator in electrical and mechanical form, the flexible string in tension and the coaxial cable with differing end conditions, vibrations of bars, membranes and plates, plane waves of sound, standing waves, radiation and scattering. Throughout reference is made to analogous process in the quantum mechanical domain. Closely coordinated with
the recitations is the co-requisite laboratory course, which provides concrete experience with the phenomena discussed in the recitations.

PHYS.3040L Vibration and Sound Lab (Formerly 96.304) - Credits: 1

A series of four directed four-hour experiments and one student directed experiment all of which are coordinated with Vibration and Sound 95.304. Emphasis is on non-intrusive measurement techniques; choosing, evaluating and applying appropriate transducers and structuring data processing and display in measurements of transfer functions. Impedances and modal structures for the system studied analytically in the companion course.

PHYS.3050 Exoplanets - Credits: 3

Beginning with the history of exoplanet research, observational techniques (transits, radial velocity, microlensing, direct imaging), and observations of exoplanet atmospheres via transmission spectra, the course will survey this rapidly developing field and focus on its theoretical foundations, including planet formation and dynamics, planetary atmospheres, planet habitability and astrobiology, star-planet interaction, and space weather on exoplanets.

PHYS.3080 Physics with Computers I (Formerly 95.308) - Credits: 3

PHYS.3160 Science and Technology in an Impoverished World (Formerly 95.316) - Credits: 3

Intended for junior-level science and engineering majors, this is a one-semester 3-credit course focused on the impact of science and technology in poverty stricken regions of the world. Students will be challenged to consider the implementation of past and present technologies for solving resource shortages, evaluate and strengths and limitations of these solutions while developing alternatives to address future barriers to positive change. Encouraged to work toward these issues, students will: 10 Pursue and evaluate topics in science and technology through the skills of inquiry, research, critical thinking and problem solving. 2) Demonstrate the knowledge for quantitative and qualitative analysis of problems in science and technology. #70 Analyze and interpret issues in interdisciplinary areas of science and engineering developing a level of comfort with solving unfamiliar problems using acquired knowledge and skills.

PHYS.3370 Geometrical Optics (Formerly 95.337) - Credits: 3

Properties of light, plane surfaces and prisms, thin and thick lenses, mirrors and stops, matrix methods applied to Gaussian (paraxial) optics, Lagrange-Helmholtz invariant, primary and chromatic aberrations, ray tracing and Abbe's sine condition, basic optical instruments including cameras, telescopes, and microscopes.

PHYS.3380 Optics and Waves (Formerly 95.338) - Credits: 3

Wave nature of light, mathematics of wave motion, electromagnetic theory of light propagation, reflection and refraction, Fresnel coefficients, polarization, interference, Young's experiment, fringe visibility and coherence, various interferometers, Newton's ring and applications, Fraunhofer diffraction by single and multiple apertures and diffraction gratings.

PHYS.3530 Electromagnetism I (Formerly 95.353/553) - Credits: 3

The theory of electromagnetic fields using vector analysis: electrostatic fields and potentials in vacuum, conductors, and dielectric media, magnetic effects of steady currents in nonmagnetic media, magnetic induction and time varying currents and fields. (offered as 95.553 for graduate credit)

PHYS.3540 Electromagnetism II (Formerly 95.354.554) - Credits: 3

Magnetic materials, electric multipoles, solutions to Laplace's equation, boundary conditions, image charge problems, Maxwell's equations; propagation of electromagnetic waves in vacuum, conductors and dielectrics; reflection and refraction of electromagnetic waves; radiation from dipoles and antennas. (offered as 95.554 for graduate credit).

PHYS.3810 Mathematical Physics I (Formerly 95.381) - Credits: 3

Intended for students having completed 2 full years of physics and math, this course is designed to develop competency in the applied mathematical skills required of junior and senior level physics majors. Covering topics involving infinite series, power series, complex numbers, and linear algebra along with vector and Fourier analysis, students will be trained with the rigor required to solve a wide range of applications in the physical sciences.

PHYS.3820 Mathematical Physics II (Formerly 95.382) - Credits: 3

Expanding on the skills mastered in 95.381 Mathematical Physics I, this course is designed to continue developing competency in the applied mathematics required of junior and senior level physics majors. Intended for students having
completed at least 2 years of physics and math, topics covered will involve ordinary, differential equations, calculus of variations, tensor analysis, special functions, series solutions of differential equations, partial differential equations, and complex variables as well as probability and statistics. Students will be trained with the rigor required to solve a wide range of applications in the physical sciences.

**PHYS.3830 Astronomy and Astrophysics I (Formerly 95.383) - Credits: 3**
This course is designed for an interdisciplinary general undergraduate (upperclassmen) audience. Fundamentals of astronomy and astromechanics, introductory survey of astrophysics and the solar system (i.e. planetary astronomy).

**PHYS.3840 Observational Astronomy - Credits: 3**
The course provides project-based practical experience in observational astronomy. Guided by faculty, students will make their own astronomical investigations using telescopes, cameras, and spectrographs. Participants will become trained and certified to use the university observatory. Observations may include stars, planets, galaxies, the sun, and phenomena of tropical interest. Skills will be developed in image processing, data visualization, controlling telescopes/instruments, obtaining data remotely, and communication of results to peers.

**PHYS.3930L Advanced Experimental Physics Laboratory I (Formerly 96.393) - Credits: 2**
Some of the most significant experiments in the history of physics are revisited. Form measuring the universal gravity constant to observing the quantization of light and matter, this laboratory course challenges students' experimental skills and tests their understanding of fundamental concepts. Preparing high quality lab reports and presentations is emphasized.

**PHYS.3940L Advanced Physics Lab II (Formerly 96.393) - Credits: 2**
A continuation of 96.393 with experiments selected mainly from condensed matter and nuclear physics. Opportunities for independent work by permission of the instructor.

**PHYS.4010 Radiation Safety and Control I (Formerly 95.401) - Credits: 4**
Introduction to radiation protection, including radiation sources, radiation dose and dose measurement, radiation exposure, radiation protection techniques, monitoring methods and instruments, contamination control and waste storage, facility design, hazards analysis, and applied health physics techniques for the safe handling and control of radioactive material including laboratory. (offered as RADI.5010L for graduate credit)

**PHYS.4020L Radiation Safety and Control II (Formerly 95.420/98.502) - Credits: 3-4**
This course provides a continuation of the theoretical and practical aspects of radiation protection provided in Radiation Safety and Control I (98.501). Topics include the statistical analyses and data reduction techniques that are used to analyze radiation measurements pertaining to the field of radiation protection. Laboratory sessions on alpha and gamma radiation measurements and air sampling will reinforce class lectures. Students also will experience applied radiation protection and dose assessment through a contamination control exercise that involves the use of protective clothing and respiratory protection.

**PHYS.4060 Nuclear Instrumentation (Formerly 96.406) - Credits: 3**
This course provides the operating principles and applications of nuclear radiation detection systems, including detector theory, electronic signal processing, and measurement and data reduction techniques. The systems covered include gas-filled detectors (ion chambers, proportional counters, and Geiger-Mueller counters), inorganic and organic scintillators, and high-purity germanium detectors, for the detection of alpha, beta, gamma, and neutron radiation. This course also covers hypothesis testing, detection limits, and detector dead time (offered as 98.506 for graduate credit).

**PHYS.4090 Nuclear Instrumentation (Formerly 96.409) - Credits: 3**
This course provides the operating principles and applications of nuclear radiation detection systems, including detector theory, electronic signal processing, and measurement and data reduction techniques. The systems covered include gas-filled detectors (ion chambers, proportional counters, and Geiger-Mueller counters), inorganic and organic scintillators, and high-purity germanium detectors, for the detection of alpha, beta, gamma, and neutron radiation. This course also covers hypothesis testing, detection limits, and detector dead time. This course is adapted for Nuclear Engineering and Medical Physics majors. (offered as 98.509 for graduate credit).

**PHYS.4090 Nuclear Instrumentation (Formerly 96.409) - Credits: 3**
This course provides the operating principles and applications of nuclear radiation detection systems, including detector theory, electronic signal processing, and measurement and data reduction techniques. The systems covered include gas-filled detectors (ion chambers, proportional counters, and Geiger-Mueller counters), inorganic and organic scintillators, and high-purity germanium detectors, for the detection of alpha, beta, gamma, and neutron radiation. This course also covers hypothesis testing, detection limits, and detector dead time. This course is adapted for Nuclear Engineering and Medical Physics majors. (offered as 98.509 for graduate credit).

**PHYS.4110 Physics Perspectives (Formerly 95.411) - Credits: 1**
Discussions on the role of the professional physicist in society.

**PHYS.4110L Senior Research In Radiological Sciences**
A research problem related to the field of radiation protection is investigated by the student under the direction of faculty and staff of the Nuclear Center. The student will present a seminar on this research project. Areas of research may include radiation shielding, radiation detection and measurement, radiation survey and monitoring, radiation biology, radiobiology, radiochemistry, radiocology, natural radioactivity, fallout, analyses and measurement of radioactivity and radiation levels associated with the operation of reactors and accelerators, and radioactive aerosols.

PHYS.4130 Mechanics (Formerly 95.413/513) - Credits: 3

PHYS.4170 Space Science Mission Design (Formerly 95.417/517) - Credits: 3
This one-semester, 3-credit course intended for junior level science and engineering majors, is centered around the conceptual design of a spaceflight mission. In this project-based and team-based class, students will apply their science and technical knowledge to develop a spacecraft and mission concept tailored to answer a specific science question. Students will perform quantitative trade studies consistent with real-life constraints such as cost, schedule, manufacturability, team-expertise, operational environment, mission lifetime, etc. Students will 1) learn the fundamentals of key subsystems involved in a spaceflight mission and 2) apply their skills of inquiry, research, critical thinking to design a complete space mission to solve a real-world problem while working within a multidisciplinary team.

PHYS.4210 Statistical Thermodynamics (Formerly 95.421/521) - Credits: 3
An integrated study of the thermodynamics and statistical mechanics, review of the experimental foundations and historical development of classical thermodynamics; probability and statistical methods of studying macroscopic systems; atomic basis of the laws of thermodynamics and microscopic definitions of thermodynamics quantities using the method of ensembles; entropy and related quantities; TdS equations, Maxwell relations, equation of state, and applications: canonical and grand canonical ensembles; phase transitions; quantum statistics; application to radiation, magnetism, specific heats. (offered as 95.521 for graduate credit)

PHYS.4240 Environmental Health Physics (Formerly 98.524 & 94.424) - Credits: 3
Natural and man-made sources of environmental radioactivity and radiation; environmental transport in air, water, and soil; exposure pathways; environmental standards and regulations; environmental monitoring and surveys (MARSSIM); contaminated site characterization, and site remediation; environmental radiological impact of industry, accidents, and natural and man-made disasters.

PHYS.4350 Introductory Quantum Mechanics I (Formerly 95.435/535) - Credits: 3
De Broglie waves, the Schroedinger equation, wave functions, wave packets, Heisenberg uncertainty principle, expectation values, particle in a box, the simple harmonic oscillator, free particles, step barrier, barrier penetration, square well potential, time independent perturbation theory. (offered as 95.535 for graduate credit)

PHYS.4360 Introductory Quantum Mechanics II (Formerly 95.436) - Credits: 3
The three dimensional Schroedinger equation, the deuteron nucleus, angular momentum, spin, the hydrogen atom, spin-orbit interaction, Zeeman effect, Pauli exclusion principle, atomic structure, multi-electron atoms, the Fermi gas, X-rays. (offered as 95.536 for graduate credit)

PHYS.4390 Electro-Optics (Formerly 95.439/539) - Credits: 3
Optical properties of materials, including dispersion, absorption, reflection and refraction at the boundary of two media. Crystal optics and induced birefringence and optical activity. Polarization states and Jones matrices. Applications to electro-optic devices. Experiments and projects involving the study of optical sources and detectors, spectroscopy, polarization, birefringence, pockels’ effect, optical fibers, and optical communication. (offered as 95.539 for graduate credit)

PHYS.4410 Radiochemistry (Formerly 95.441) - Credits: 3
This course stresses analytical techniques applicable to identification and quantification of radionuclides in various sample types. Considerable time will be spent on review of general chemistry and inorganic analytical chemistry. The theories and applications of various separation techniques including precipitation, solvent extraction, ion exchange chromatography, and electrodeposition will be discussed with emphasis on separation of radioactive species. Additional material to be covered includes instrumental techniques for...
analysis of radioactive species, radiotracer and isotope dilution techniques, neutron activation analysis, and sample preparation.

**PHYS.4450L Characterization of Materials (Formerly 96.445/545) - Credits: 2**

A one-semester course designed to teach the student several of the important techniques for characterizing the structural, optical, and electronic properties of materials. Experiments will include x-ray diffractometry, hardness measurements, ellipsometry, visible and near infrared spectroscopy, far infrared spectroscopy, and raman spectroscopy.

**PHYS.4530L Health Physics Capstone (Formerly 95.453) - Credits: 3**

This course will provide the B.S. candidate in Physics (Radiological Health Physics option) with an undergraduate capstone experience through basic independent research, including critical thinking, problem solving, report writing, and presentation skills.

**PHYS.4560 Radiative Processes in Astrophysics (Formerly 95.456/556) - Credits: 3**

Our knowledge of the universe beyond the Solar System is derived almost entirely from our interpretation of the radiation we receive from the universe; Our knowledge of the Earth’s upper atmosphere and the atmospheres of other solar system objects is heavily dependent on observations of electromagnetic radiation. To understand the atmospheres of Earth and other planets, stars, galaxies and the universe, we need to understand the processes which produce electromagnetic radiation, and how radiation interacts with matter and propagates through space. This course describes the basic processes which create and alter such electromagnetic radiation before it’s detected here in the Solar System. The course will consist of a combination of lectures, problem sets and class discussion sessions. The lectures will be expanded from the material in the text and will include additional material on the astrophysical and planetary context of radiative processes, drawn primarily from the following list of references. The discussion sessions will often be based on recent problem sets - regular participation of students in class discussions is expected.

**PHYS.4610 Nuclear Physics I (Formerly 95.461/561) - Credits: 3**

Nuclear properties including size, mass, binding energy, electromagnetic moments, parity and statistics; nuclear shell model, collective structure, deformed shell model, radioactive decay law and the Bateman equations, radioactive dating, counting statistics, energy resolution, coincidence measurements and time resolution, lifetime measurements; nuclear barrier penetration; angular momentum, Coulomb barrier, alpha decay and systematics, fission. (offered as 95.561 for graduate credit).

**PHYS.4620 Radiation Biology (Formerly 95.462) - Credits: 3**

Effects of ionizing radiation on cellular, molecular and organ systems levels of biological organization; Study of x-rays, gamma rays, accelerator beams, and neutrons in interaction with living systems; Cohesive treatment of radiation biophysics with applications in health physics and radiation oncology. (offered as 98.562 for graduate credit)

**PHYS.4630 Computational Methods in Physics - Credits: 3**

A practical overview of advanced computational methods currently used in physics research using kinetic, fluid, and spectral approaches, as well as other practical applications that physics researchers may encounter, such as high-performance computing and grid construction. The course will focus on hands-on experience with coding the algorithms of finite differences, finite volume, finite elements, Monte Carlo, particle in cell, and spectral methods, and will provide the students with tools to develop and use scientific numerical models.

**PHYS.4640 Particle Astrophysics (Formerly 95.464/564) - Credits: 3**


PHYS.4690 Plasma Physics - Credits: 3
Introduction to plasma physics, focusing on the fundamental physics principles aimed at upper level undergraduate and graduate students in physics and engineering. Material covered in the course includes single particle motion in a magnetic field, particle drift, adiabatic invariants, kinetic theory moments, fluid approximation of plasma & magnetohydrodynamics, waves in plasma, shocks, resistivity, plasma instabilities, plasma kinetic theory, plasma applications, and computational plasma physics.

PHYS.4720 Solid State Physics (Formerly 95.472/572) - Credits: 3
Crystal structures, x-ray diffraction, crystal binding, lattice vibrations, free electron and band models of metals. (offered as 95.572 for graduate credit).

PHYS.4770 Solid State Electronic and Optoelectronic Devices (Formerly 95.477/577) - Credits: 3
This course is an introduction to solid state electronic and optoelectronic devices for undergraduate science students (i.e. biology, chemistry, mechanical engineering, electrical engineering, physics, etc.) graduate students just entering a scientific endeavor which utilizes solid state devices, and practical engineers and scientists whose understanding of modern electronics and optoelectronics needs updating. The course is organized to bring students with a background in sophomore physics to a level of understanding which will allow them to read much of the current literature on new devices and applications. The course will cover fundamental crystal properties, atoms and electrons, energy bands and charge carriers, excess carriers, junctions and p-n junction diodes (includes photodiodes and light-emitting diodes). Three or four practical demonstrations will also be performed with the analysis of the generated data assigned as homework. (offered as 95.577 for graduate credit)

PHYS.4780 Integrated Optics: Wave Guides and Lasers (Formerly 95.478/578) - Credits: 3
This course is a continuation of 95.477 and serves as an introduction to solid state electronic and optoelectronic devices. The course will cover bipolar junction transistors, field effect transistors, integrated circuits, lasers, switching devices, and negative conductance microwave devices. Three or four practical demonstrations will also be performed with the analysis of the generated data assigned as homework. (offered as 95.548 for graduate credit)

PHYS.4810 Mathematical Methods of Radiological Sciences (Formerly 95.481) - Credits: 3
An applied course emphasizing the mathematical skills used in radiological sciences/health physics fields, including special techniques used in radiation physics, radiation dosimetry, and radiation shielding. Computer applications will be emphasized. (offered as 98.581 for graduate credit)

PHYS.4820 Numerical Methods of Radiological Sciences (Formerly 95.482) - Credits: 3
Advanced mathematical treatment of topics covered in 98.481 with extensive application of computer techniques to problem solutions applicable to Radiological Sciences and Protection. (offered as 98.582 for graduate credit)

PHYS.4950L Special Research Problems I (Formerly 96.495) - Credits: 3
Special problems in physics assigned to the individual student with emphasis on modern research methods and preparation of results for publication.

PHYS.4960L Special Research Problems II (Formerly 96.496) - Credits: 3
A continuation of 96.495 for a second semester.

PHYS.4970L Senior Thesis in Physics (Formerly 96.497) - Credits: 3
PHYS.5170 Space Science Mission Design (Formerly 95.417/517) - Credits: 3

This one-semester, 3-credit course intended for junior level science and engineering majors, is centered around the conceptual design of a spaceflight mission. In this project-based and team-based class, students will apply their science and technical knowledge to develop a spacecraft and mission concept tailored to answer a specific science question. Students will perform quantitative trade studies consistent with real-life constraints such as cost, schedule, manufacturability, teamwork, operational environment, mission lifetime, etc. Students will 1) learn the fundamentals of key subsystems involved in a space flight mission and 2) apply their skills of inquiry, research, critical thinking to design a complete space science mission to solve a real-world problem while working within a multidisciplinary team.

PHYS.5210 Statistical Thermodynamics (Formerly 95.421/521) - Credits: 3

An integrated study of the thermodynamics and statistical mechanics, review of the experimental foundations and historical development of classical thermodynamics; probability and statistical methods of studying macroscopic systems; atomic basis of the laws of thermodynamics and microscopic definitions of thermodynamics quantities using the method of ensembles; entropy and related quantities; TdS equations, Maxwell relations, equation of state, and applications: canonical and grand canonical ensembles; phase transitions; quantum statistics; application to radiation, magnetism, specific heats. (offered as 95.521 for graduate credit)

PHYS.5350 Introductory Quantum Mechanics I (Formerly 95.435/535) - Credits: 3

De Broglie waves, the Schroedinger equation, wave functions, wave packets, Heisenberg uncertainty principle, expectation values, particle in a box, the simple harmonic oscillator, free particles, step barrier, barrier penetration, square well wave packets, Heisenberg uncertainty principle, expectation values, particle in a box, the simple harmonic oscillator, free particles, step barrier, barrier penetration, square well potential, time independent perturbation theory. (offered as 95.535 for graduate credit)

PHYS.5390 Electro-Optics (Formerly 95.439/539) - Credits: 3

Optical properties of materials, including dispersion, absorption, reflection and refraction at the boundary of two media. Crystal optics and induced birefringence and optical activity. Polarization states and Jones matrices. Applications to electro-optic devices. Experiments and projects involving the study of optical sources and detectors, spectroscopy, polarization, birefringence, pochels’ effect, optical fibers, and optical communication. (offered as 95.539 for graduate credit)

PHYS.5450L Characterization of Materials (Formerly 96.445/545) - Credits: 2

A one-semester course designed to teach the student several of the important techniques for characterizing the structural, optical, and electronic properties of materials. Experiments will include x-ray diffractometry, hardness measurements, ellipsometry, visible and near infrared spectroscopy, far infrared spectroscopy, and raman spectroscopy.

PHYS.5530 Electromagnetism I (Formerly 95.353/553) - Credits: 3

The theory of electromagnetic fields using vector analysis: electrostatic fields and potentials in vacuum, conductors, and dielectric media, magnetic effects of steady currents in nonmagnetic media, magnetic induction and time varying currents and fields. (offered as 95.553 for graduate credit)

PHYS.5540 Electromagnetism II (Formerly 95.354.554) - Credits: 3

Magnetic materials, electric multipoles, solutions to Laplace’s equation, boundary conditions, image charge problems, Maxwell’s equations; propagation of electromagnetic waves in vacuum, conductors and dielectrics; reflection and refraction of electromagnetic waves; radiation from dipoles and antennas. (offered as 95.554 for graduate credit).

PHYS.5560 Radiative Processes in Astrophysics (Formerly 95.456/556) - Credits: 3

Our knowledge of the universe beyond the Solar System is derived almost entirely from our interpretation of the radiation we receive from the universe; Our knowledge of the Earth’s upper atmosphere and the atmospheres of other solar system objects is heavily dependent on observations of electromagnetic radiation. To understand the atmospheres of Earth and other planets, stars, galaxies and the universe, we need to understand the processes which produce electromagnetic radiation, and how radiation interacts with matter and propagates through space. This course describes the basic processes which create and alter such electromagnetic radiation before it’s detected here in the Solar System. The course will consist of a combination of lectures, problem sets and class discussion sessions. The lectures will be expanded from the material in the text and will include additional material on the astrophysical and planetary context of radiative processes, drawn primarily from the following list of references. The discussion sessions will often be based on recent problem sets - regular participation of students in class discussions is expected.
PHYS.5610 Nuclear Physics I (Formerly 95.461/561) - Credits: 3

Nuclear properties including size, mass, binding energy, electromagnetic moments, parity and statistics; nuclear shell model, collective structure, deformed shell model, radioactive decay law and the Bateman equations, radioactive dating, counting statistics, energy resolution, coincidence measurements and time resolution, lifetime measurements; nuclear barrier penetration; angular momentum, Coulomb barrier, alpha decay and systematics, fission. (offered as 95.561 for graduate credit).

PHYS.5640 Particle Astrophysics (Formerly 95.464/564) - Credits: 3


PHYS.5720 Solid State Physics (Formerly 95.472/572) - Credits: 3

Crystal structures, x-ray diffraction, crystal binding, lattice vibrations, free electron and band models of metals. (offered as 95.572 for graduate credit).

PHYS.5770 Solid State Electronic and Optoelectronic Devices (Formerly 95.477/577) - Credits: 3

This course is an introduction to solid state electronic and optoelectronic devices for undergraduate science students (i.e. biology, chemistry, mechanical engineering, electrical engineering, physics, etc.) graduate students just entering a scientific endeavor which utilizes solid state devices, and practical engineers and scientists whose understanding of modern electronics and optoelectronics needs updating. The course is organized to bring students with a background in sophomore physics to a level of understanding which will allow them to read much of the current literature on new devices and applications. The course will cover fundamental crystal properties, atoms and electrons, energy bands and charge carriers, excess carriers, junctions and p-n junction diodes (includes photodiodes and light-emitting diodes). Three or four practical demonstrations will also be performed with the analysis of the generated data assigned as homework. (offered as 95.577 for graduate credit)

PHYS.5780 Integrated Optics: Wave Guides and Lasers (Formerly 95.478/578) - Credits: 3

This course is a continuation of 95.477 and serves as an introduction to solid state electronic and optoelectronic devices. The course will cover bipolar junction transistors, field effect transistors, integrated circuits, lasers, switching devices, and negative conductance microwave devices. Three or four practical demonstrations will also be performed with the analysis of the generated data assigned as homework. (offered as 95.548 for graduate credit)

RADI.1010 Radiation and Life (Formerly 99.101) - Credits: 3

This course will provide students with an understanding of the nature, sources, uses, and biological effects of natural and man-made radiations. Radiations discussed include non-ionizing radiations such as ultraviolet and microwave as well as the ionizing radiations produced by radon in homes and radio nuclides released from nuclear power plants. Students will have a better understanding of the risks and benefits of radiation in the modern world. Satisfies Gen Ed science requirements for non-science majors. Does not satisfy science requirements for Science majors but may be used as a free elective by Science majors.

RADI.1020L Radiation and Life Laboratory (Formerly 99.102) - Credits: 1

This laboratory course which is suitable for non-science majors will provide the student with an opportunity for some hands-on experience with modern equipment used to identify and quantify levels of radioactivity in the environment. Students will measure radiation from a variety of sources and will determine concentrations of radionuclides in several environmental samples including making measurements of the radon levels in the air of their own homes. Students will also study the effects of ionizing radiation on the germination and growth rate of exposed seeds. Satisfies Gen Ed science
requirements for non-science majors. Does not satisfy science requirements for Science majors but may be used as a free elective by Science majors.

RADI.1330 Technical Physics III (Formerly 99.133) - Credits: 3

Presents material in both the class and laboratory format. Reflection, refraction, mirrors, lenses, wave optics, optical instruments, Coulomb’s law, magnetic force, quantum physics, atomic physics and nuclear physics will each be addressed. One session per week. Two additional Friday night classes are required.

RADI.4810 Mathematical Methods of Radiological Sciences (Formerly 98.481/581) - Credits: 3

This course provides an overview of applied mathematical concepts that are useful in radiological sciences and protection, including special techniques for radiation physics, radiation dosimetry, and radiation shielding, with emphasis on computer applications.

RADI.5010L Radiation Safety and Control I (Formerly 98.501) - Credits: 3-4

This course provides a theoretical basis for radiological sciences and protection, with a rigorous review of the fundamentals of radiation physics including nuclear reactions, radioactivity and the kinetics of radioactive decay, natural and man-made radiation sources, the characteristics of ionizing radiation, radioactivity analysis, radiation dose quantities and measurement, external and internal radiation dosimetry, and radiation protection techniques.

RADI.5020L Radiation Safety and Control II (Formerly 95.420/98.502) - Credits: 3-4

This course provides a continuation of the theoretical and practical aspects of radiation protection provided in Radiation Safety and Control I (98.501). Topics include the statistical analyses and data reduction techniques that are used to analyze radiation measurements pertaining to the field of radiation protection. Laboratory sessions on alpha and gamma radiation measurements and air sampling will reinforce class lectures. Students also will experience applied radiation protection and dose assessment through a contamination control exercise that involves the use of protective clothing and respiratory protection.

RADI.5060 Nuclear Instrumentation (Formerly 98.506) - Credits: 3

This course provides the operating principles and applications of nuclear radiation detection systems, including detector theory, electronic signal processing, and measurement and data reduction techniques. The systems covered include gas-filled detectors (ion chambers, proportional counters, and Geiger-Mueller counters), inorganic and organic scintillators, and high-purity germanium detectors, for the detection of alpha, beta, gamma, and neutron radiation. This course also covers hypothesis testing, detection limits, and detector dead time.

RADI.5090 Nuclear Instrumentation (Formerly 96.409) - Credits: 3

This course provides the operating principles and applications of nuclear radiation detection systems, including detector theory, electronic signal processing, and measurement and data reduction techniques. The systems covered include gas-filled detectors (ion chambers, proportional counters, and Geiger-Mueller counters), inorganic and organic scintillators, and high-purity germanium detectors, for the detection of alpha, beta, gamma, and neutron radiation. This course also covers hypothesis testing, detection limits, and detector dead time. This course is adapted for Nuclear Engineering and Medical Physics majors. (offered as 98.509 for graduate credit).

RADI.5240 Environmental Health Physics (Formerly 98.524 & 94.424) - Credits: 3

Natural and man-made sources of environmental radioactivity and radiation; environmental transport in air, water, and soil; exposure pathways; environmental standards and regulations; environmental monitoring and surveys (MARRSIM); contaminated site characterization, and site remediation; environmental radiological impact of industry, accidents, and natural and man-made disasters.

RADI.5330 External Dosimetry and Shielding (Formerly 98.533) - Credits: 3

This course provides the theory and application of dosimetry and shielding for ionizing radiation sources outside the human body. Differential cross-sections, energy transfer and absorption coefficients, kerma, attenuation, and buildup are discussed for photons. Cross-sections, kerma factors, removal coefficients, diffusion, and point-source dose functions for fissioning sources are discussed for neutrons. Beta dosimetry concepts include stopping power, point-source dose functions, and the effects of attenuating materials. Heat generation and temperature profiles are discussed for irradiated materials and radioactive substances. Dosimetry concepts and barrier requirements also are described for particle accelerators, radiotherapy facilities, and medical x-ray imaging facilities.

RADI.5340 Internal Dosimetry and Bioassay
RADI.5410 Radiochemistry (Formerly 98.541) - Credits: 3

This course provides the theory and application of several analytical techniques, including precipitation, solvent extraction, ion exchange chromatography, and electrodeposition, to the separation and analysis of radioactive substances in various samples. This course also covers some common radiation detection systems, measurement and data reduction techniques, radiotracer and isotope dilution techniques, neutron activation analysis, and radioimmunoassay.

RADI.5620 Radiation Biology (Formerly 98.562) - Credits: 3

Effects of ionizing radiation on cellular, molecular and organ systems levels of biological organization; Study of x-rays, gamma rays, accelerator beams, and neutrons in interaction with living systems; Cohesive treatment of radiation biophysics with applications in health physics and radiation oncology. (offered as 98.562 for graduate credit)

RADI.5650 Introduction to Radiation Therapy Physics (Formerly 98.565) - Credits: 3

Introduction to the fundamental physics of radiation therapy, with emphasis on external beam photon and electron therapy and on brachytherapy. For these modalities, the basic operation of delivery equipment, treatment planning principles, methods of dose calculations, determination of time of irradiation from dose prescription, dose measurements, and quality assurance will be studied. This knowledge will prepare the student for an introduction to the practice of clinical physics in radiation therapy, for advanced radiation therapy physics, and research in radiation therapy physics.

RADI.5750 Certification Preparation in Radiological Sciences (Formerly 98.575) - Credits: 3

Advanced problem solving in radiological sciences including strategies for preparing for and taking professional certification examinations.

RADI.5810 Mathematical Methods of Radiological Sciences (Formerly 98.481/581) - Credits: 3

This course provides an overview of applied mathematical concepts that are useful in radiological sciences and protection, including special techniques for radiation physics, radiation dosimetry, and radiation shielding, with emphasis on computer applications.

RADI.5820 Numerical Methods In Radiological Sciences (Formerly 98.582) - Credits: 3

This course provides a more advanced mathematical treatment of the topics covered in 98.481, with extensive application of computer techniques to numerical problem solving that is applicable to radiological sciences and protection.

RADI.5980 Medical Imaging I (Formerly 98.598) - Credits: 3

Medical Imaging I is the first part of a two course sequence. Medical Imaging I provides an overview of the medical imaging modalities, teaches basic underlying physics and mathematics of medical imaging, describes key modalities in radiographic imaging, including general x-ray radiography, fluoroscopy, and mammography.

RADI.6050 Radiation Interactions and Transport (Formerly 98.605) - Credits: 3

Photon, neutron, and electron interactions and energy deposition; the Boltzmann equation, elementary analytical solutions; deterministic computational methods, including spherical harmonics and discrete ordinates techniques; continuous slowing down and Fokker Planck approximations.

RADI.6060 Monte Carlo Simulation of Radiation Transport (Formerly 98.606) - Credits: 3

Radiation transport simulation by the Monte Carlo method: phase space tracking, dose response estimators, biasing method; integral form of the Boltzmann equation; condensed history method for charged particles; neutron, photon, and electron transport calculations for medical physics and health physics applications.

RADI.6310L Professional Health Physics Internship (Formerly 98.631) - Credits: 1-3

RADI.6650 Advanced Radiation Therapy Physics (Formerly 98.665) - Credits: 3

The student will be introduced to the physics of advanced treatment techniques used in radiation therapy, which include external beam electron, proton, and photon therapy and internal brachytherapy. For these techniques, the principles of the techniques such as clinical applications, radiation delivery equipment, treatment planning methods, methods of dose calculations, determination of time of irradiation from dose prescription, dose measurements, and quality assurance will be studied. This knowledge will prepare the student for an introduction to the clinical practice of medical physics applied to complex treatment techniques used in radiation therapy.
Also, this should help prepare the student for research in radiation therapy physics.

RADI.6710L Graduate Accelerator HP Internship
(Formerly 98.671) - Credits: 3
RADI.6720 Graduate Reactor HP Internship (Formerly 98.672) - Credits: 1-3
RADI.6730L Graduate Reactor HP Internship
(Formerly 98.673) - Credits: 3
RADI.6750L Graduate Medical HP Internship
(Formerly 98.675) - Credits: 3
RADI.6760L Graduate Medical Physics Internship
(Formerly 98.676) - Credits: 1-3

Clinical Rotation under the direction of clinical staff. This course provides the student with exposure to medical physics responsibilities in a radiation oncology department, including simulation, treatment planning and preparation, monitor unit calculations, dose measurements and calculations, treatment delivery techniques, quality assurance, and radiation safety.

RADI.6770L Graduate Medical Physics Internship
(Formerly 98.677) - Credits: 3
RADI.6780L Graduate HP Internship (Formerly 98.678) - Credits: 1-3
RADI.6790L Graduate HP Internship (Formerly 98.679) - Credits: 1-3
RADI.6830L Graduate HP Internship (Formerly 98.683) - Credits: 3
RADI.6850L Advanced Medical HP Internship
(Formerly 98.685) - Credits: 3
RADI.6860L Advanced Medical Physics Internship
(Formerly 98.686) - Credits: 1-9

Clinical Rotation under the direction of clinical staff. This course involves the student in one or more projects that require skill development, extended involvement, and project completion, which includes planning and delivery of advanced radiation therapy treatments.

RADI.6870L Advanced Medical Physics Internship
(Formerly 98.687) - Credits: 3
RADI.6890L Advanced Graduate HP Internship
(Formerly 98.689) - Credits: 1

RADI.6900L Advanced Graduate HP Internship
(Formerly 98.690) - Credits: 2
RADI.6910L Advanced Graduate HP Internship
(Formerly 98.691) - Credits: 2
RADI.6920L Advanced Graduate HP Internship
(Formerly 98.692) - Credits: 3
RADI.6930L Advanced Graduate HP Internship
(Formerly 98.693) - Credits: 3
RADI.6980 Medical Imaging II (Formerly 98.599) - Credits: 3

Medical Imaging II is the second part of a two course sequence. Medical Imaging II focuses on the fundamental principles, instrumentation, image reconstruction and applications of computed tomography, radioactive tracer imaging, magnetic resonance imaging, ultrasound imaging, and new emerging imaging technologies.

RADI.7050 Supervised Teaching in Radiological Sciences (Formerly 98.705) - Credits: 0
RADI.7110 Graduate Seminar in Radiological Sciences (Formerly 98.711) - Credits: 0-1

"Variable credit course, student chooses appropriate amount of credits when registering."

RADI.7120 Graduate Seminar in Radiological Sciences (Formerly 98.712) - Credits: 0-1

"Variable credit course, student chooses appropriate amount of credits when registering."

RADI.7310L Advanced Project in Radiological Sciences I (Formerly 98.731) - Credits: 3-6
RADI.7320L Advanced Project in Radiological Sciences II (Formerly 98.732) - Credits: 3
RADI.7330 Graduate Project in Radiological Sciences and Protection (Formerly 98.733) - Credits: 3-6
RADI.7430 Master’s Thesis in Radiological Sciences and Protection (Formerly 98.743) - Credits: 3
RADI.7460 Master’s Thesis in Radiological Sciences and Protection (Formerly 98.746) - Credits: 1-9
RADI.7490 Master’s Thesis Research in Radiological Sciences (Formerly 98.749) - Credits: 9
RADI.7530L Doctoral Dissertation in Radiological Sciences and Protection (Formerly 98.753) - Credits: 3
RADI.7560 Doctoral Dissertation in Radiological Sciences and Protection (Formerly 98.756) - Credits: 1-9
RADI.7590L Doctoral Dissertation in Radiological Sciences and Protection (Formerly 98.759) - Credits: 9
RADI.7690 Continued Graduate Research (Formerly 98.769) - Credits: 9
CORE.SS Core Curriculum - (SS) Social Sciences
Perspective - Credits: 0

The Core Curriculum at UMass Lowell ensures that students are learning deeply and broadly, developing essential intellectual abilities that prepare our students for work, life, and the world. The Social Sciences perspective draws upon the empirical study of behavior, society and social relationships. Select three courses from the following: CRIM, ECON, POLI, PSYC and SOCI. No more than two courses can be from any one discipline. Discipline is defined by the course prefix; courses with different prefixes are considered as different disciplines. Interdisciplinary courses are found on the Core Curriculum site and can only fulfill one breadth of knowledge requirement. NOTE: Some courses may have specific prerequisites and/or co-requisites or are open only to majors within that discipline.

CRIM.1010 The Criminal Justice System (Formerly 44.101) - Credits: 3
This course presents a brief history of the Criminal Justice System and an analysis of its structure and function. This course required of all CJ majors and is a prerequisite for all other courses in criminal justice. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

CRIM.1150 Introduction to Homeland Security (Formerly 44.115) - Credits: 3
This course will encompass the study and relationship between those entities and institutions necessary for the protection of the United States. Course instructional material will examine the components of Federal, State and Local Police Agencies, as well as the role of Private Security and Emergency Responders needed to facilitate the implementation of the Homeland Security Act. Particular attention will be focused on Policy, Plans and Procedures at governmental and community levels.

CRIM.1410 Introduction to Policing (Formerly 44.141) - Credits: 3
This course provides an examination of the historical development of police work with special emphasis on the conflicting role expectations facing police officer.

CRIM.1510 Introduction to Corrections (Formerly 44.151) - Credits: 3
This course provides an overview of the American correction system including the history of corrections, probation, incarceration, community corrections, the prison experience and release.

CRIM.2030 Technology and the Criminal Justice System (Formerly 44.203) - Credits: 3
This course is designed to introduce students to the latest innovations in the applications of new technological advances in the criminal justice system. Topic areas include an examination of the new technology of crime commission, and the corresponding new technology of crime control strategies. Our focus will be on the application of both "hard" technology (e.g. equipment, hardware, devices, etc.) and "soft" technology (e.g. computer software programs, information systems, classification devices, and other problem-solving applications) in each of the following areas: crime prevention, police, courts, institutional corrections, community corrections and the private sector.

CRIM.2120 Weapons of Mass Destruction (Formerly 44.212) - Credits: 3
This course will center on Weapons of Mass Destruction (WMD) and their potential use by terrorists to obtain their goals. We will explore the origins, development and weaponization of Chemical, Biological, Nuclear and Radiological Systems and Devices. The course content is designed particularly for the First Responder to such incidents of WMD. The class will focus on the preparation and execution of plans and policies to counter this threat.

CRIM.2210 Criminology (Formerly 44.221) - Credits: 3
The definition and nature of crime, criminal statistics, and theories of crime causation are included. Required of all CJ majors.

CRIM.2230 Crime and the Media (Formerly 44.223) - Credits: 3
This course provides an overview about how the media portrays crime and its impact on the general public, crime, and victims and offenders.
CRIM.2330 Criminal Procedure (Formerly 44.233) - Credits: 3
Examines the rules that govern the everyday operation of the criminal justice system from investigation to sentencing and appeal. Topics include: Investigation, arrest, search and seizure, interrogation, pretrial detention and hearings, plea bargaining, trial procedures, sentencing, and appeals.

CRIM.2340 Criminal Law (Formerly 44.234) - Credits: 3
The historical origins and development of criminal law from the early common law to contemporary decisions and statutes. Constitutional and statutory factors as they pertain to criminal responsibility, capacity, crimes against persons and property, defenses to criminal charges and sentences. Sections of the Massachusetts Criminal Code and other statutes will be covered where applicable.

CRIM.2350 Introduction to the Law and Politics of Constitutional Development (Formerly 44.235) - Credits: 3
A course examining American constitutional doctrine as it has developed historically through the process of constitutional adjudication.

CRIM.2410 Physical Security (Formerly 44.241) - Credits: 3
The basic principles of physical security with emphasis on tailoring these principles to the protection of specific operations and facilities. Proper planning, appropriate design, and use of modern techniques and devices to enhance security while reducing costs are discussed.

CRIM.2430 Criminalistics I (Formerly 44.243) - Credits: 3
This laboratory course will cover basic procedures in arrest, search and seizure, and the gathering and evaluation of evidence as to admissibility, weight, and competence.

CRIM.2440 Criminalistics II (Formerly 44.244) - Credits: 3
This course is a continuation of Criminalistics I. It is intended to familiarize the student with various types of physical evidence that can be found at the more violent crime scenes. Methods of identification, preservation, collection and analysis of physical evidence relating to specific criminal activities shall be stressed. Topics shall include Bloodstain Pattern Analysis, DNA Typing, Crime Scene Reconstruction, Point of Origin Determination and evidence associated with Death Investigations, Sexual Assaults, Bombings, Arsons, Motor Vehicle Homicides, Robberies and Burglaries.

CRIM.2480 Terrorism (international and domestic) (Formerly 44.248) - Credits: 3
This course acquaints the Criminal Justice student with the concept of terrorism at both the international and domestic levels. Topics include the history of terrorism, terrorism today and terrorism in the future. Counter measures taken to respond to terrorist threats are also examined.

CRIM.2610 Juvenile Delinquency (Formerly 44.261) - Credits: 3
An examination of causative factors in the development of youthful offenders and the development and philosophy behind treatment and rehabilitative practices.

CRIM.2800 Criminal Justice Ethics (Formerly 44.280) - Credits: 3
CRIM.2910 Short Study Abroad: Selected Topics (Formerly 44.291) - Credits: 6
This is a short study abroad course, usually 3 weeks in duration. Topic and location vary.

CRIM.3120 Security Management (Formerly 44.312) - Credits: 3
Addresses the basic interdisciplinary principles of security management including planning, budgeting, organizing, staffing, directing, and controlling. This course will also cover marketing security services to management, risk management, civil and criminal liability, and labor relations. Each aspect of the course is designed to prepare security managers to face the new challenges as broader and more cost-effective protection is required with fewer resources. The course will also bring about greater awareness and understanding of the various options available in security and loss control. It will identify a number of risk areas and outline various deterrent and preventative methods.

CRIM.3230 White Collar and Elite Deviance (Formerly 44.323) - Credits: 3
This course will provide an overview of white collar crime including white collar, corporate, occupational, workplace, and organized crime.
CRIM.3260 Hate Crime (Formerly 44.326) - Credits: 3
This course examines prejudice as a motivation for criminal behavior. The criminological theory for hate crime is reviewed, as well as historical perspectives of this crime category.

CRIM.3270 Violence in America (Formerly 44.327) - Credits: 3
This course provides students with an in-depth analysis of the courses, context, and control of a wide range of violent crimes.

CRIM.3420 Criminal Profiling (Formerly 44.342) - Credits: 3
This course provides an overview of the development and character of the many types of offenders who become criminal psychopaths. The course explores the various methods used in classifying and predicting criminal behavior derived form the field of Criminology, Psychology and Forensic Science.

CRIM.3430 Forensic Psychology (Formerly 44.343) - Credits: 3
This course examines the application of psychological theories, principles, and research to issues of concern to the criminal justice system.

CRIM.3450 The Role of Women in Terrorism and War - Credits: 3
This interdisciplinary course will examine the gendered processes of war, sub-state violence, counter-terrorism/insurgency and conflict resolution. More specifically, we will review relevant conceptual and theoretical frameworks which focus on the relationships between gender, armed conflict and conflict resolution. In addition, we will examine the strategies used by women’s and feminist movements to promote specific security related policy. The class will explore cases from Africa, the Americas, Asia, Europe, and the Middle East and North Africa.

CRIM.3460 Critical Infrastructure Protection (Formerly CRIM 346) - Credits: 3
This course provides an overview on critical infrastructure and the protection. The course will cover the concept and components of the country’s critical assets and threat environment; federal government plans and how public-private partnership protection efforts are leveraged; and strategies and methods of protecting critical infrastructure.

CRIM.3470 Police Innovations (Formerly 44.347) - Credits: 3
This course is concerned with contemporary efforts to change police agencies, particularly in the United States. Contemporary reform revolves mainly around what we now know as “community policing” and this course will dwell at some length on these initiatives. Other innovations, some of which may complement community policing, and all of which are narrower in scope, are also considered.

CRIM.3480 Advanced Seminar on Weapons of Mass Destruction and Terrorism (Formerly 44.348) - Credits: 3
This course will examine the scientific and technological details of chemical, biological, radiological and nuclear (CBRN) weapons; the proliferation of these weapons and international CBRN prevention efforts (like the Nuclear Nonproliferation Treaty, the Chemical Weapons Convention, and the Biological Weapons Convention); and the threat of terrorist groups seeking to acquire and use CBRN weapons, and explore ways to improve our response to this complex threat.

CRIM.3490 Intelligence & National Security (Formerly 44.349) - Credits: 3
This course is designed to provide students with an understanding of how the U.S. intelligence community functions, where it fits in the policy making and law enforcement systems of U.S. democracy, and its role in the protection of national security.

CRIM.3500 Institutional Correction (Formerly 44.350) - Credits: 3
This course provides an in-depth examination of the history, function, structure, and operation of American adult and juvenile correctional institutions.

CRIM.3510 Community-Based Corrections (Formerly 44.351) - Credits: 3
A comprehensive review of community-based sanctions and community-based, early-release mechanisms. In addition to traditional probation and parole reviews, "new" intermediate sanctions such as electronic monitoring, intensive supervision, boot camps, day fines, day reporting centers, and community service sentences.

CRIM.3520 Decision Making Under Uncertainty - Credits: 3
In this course we explore the psychological process of making (or not making) high-stakes decisions in a range of situations. Most theories of decision making (in police, business, medical and ethical contexts) emphasize selecting the "best" course of action, yet the reality is that, in the real world, there is not always a 'best' option. Most options are high-risk and most carry negative consequences. In such instances decisions involve choosing the least-worst outcome. In this course, and drawing upon the decades of psychological research in areas of decision making (in high-and-low stakes environments), and touching on cognitive, social and neurological research we look at the psychological process of making decisions in range of high-stakes environments.

CRIM.3600 Gender, Race, and Crime (Formerly 44.360) - Credits: 3
This course examines gender and racial implications of criminal laws, criminal justice practices and programs will be examined. The position of women and racial/ethnic minorities will be assessed from the different perspectives of victims, offenders, and criminal justice practitioners.

CRIM.3650 Hate Crimes (Formerly 44.365) - Credits: 3
Hate crimes illustrate bigotry plus criminal acts. This course examines prejudice as a motivation for criminal behavior. The criminological theory for hate crime is reviewed, as well as historical perspectives of this crime category. This is a rich and comprehensive exploration that begins with understanding the psychology of prejudice and ends with reviewing genocide as a mass hate crime.

CRIM.3730 Contemporary Issues in Policing (Formerly 44.373) - Credits: 3
This course will explore a number of fundamental issues relevant to contemporary public police in America. Such issues could include, but are not limited to: the impact of police on crime and disorder; police discretion and its control; legitimacy and public support; police culture; the changing role of police in society.

CRIM.3800 Selected Topics in Criminal Justice (Formerly 44.380) - Credits: 3
An advanced course of study and examination of a variety of current issues and topics in criminal justice. Students without a sufficient background in criminal justice courses should not attempt this course. Subject matter to be announced in advance. Visit the current semester schedule on the Continuing Studies website for more details.

CRIM.3850 Crime and Mental Illness (Formerly 44.385) - Credits: 3
This course examines the realities and myths surrounding the involvement of individuals with mental illness in the criminal justice system. Material from criminal justice and psychology will be examined, with emphasis on service models that foster collaboration between mental health professionals, law enforcement, the courts, and corrections.

CRIM.3870 Criminal Mind and Behavior (Formerly 44.387) - Credits: 3
This course will explore the psychological dimensions of criminal thinking and behavior. The course will cover the psychological origins and types of crime, the multidimensional influences on criminal behavior, developmental criminal pathways, diagnoses, assessment and treatment approaches and a description of the continuum of psychopathic behavior.

CRIM.3880 Forensic Psychopathology (Formerly 44.388) - Credits: 3
This course addresses psychopathology in forensic settings, providing students with an integrative approach to understanding the multiple causes of psychological problems and disorders of adult and juvenile offenders as well as crime victims including biological, social, emotional, cognitive, and behavioral influences.

CRIM.3900 Criminal Justice Research Methods (Formerly 44.390) - Credits: 3
An introduction to research methods for the criminal justice professional including terminology, standard methodologies, and elementary statistics. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

CRIM.3950 Statistics in Criminal Justice (Formerly 44.395) - Credits: 3
This course is an extension of concepts learned in 44.390 (Introduction to Criminal Justice Research Methods). Statistics will be utilized as a mathematical language for interpreting the interrelation of social forces impacting criminality and deviance. The course will focus on how various statistics are calculated, but more importantly, the meaning of these figures for criminal justice scholars and practitioners will be discussed.

CRIM.3970 Crime Mapping (Formerly 44.397) - Credits: 3
This course examines the use of new technologies to analyze
crime patterns and develop crime prevention strategies. Students study theories that explain the geographic distribution of crime and learn how to use Geographic Information Systems to study crime in ways that draw upon theory as well as how to apply GIS techniques in the law enforcement and corrections fields.

CRIM.3980 Criminal Justice Data Analysis (Formerly 44.398) - Credits: 3
The student is introduced to computer software packages (i.e. SPSS) used to analyze large quantitative data sets common in criminal justice/criminology. This course is seen as the capstone to the research methods/technology component of the major, and is intended for upper level students, especially those preparing for graduate study.

CRIM.4010 Substance Abuse and Crime (Formerly 44.401) - Credits: 3
Covers the problems posed by substance use/abuse and examines the role and impact of the legal, criminal justice, and public health systems, as well as current treatment/intervention approaches.

CRIM.4180 American Courts and Judicial Process (Formerly CRIM.418) - Credits: 3
This course will study the organization of and the processes employed by American Courts in an intensive participation format. Traditional text lessons on the U.S. Court system will be supplemented by simulations and mock trial problems. Using this two track approach, students will learn about the courts and simultaneously develop the analytical, critical reasoning and public speaking skills used in the Judicial system.

CRIM.4220 Victimology (Formerly 44.422) - Credits: 3
This course examines the patterns of victimization, the characteristics and lifestyles of crime victims, and the impact of their victimizations. The treatment of victims by the criminal justice system will be examined along with possible reforms in these approaches.

CRIM.4770 Intimate Partner Violence (Formerly 44.477) - Credits: 3
This course examines the causes and consequences of domestic violence and the latest research regarding the responses of the criminal justice system.

CRIM.4780 Child Maltreatment (Formerly 44.478) - Credits: 3
This course introduces students to empirical findings and theoretical perspectives concerned with the maltreatment of children and youth. One of the major course goals is to balance the view of children and youth in the criminal justice system by focusing of their victimization instead of exclusively on their offending behavior.

CRIM.4890 Capstone Seminar in Criminology & Criminal Justice (Formerly 44.489) - Credits: 3
This course is designed to provide criminal justice majors with a capstone experience emphasizing integration of knowledge acquired in previous courses on the causes of criminal behavior and responses to it, particularly the institutions, policies and practices of the criminal justice system. Students engage in the development and production of a senior level research paper grounded in relevant criminology and criminal justice literature.

CRIM.4900 Criminal Justice Honors Seminar (Formerly 44.490) - Credits: 3
Specific practice in the definition, design, and execution of a research project, and an analysis of the impact of contemporary criminal justice research on policy development.

CRIM.4910 Directed Study - Criminal Justice (Formerly 44.491) - Credits: 3
CRIM.4920 Short Directed Study (Formerly 44.492) - Credits: 1
This course is designed as an independent study of a subject with Chair's permission.

CRIM.4930 Issues in Technology and Security (Formerly 44.493) - Credits: 3
An examination of the causes and consequences of computer crime as well as the criminal justice system's response to the problem.

CRIM.4950 Criminal Justice Field Studies (Formerly 44.495) - Credits: 6
This is an intense internship program for Criminal Justice majors which requires approval by the Department Chair.

CRIM.4960 Criminal Justice Internship (Formerly 44.496) - Credits: 3
Assigned fieldwork under the supervision and with the permission of the instructor assigned to the course. The purpose is to broaden the educational experience of pre-service students in law enforcement, probation, and correctional agencies within this area. This course is designed to provide a correlation of theoretical knowledge with practical experience in an area of particular interest to the student.

**CRIM.4970 Terrorism Internship - Credits: 3**

This course is a semester long internship with the Center for Terrorism & Security Studies (CTSS) where students will work on one or more of the center’s research projects. After an initial period of training in data collection and coding, CTSS interns will then work under the supervision of Center faculty and staff.

**CRIM.5010 Criminological Theory: Foundations (Formerly CRIM 501/521) - Credits: 3**

This course provides a detailed examination of the best known and most influential theories of crime causation. Topics include: theory construction, hypothesis testing, theory integration, and the links among theory, research, and policy.

**CRIM.5200 Administration of Justice (Formerly 44.503/CRIM 520) - Credits: 3**

An examination of the components of the criminal justice system and a review of the administration of federal, state and local criminal justice agencies, including a focus on criminal law and procedure.

**CRIM.5210 Managing Justice Organizations (Formerly 44.570/CRIM 521) - Credits: 3**

A range of criminal justice management issues are addressed, including organizational structure, purpose, rewards and relationships, leadership and management styles, and the development of effective change strategies by criminal justice agencies. The complex role of the criminal justice manager in both the adult and juvenile justice system is emphasized.

**CRIM.5230 Issues in Policing - Credits: 3**

The course provides a foundation for understanding policing in the United States. The American public has voluntarily given the police the right to use coercive force; and yet, the modern police force is often taken for granted with little analysis of its function in a free society. The implications of this function provide the context for the current course, which reviews fundamental issues, both historical contemporary, in policing a democratic society. Such issues include, but are not limited to: the police function, culture, discretion, misconduct, legitimacy, accountability, and contemporary reforms.

**CRIM.5240 Issues in Corrections (Formerly 44.550/CRIM 524) - Credits: 3**

This course reviews the development of institutional corrections and the issues surrounding the punishment of criminals in secure settings. The course also surveys the management of correctional institutions, including custody, classification, reception, programming, release, staffing, scheduling, collective bargaining, prisoners’ rights, and other related issues.

**CRIM.5250 Juvenile Justice and Youth Crime (Formerly CRIM.525) - Credits: 3**

Examines the historical development of juvenile justice in the U.S., how the juvenile justice system operates, the rationale for treating juveniles differently from adults, and the extent of youth crime in the United States according to official statistics and self-report data.

**CRIM.5400 Criminal Profiling (Formerly 44.542/CRIM 540) - Credits: 3**

An overview of the development and characteristics of violent offenders, some of whom will evolve to become criminal psychopaths. The class provides an analytical understanding of the unique characteristics of serial criminals and the methodologies used to commit their crimes.

**CRIM.5410 Forensic Psychology (Formerly 44.543/CRIM 541) - Credits: 3**

This course applies psychological theories, principles, and research to issues of concern to the criminal justice system with a special focus on the intersection of the mental health and criminal justice systems.

**CRIM.5600 Gender, Race & Crime (Formerly 44.560) - Credits: 3**

The implications of criminal laws, criminal justice practices and programs. Focus on inequalities based on gender, race and class.

**CRIM.5660 Transportation Systems Safety and Security (Formerly 44.566) - Credits: 3**

This course will look at safety, security and emergency management with regard to transportation operations; multimodal transportation security threats, vulnerabilities, risk and strategies to mitigate and incident; and the security of supply chains and critical infrastructure. The course will use case studies to provide the student with the knowledge, skills, and
abilities to effectively safeguard the movement of assets within interconnected transportation networks.

CRIM.5700 Crisis and Emergency Management  
(Formerly 44.513/CRIM 570) - Credits: 3

This course will provide a broad introduction to the critical challenges of disaster management. The course will address past and present strategies for reducing and responding to hazards posed by both manmade and natural disasters. Emphasis will be placed on what we can learn from the history of disasters, and on how we can apply those lessons to the management of future events.

CRIM.5710 Domestic Terrorism and Violent Extremism  
(Formerly 44.526/CRIM 571) - Credits: 3

This course examines the evolution and contemporary nature of domestic terrorist threats and violent extremist movements that the U.S. has confronted over the past several decades. Special attention is focused on right-wing militias, religious extremists, racial supremacist/hate groups, and extreme environmental and animal rights groups. Students will also learn about political and socioeconomic factors that enable a terrorist group’s ideological resonance, prison radicalization, the role of the Internet in mobilizing individuals toward violent behavior, and the legal and criminal justice dimensions of responses to terrorism.

CRIM.5720 Comparative Terrorism and Counterterrorism  
(Formerly 44.549/CRIM 572) - Credits: 3

This course examines a broad spectrum of terrorist groups and counterterrorism responses in over a dozen countries, including Colombia, Germany, India, Israel, Italy, Northern Ireland/UK, Pakistan, Somalia, Spain, Sri Lanka, Turkey and Yemen. This comparative analysis will help students develop and understanding of patterns and trends within political violence (including radicalization, tactics, financing, targeting behavior, malevolent creativity, disengagement and de-radicalization) and the many different policies and strategies adopted by governments in response to terrorist threat.

CRIM.5730 Threat Assessment and Risk Management  
(Formerly 44.554/CRIM 573) - Credits: 3

The goal of this course is to enhance understanding and increase expertise regarding risk management and the impact of terrorism on economic and other critical infrastructures in the United States. The course will provide the tools (operational and statistical) and technology required to mitigate these risks.

CRIM.5740 Overview of Homeland Security  
(Formerly 44.567/CRIM 574) - Credits: 3

The U.S. has embraced the homeland security monolith without a full understanding of what it encompasses. This course provides a comprehensive overview of homeland security and defense as undertaken in the United States since 9/11. The course critically examines the current body of knowledge with a specific focus on understanding security threats, sources, and reasons for these threats. The roles of the key players at the federal, state and local levels, the policies and procedures enacted since 9/11, and the homeland security system in practice are also examined.

CRIM.5750 Contemporary Security Studies  
(Formerly 44.568/CRIM 575) - Credits: 3

This course examines the complex nature of key domestic and international security threats and responses. Topics include terrorism and insurgency, transnational organized crime, WMD proliferation, cyber-security, intelligence, national and homeland security strategies, critical infrastructure protection, and theories of international security.

CRIM.5780 Intelligence Analysis Policy and Practice  
(Formerly CRIM.578) - Credits: 3

Students will examine the tradecraft of intelligence collection and analysis from various perspectives. Topics will include strategies, tactics, legal and ethical implications, sources, means, methods, limitations, covert action, methods of analysis, and case studies of prominent intelligence successes and failures in the last half century.

CRIM.5830 Master’s Thesis - Criminal Justice  
(Formerly 44.743/CRIM 583) - Credits: 3

CRIM.5860 Master’s Thesis - Criminal Justice  
(Formerly 44.746/CRIM 586) - Credits: 6

CRIM.5900 Descriptive & Inferential Statistics  
(Formerly 44.580/44.590) - Credits: 3

This course is a rigorous introduction to statistical inference: probability theory, confidence intervals, and hypothesis tests. The course also covers regression analysis, which is developed in a non-technical way, with an emphasis on interpretation of regression results, using examples from recent research.

CRIM.5910 Research Design (Formerly CRIM.591) -
Credits: 3

Research design is a graduate-level introduction to methodology as used in criminology/criminal justice. The course surveys the research design enterprise and covers a host of issues on the measurement and collection of data, and other procedures that influence whether a research study will lead the investigator to scientifically rigorous information. This course explains various strategies for devising social science studies, compares the relative benefits of various designs, and identifies the tools necessary to conduct studies that will yield data worthy of analysis and interpretation. This material will be valuable for students who will conduct research and administrators who must evaluate the research of others.

CRIM.5950 Program Evaluation (Formerly 44.595) - Credits: 3

A detailed examination of methods of evaluating criminal justice programs. Focuses on both process and outcome evaluation.

CRIM.6010 Criminological Theory Advanced (Formerly 44.601) - Credits: 3

The course examines contemporary criminological thought by assessing major theories that anchor the discipline of criminology. Also explores the causal structure of these theories, the level of analysis at which they reside, the assumptions that underlie them, their strengths and weaknesses, and their policy implications.

CRIM.6020 Nature and Extent of Crime and Criminals ( Formerly CRIM 602) - Credits: 3

Exposes students to the major measurement methods for the incidence of crime and prevalence of criminals. Students will become versed in using data derived from any of the three primary sources of crime statistics: police-based measures (UCR, NIBRS), victim surveys (NCVS), and self-reports of criminal behavior (Monitoring the Future, National Youth Survey).

CRIM.6030 Correlates of Crime and Justice ( Formerly CRIM 603) - Credits: 3

This course examines the nature of the relationships among attributes and indices at the individual, situational, and aggregate levels to various forms of crime and systems of justice. The implications of criminal laws, criminal justice practices, and programs are examined with a focus on inequalities based on gender and race.

CRIM.6110 Law and Social Control (Formerly CRIM 611) - Credits: 3

This course examines and analyzes the various means by which society attempts to control criminal conduct. Social control encompasses both formal and informal mechanisms and a variety of institutions and social processes to deter inappropriate conduct, if possible, and/or punish and reform such conduct. Social control has evolved considerably over time and various social control philosophies and techniques have been prevalent at one time but not in others. Because social control is a response to inappropriate conduct, the course will also provide a brief introduction to the concepts of deviance and crime and the differential social control needs and priorities posed by different kinds of inappropriate conduct.

CRIM.6120 Drugs, Crime and Justice (Formerly CRIM 612) - Credits: 3

This course surveys the historical development and contemporary context of the use of criminal sanctions to combat the use of illicit drugs. The relationship between drug use/abuse and crime is explored. The course also provides a policy analysis of the alternative means available to deal with the drugs-crime issue (legalization, decriminalization, interdiction, tougher criminalization).

CRIM.6130 Law and Public Policy (Formerly 44.573/CRIM 613) - Credits: 3

The course is an introduction to crime and the efforts to control crime through public policy. We explore the foundations of the policy-making process at the federal, state, and local levels. The course also considers broad theoretical applications pertaining to public opinion, national culture, and comparative analyses among Western democracies and their differing approaches to crime. This course employs a variety of learning tools, from roundtable discussions to policy cases.

CRIM.6220 Seminar in Policing (Formerly CRIM 622) - Credits: 3

This seminar examines the contemporary research literature in policing with a focus on the key research issues. Through a critical examination of the literature, students gain an understanding of the significant topic areas that have been pursued and develop an agenda for further research.

CRIM.6230 Seminar in Courts and Sentencing (Formerly CRIM 623) - Credits: 3

This seminar examines the contemporary research literature in adjudication and sentencing with a focus on the key research issues. Through a critical examination of the literature, students gain an understanding of the significant topic areas
that have been pursued and develop an agenda for further research.

CRIM.6250 Seminar in Juvenile Justice and Youth Crime (Formerly CRIM 625) - Credits: 3

This seminar examines the contemporary research literature concerning juvenile justice with a focus on the key research issues. Through a critical examination of the literature, students gain an understanding of the significant topical areas that have been pursued and develop an agenda for further research.

CRIM.6260 Community Based Correction (Formerly 44.650/CRIM 626) - Credits: 3

This course presents a detailed examination of current theory, research, and policy development in the field of community corrections, both nationally and internationally. Topic areas include sentencing, probation, parole, fines, community service, and intermediate sanctions (intensive supervision, house arrest/electronic monitoring, boot camps). Issues include the punishment vs. control argument, community justice models, special offender populations (drug offenders, sex offenders, mentally ill offenders, AIDS), and the cost effectiveness of community corrections.

CRIM.6300 Victimology (Formerly CRIM 522) - Credits: 3

This course examines the study of crime victims and of the patterns, impact, and formal responses to criminal victimization. Particular attention is given to research issues such as measurement of victimization, fear of crime and related measures, and conducting research with victimized populations, as well as discussion of current issues in the field of Victimology. Substantive topics may include theories of victimization, the overlap between victims and offenders, social-psychological and other impacts of victimization on primary and secondary victims, media coverage of victimization, and evaluation of prevention and intervention programs for victims (criminal justice system based programs and others).

CRIM.6310 Intimate Partner Violence (Formerly 44.622/CRIM 631) - Credits: 3

An examination of the nature and extent of intimate partner violence and an analysis of the causes and consequences of violence between partners as well as the latest research regarding the criminal justice response.

CRIM.6320 Responding to Child Maltreatment (Formerly 44.623/CRIM 632) - Credits: 3

Introduction to empirical findings and theoretical perspectives concerned with the maltreatment of children and youth. Includes an examination of prevalence rates, risk factors, consequences, and system responses.

CRIM.6400 Criminal Mind and Behavior (Formerly 44.545) - Credits: 3

This course is designed to address a broad range of topics relevant to criminal behavior and the development of the so-called criminal personality. Factors that are considered to influence the evolution of criminal mentality are examined and the laws and the past and current response of the criminal justice system to repeat offenders are explored.

CRIM.6410 Mental Health & Criminal Justice (Formerly 44.546/CRIM 641) - Credits: 3

The course focuses on how and why individuals with serious mental illness become involved in the criminal justice system, and on how the criminal justice and public mental health systems respond to that involvement. Topics include law enforcement responses, court-based strategies, mental health and corrections, community supervision of individuals with mental illness, violence and mental disorder, and unique challenges associated with female and juvenile populations.

CRIM.6420 Sex Crimes and Offenders (Formerly 44.646/CRIM 642) - Credits: 3

This course examines the nature of sex offenses as well as the mind of the sex offender, and focuses on motives, possible victims, and rehabilitation. The responses of the mental health and criminal justice systems are examined and the effectiveness of those responses is assessed.

CRIM.6500 Violence in America (Formerly CRIM 650) - Credits: 3

This course provides an in-depth analysis of the causes, context, and control of a wide range of violent crimes. Topics covered in this class include: Murder, rape, robbery, assault, and violence in the helping professions, the workplace, school, gang violence, cult violence, and institutional violence. For each form of violence, we examine issues related to (1) the extent of the problem, characteristics of the crime, victim, and offender, (2) causation, (3) crime prevention, and (4) crime control strategies.

CRIM.6510 Criminal Homicide (Formerly 44.575/CRIM 575) - Credits: 3

A survey of the nature and extent of criminal homicide. There will be five main components: statutory definitions of
homicide; theories of homicide; homicide rates over time and across jurisdictions; trends and patterns in homicide characteristics; and cross-cultural comparisons. Homicide is an important topic in criminology for three reasons: (1) it is the crime of greatest severity in any penal code; (2) it is a fairly reliable barometer of all violent crime; and (3) at a national level, no other crime is measured as accurately, precisely, and comprehensively.

CRIM.6540 Elite Deviance and White Collar Crime (Formerly 44.523) - Credits: 3

This course introduces the concept of white collar crime as an area of scientific inquiry and theory formation. It critically examines the latest scholarship on the subject by looking at white collar crime from a multiplicity of perspectives and reference points, ranging from a focus on the offense, offender, legal structure, organizational structure, individual and organizational behavior, to victimization and guardianship, with special attention on the interaction between these components. The course also pays special attention to definitional issues, typologies of white collar crime, and assesses the nature, extent and consequences of white collar crime nationally and internationally. To enhance the understanding of white collar crime in today's IT development and society, the course will pay a special attention to roles of information and technology and E-commerce within white collar crime. Finally, the course examines current criminal justice system efforts at controlling white collar crime.

CRIM.6550 Substance Abuse and Crime (Formerly 44.563/CRIM 655) - Credits: 3

This course examines the dynamics of substance abuse, the interrelationship between substance abuse and crime, and the use of both criminal and civil law to deal with the problems posed by substance abuse.

CRIM.6580 Issues in Computer Crime and Cyber Security (Formerly 44.642/CRIM 658) - Credits: 3

This course will examine the history and evolving nature of the relationship between technology, crime, and security, with a particular focus on legitimate and illegitimate Internet commerce, and cyber criminal methodologies and techniques. We will study major issues in cyber security including criminal and state-sponsored hacking; data, intellectual property, and identity theft; financial and personal data security; cyber-terrorism; tools and methods used to exploit computer networks, and strategies to protect against them; and new and emerging technologies. This course will be taught specifically for non-computer science majors, although students with computer science backgrounds are welcome for the experiences that they can bring to the class discussions.

CRIM.6640 Weapons of Mass Destruction (Formerly 44.643/CRIM 664) - Credits: 3

This course explores the threats that weapons of mass destruction (WMD) pose to the U.S. and its interests along with the strategies to meet those threats. The course will examine the technical aspects, history, and contemporary threat of each category of weapon Chemical, biological, radiological, and nuclear followed by a critical analysis of U.S. and global efforts to limit access to these weapons and prohibit their production, proliferation and use. The course will also review some aspects of WMD attack response, recovery, and mitigation.

CRIM.6650 Global Trafficking and Criminal Networks (Formerly 44.644/CRIM 665) - Credits: 3

Illicit economic activities are a global phenomenon with local impact. This course will examine the threat that global trafficking poses to a nation’s security, political stability, economic development, and social fabric. The lessons in this advanced graduate-level seminar are organized around the trafficking activities of greatest concern to the United Nations, Interpol, IAEA and other international agencies’ as well as to the U.S. Departments of State, Defense, Justice, and Homeland Security.

CRIM.6660 Terrorism Networks (Formerly 44.577/CRIM 666) - Credits: 3

This course will explore the dynamics of terrorist networks and will equip students with an understanding of the drivers of terrorist network formation, development and disintegration. The course will also provide students with knowledge and understanding of how, why and when networks expand, affiliate, and occasionally splinter. And finally, students will be guided through the applicability of network theory and analysis to the design of hypothetical operational responses and contingency planning surrounding the disruption or containment of terrorist networks.

CRIM.6670 Advanced Security Studies (Formerly CRIM 667) - Credits: 3

This course examines the complex nature of key domestic and international security threats and how nations respond to them. While the traditional focus of security studies has been the phenomenon of war, the past two decades have seen tremendous growth and expansion of the field. Some scholars have studied the threat, use and control of military force, while others have studied various forms of political violence such as terrorism, organized crime, and insurgency or armed rebellion. Research in this field also incorporates scholarship on the politics of defense and foreign policymaking, traditional
theories of international relations, comparative analysis of national and regional case studies, ethics and morality of security policies, and transnational issues like arms trafficking, piracy, and the proliferation of materials and technology for weapons of mass destruction. Overall, the study of national and international security has evolved into a complex, interdisciplinary field, as demonstrated on the list of journals and websites provided on the last page of this syllabus. Each lesson in this course draws on a large and diverse body of readings, including academic journal articles, government reports, and original source materials.

CRIM.6680 Scientific & Technological Dimensions of National Security (Formerly 44.569/CRIM 668) - Credits: 3

In this required course for the MS in Security Studies program, students will take this course to learn all about the efforts in the public and private sector to design new sensors, scanner, and the general role of science and technology in homeland and national security.

CRIM.6690 Counterterrorism Policies and Strategies (Formerly 44.576/CRIM 669) - Credits: 3

This course examines the formulation and implementation of U.S. national strategies for combating terrorism, protecting critical infrastructure, and preventing the proliferation of chemical, biological, radiological and nuclear weapons or materials that could be used by terrorists. Students will develop an understanding of the structure and operations of key federal agencies, state and local fusion centers, and examine the political, legal, moral and ethical issues of countering modern terrorism threats.

CRIM.6700 Seminar in Terrorism Studies (Formerly CRIM 670) - Credits: 3

This course will offer an in-depth examination of one more special topics within the field of terrorism. Examples include terrorist psychology, the use of women and children by terrorist groups, models of successful hostage negotiation or the use of social network analysis to understand the evolving nature of a terrorist threat. Students should consult with their advisor and the program director before registering for this course.

CRIM.6800 Selected Topics (Formerly 44.680) - Credits: 3

A comprehensive examination of a current issue in criminal justice.

CRIM.6830 Directed Study (Formerly CRIM 683) - Credits: 3

This course is designed as an independent study of a subject not offered in the standard curriculum.

CRIM.6860 Directed Study (Formerly 44.696/CRIM.686) - Credits: 6

This course is designed as an independent study of a subject not offered in the standard curriculum.

CRIM.6890 Special topics in Criminal Justice and Criminology (Formerly CRIM.689) - Credits: 3

Special topics classes are used to address timely issues that do not fit into the regular course offerings.

CRIM.6900 Advanced Regression Analysis (Formerly CRIM 690) - Credits: 3

This course focuses on statistical methods that are useful in the investigation of hypotheses in the social sciences and the analysis of public policies and programs. The bulk of the course is a detailed examination of the bivariate and multiple regression models estimated using Ordinary Least Squares (OLS), with an emphasis on constructing regression models to test social and economic hypotheses. Several special topics in regression analysis are addressed as well, including violations of OLS assumptions and the use of dummy variables, and interaction effects. Throughout, examples are drawn from the literature so students can see the models and methods in action.

CRIM.6910 Advanced Research Design (Formerly 44.691) - Credits: 3

This course focuses on measurement and data development strategies and techniques to facilitate effective statistical analysis. Topics include the logic of causal inquiry and inference, the elaboration paradigm and model specification, handling threats to internal validity, hierarchies of design structure (experimental, quasi-experimental and non-experimental), linking design structure to affect estimation strategies, and analyzing design elements in published literature. Students will select a research topic in consultation with the instructor and prepare a written comparative design analysis.

CRIM.6919 Directed Study in Criminal Justice (Formerly CRIM.691) - Credits: 3

This course is designed as an independent study of a subject not offered in the standard curriculum.
CRIM.6920 Qualitative Research Methods (Formerly CRIM 692) - Credits: 3
This course is designed to increase students' knowledge and understanding of the design and process of qualitative research in criminology. The material covered in this course includes the nature and uses of qualitative research; the design of qualitative research; grounded theory and the use of qualitative research to advance new theories and critically evaluate tenants or assumptions of widely held explanations of criminal behavior and justice system functioning; and the ethics of qualitative research. Qualitative research methodologies including ethnography, case studies, participant observation, interviewing, content analysis, and life history narrative / life course analysis will be studied. Students will develop and initiate their own qualitative research and learn first-hand about the conduct of such research, the sequencing of data collection, data analysis, and more data collection. Students will learn the uses of computer assisted software programs designed to assist qualitative data analysis.

CRIM.6930 Survey Methods (Formerly CRIM 693) - Credits: 3
This course exposes students to the use of survey methods in social science research. Emphasis is placed on interview and questionnaire techniques and the construction and sequencing of survey questions as well as the use of Likert and Thurstone sales. Attention is also devoted to sampling theory, sampling designs, and non-sampling errors.

CRIM.6940 Crime Analysis and Mapping (Formerly 44.594/CRIM 694) - Credits: 3
This course examines the use of new technologies to analyze crime patterns and develop crime prevention strategies. Students study theories that explain the geographic distribution of crime and learn how to use Geographic Information Systems to study crime in ways that draw upon theory as well as how to apply GIS techniques in the law enforcement and corrections fields.

CRIM.6990 Security Studies Capstone Research Paper (Formerly 44.699/ CRIM.699) - Credits: 3
This course represents the culminating capstone experience for students in the MA in Security Studies program at UMass Lowell. Incorporating the tools learned in CRIM.5900, Research Design and Methods, students are required to design a research question, gather and analyze information, and write a Masters level research paper of at least 50 pages on a topic of their choosing related to security studies. Students will provide drafts of their paper to their faculty supervisor periodically during the semester, and the final version will be submitted for grading on the basis of quality research and writing.

CRIM.6993 Capstone Research Paper in Criminal Justice - Credits: 3
This course is the culminating, final core requirement for the Masters in Criminal Justice. In this course, students will write an integrative research paper (generally 50-60 pages in length, double- spaced) on a topic of their choosing within the realm of criminal justice. By integrative, we mean you are expected to draw upon material you have covered in several of the courses in this program, including (but not limited to) Administration of Criminal Justice, Criminological Theory: Foundations, Descriptive and Inferential Statistics, Research Design, Managing Criminal Justice Organizations, or Law & Public Policy. You may enroll in this course at the same time as on of your elective courses, but it is assumed that you have already completed all requirements for the Masters in Criminal.

CRIM.7030 Dissertation Supervision (Formerly CRIM 703) - Credits: 3
Direct supervision with a dissertation advisor (3 credits).

CRIM.7060 Dissertation Supervision (Formerly CRIM 706) - Credits: 6
Direct supervision with a dissertation advisor (6 credits).

CRIM.7090 Dissertation Supervision (Formerly CRIM 709) - Credits: 9
Direct supervision with a dissertation advisor (9 credits).

CRIM.7100 Advanced Research in Terrorism (CRIM 710) - Credits: 3
This course focuses on describing and understanding how research and evidence-based analysis helps us to understand, explain and predict changes in terrorist behavior. The course makes use of case studies to illustrate quantitative and qualitative research methods, and to approach research questions on terrorism from multiple levels of analysis. The course will also examine successful examples of interdisciplinary research and will help students navigate the pathway from theoretically informed research on terrorism to policy and practitioner-relevant counter-terrorism.

CRIM.7110 Continued Dissertation Review (Formerly CRIM 711) - Credits: 1
Direct supervision with a dissertation advisor (1 credit).
CRIM.7900 Categorical and Limited Dependent Variables (Formerly CRIM 790) - Credits: 3

The estimation of empirical models is essential to public policy analysis and social science research. Ordinary Least Squares (OLS) regression analysis is the most frequently used empirical model, and is appropriate for analyzing continuous dependent variables that meet certain distributional assumptions. This course examines several types of advanced regression models for dependent variables that violate one or more of the assumptions of the OLS regression model. For example, some dependent variables may be categorical, such as pregnant or not, employed or not, etc. Other dependent variables may be truncated or censored, such as contributions to an individual retirement account that are limited by law to certain dollar amounts. Still others may be counts of things, like the number of children born to a given woman or the number of traffic accidents on a given day. The principal models examined in the course are binary logit and probit, multinominal logit, ordinal logit and probit, tobit, and the family of Poisson regression models. The Heckman correction for selection and Event History Analysis are also addressed. All these models are estimated using maximum likelihood estimation (MLE). The course focuses on the application and interpretation of the models, rather than statistical theory.

CRIM.7910 Structural Equation Modeling (Formerly CRIM 791) - Credits: 3

This course is an introduction to structural equation modeling (SEM). SEM represents a general approach to the statistical examination of the fit of a theoretical model to empirical data. Topics include observed variable (path) analysis, latent variable models (e.g., confirmatory factor analysis), and latent variable SEM analyses.

CRIM.7920 Survival Analysis and Longitudinal Data (Formerly CRIM 792) - Credits: 3

Criminological research often involves the study of change over time in both individuals and groups. Analyzing such over time poses a number of methodological and statistical challenges, however, and these must be addressed to derive valid inferences from data analysis. This course will examine several techniques that are appropriate for such analyses. These include the family of univariate, bivariate and multivariate techniques collectively known as "survival" or "event history analysis" that are appropriate for studying processes such as recidivism and length of time individuals spend in various programs. The course will also describe zero-inflated Poisson trajectory and latent growth curve models, as well as multilevel models for change. Emphasis will be on application as opposed to theory.

CRIM.7940 Multi-Level Modeling - Credits: 3

This course covers multilevel statistical models, which are increasingly being used in the social sciences to analyze clustered data. The course will introduce students to the theory and concepts of multilevel model and will address both the statistical and theoretical advantages to using multilevel models to analyze clustered data. The course will largely take an applied approach, meaning that it is designed to prepare students for putting the techniques covered in the course to use in a "real world" context. As such, course lectures and assignments will cover a range of relevant issues, including data acquisition, data exploration, estimation of multilevel models with statistical software, and reporting of results from multilevel analyses.

ECON.1010 The Economics of Social Issues (Formerly 49.101) - Credits: 3

Social Issues in Economics will take economic theory and apply it to public policy decisions. Topics that will be covered in the course are: Economics of crime, Should we legalize drugs, is it more economical to imprison someone for life or seek the death penalty and did the Supreme Court decision in Roe v Wade (the legalization of abortion) contribute to the declining crime rate that began in the 90,s: The economics of unintended consequences will explore how well meaning public policy sometimes backfires and has the reverse effect; health economics will look at the rising cost of healthcare and the effect of Obamacare; Taxes and poverty, is there a natural rate of poverty (does minimum wage increases actually contribute to a higher rate) and does taxing the rich less actually help the economy; Energy &Environmental economics, what is the effect of global warming, or is it global cooling, and what is the best energy mix for the 21st century and lastly, who has it right, New Keynesians or Neo-Classicals.

ECON.2010 Principles of Microeconomics (Formerly 49.201) - Credits: 3

Studies the principles of production and exchange. An introduction to demand, supply, pricing, and output under alternative market structures. Derived demand and resource markets are introduced. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

ECON.2010SI Supplemental Instruction for Economics I - Navitas only. (Formerly 49.201SI) - Credits: 1

Supplemental Instruction for Economics I - Navitas only. Credits do not count toward degree requirements.

ECON.2020 Principles of Macroeconomics (Formerly 49.202) - Credits: 3

This course studies national accounts, inflation, and aggregate
unemployment, as well as the driving forces behind business cycles and long-run growth in the context of aggregate demand and aggregate supply. In addition, it examines monetary and fiscal policy, the Federal reserve, and select additional topics, such as an introduction to open-economy macroeconomics.

ECON.2110 Statistics for Business and Economics I (Formerly 49.211) - Credits: 3

Presents descriptive statistics, sophisticated counting techniques and other components of probability, simple random variables and their distribution, bivariate functions, sampling theory properties of estimators.

ECON.2120 Statistics for Business and Economics II (Formerly 49.212) - Credits: 3

Discusses interval estimation, hypothesis testing, analysis of variance, applied regression theory, correlation analysis, and other selected topics.

ECON.3020 Labor Economics (Formerly 49.302) - Credits: 3

An introduction to the economic analysis of behaviors and institutions in the labor market: labor supply and participation, labor demand by firms, wage determination under different institutional settings, and gender, race or ethnicity as determinants of different labor market outcomes. The course presents microeconomic models, empirical findings and their public policy implications on topics such as minimum wage, affirmative action, social insurance programs, workplace safety, and subsidized day care.

ECON.3030 Microeconomic Theory (Formerly 49.303) - Credits: 3

Provides an advanced examination of price and production theory and the theory of the consumer and the firm.

ECON.3040 Macroeconomic Theory (Formerly 49.304) - Credits: 3

Building on Principles of Macroeconomics (ECON.2020), this course studies goods markets and money markets in further detail. Emphasis is placed on aggregate labor markets and also on the relationship between inflation, unemployment, and aggregate output. These topics are contextualized in order to examine aggregate economic developments in the short, medium, and long run. Optimal monetary and fiscal policies are examined against this background. Select additional topics are covered, such as the basics of open-economy macroeconomics. This course meets the Essential Learning Outcome of Critical Thinking and Problem Solving (CTPS) as defined under the Core Curriculum requirements.

ECON.3060 Urban Economics (Formerly 49.306) - Credits: 3

More than half of the world population now lives in cities. Therefore, grasping the economic dynamics of cities is a key to understanding modern economic systems. Urban economics is the economic study of cities. This course covers (I) the theories underlying cities functioning, growth and development, (II) the methods useful for examining city economies, and (II) the public policies targeting metropolitan problems. Skills in using Geographic Information System (GIS) software are also trained in this course.

ECON.3100 Development Economics (Formerly 49.310) - Credits: 3

Development Economics provides an introduction to the importance of political and market institutions in shaping the economic performance in the context of understanding economic role of institutions; theories of income distribution and distributional conflict; effect of social conflict and class conflict on development; political economic determinants of policies; causes and consequences of corruption; and importance of financial markets. The course utilizes both theoretical and empirical approaches in its analysis of economic development.

ECON.3110 Mathematical Economics - Credits: 3

Since the late nineteenth century, economics as a discipline has chosen mathematics as the main language of choice to describe the problems, hypothesis, theoretical explanation and tests it wants to study. This course aims to strengthen students’ "translation skills" so that they can become more comfortable in applying mathematical concepts to their study of economics problems. Two distinct features set this course apart from a typical upper-level economics course of a pure mathematics course. First, this course will not only sharpen students’ technical skills but will mainly emphasize on the connections between those skills and economic intuitions. Second, students will learn those mathematical tools in a more organized and intensive way, with ample economic applications.

ECON.3120 Managerial Economics (Formerly 49.312) - Credits: 3

Applies the economic theory and statistical methods to business decision making. Estimation of demand, production, cost functions and accompanying elasticity estimates, pricing and output decisions, value maximization problems, and capital budgeting.

ECON.3160 Investments: Instruments and Strategies
In this course we will look at different types of investments, from stocks, bonds and real estate to mutual funds, hedge funds and derivatives exploring how and when to use them. Students will create a diversified investment portfolio using an online trading program that incorporates products covered in class. In addition we will look at how different exchanges operate and the role of financial investments in real capital accumulation and rising living standards.

ECON.3170 Capital Markets (Formerly 49.317) - Credits: 3

ECON.3180 Financial Markets and Monetary Policy (Formerly 49.318) - Credits: 3
This course studies the formal role of money, interest rates, interest rate determination, and financial markets within the context of aggregate economic activity. These topics are related to central banks, with a focus on the Federal Reserve, and linked to money supply and the tools of monetary policy. Formal theories and practical implementation of strategies and tactics of monetary policy are addressed, as well as their implications for aggregate economic activity. This course meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Written &Oral Communication (WOC).

ECON.3190 Public Finance (Formerly 49.319) - Credits: 3
The economics of the public sector. Principles of public expenditure, taxation, and the public debt applied to federal, state, and local governments.

ECON.3250 United States Economic History (Formerly 49.325) - Credits: 3
The evolution of institutions and their functions, and sources of economic development. The contributions of railroads, agricultural population growth, immigration, capital formation and technological progress to economic development. Other areas addressed: rapid industrialization and antitrust laws; evolution of financial institutions, the creation of the Federal Reserve System, crash of 1929, the depression of the 1930s, the New Deal and various banking acts, the labor movement, the growth of international trade.

ECON.3450 Health Economics (Formerly 49.345) - Credits: 3
An introduction to the economic analysis of health care market. The course presents microeconomic models, empirical findings and public policies referring to the following topics: the production and demand for health (the investment/consumption aspects of health and the relationship between socio economic status and health status), the issues of moral hazard and adverse selection in the insurance market, the role of information in the physician-patient relationship, the different regulation and payment systems for providers, the Medicare and Medicaid programs, and the comparisons between the US system and the health systems of other western economies and developing countries. This class aims to help students becoming more informed future citizens and consumers or producers of healthcare. Prerequisites: 49.201 or instructor’s approval. Meets Core Curriculum Essential Learning Outcome for Critical Thinking &Problem Solving (CTPS) and Social Responsibility &Ethics (SRE).

ECON.4010 Special Topics in Economics (Formerly 49.401) - Credits: 3
Special Topics in Economics is a course for advanced undergraduates in Economics. The content will vary from semester to semester depending on the research interests of the Faculty member teaching the course.

ECON.4020 Industrial Organization (Formerly 49.402) - Credits: 3
The field of Industrial Organization studies the behaviors of firms in imperfectly competitive markets. Its importance is best illustrated by understanding limitations of perfect competition. By definition, a perfectly competitive firm takes the market determined price as given and therefore has absolutely no control over price. Consequently, there is no room for any pricing strategy, not room for advertisement, and the firm has little incentive to conduct R&D or merge with other firms. All these business practices that we see every day must be discussed and analyzed in a setting of imperfect competition - the main focus of Industrial Organization.

ECON.4030 International Trade (Formerly 49.403) - Credits: 3
This course is devoted to the study of why countries trade the products they do and the attendant benefits and costs of trade. The course covers both the main theories of international trade, and their empirical applications.

ECON.4060 International Macroeconomics - Credits:
This course is part of the two sub-disciplines that compose the overall discipline of International Economics, with the other sub-discipline being International Trade. As such, International Macroeconomics is complementary to International Trade, but neither course is a prerequisite for the other. This course provides an overview of open economy macroeconomics, and international financial markets and policies. The focus is on exchange rate determination, the importance of the balance of payments for both the domestic economy and the economies of other countries, international capital flows, the impact of internal debt on the balance of trade, and the interaction and potential conflicts between domestic and international economic policy objectives.

ECON.4070 Econometrics (Formerly 49.407) - Credits: 3

This course covers regression analysis including ordinary least squares, bivariate and multiple regression. In addition to basic regression technique and inference issues, specific topics related to OLS, such as interaction terms and quadratic forms together with more advanced techniques such as panel data and instrumental variables will be covered. This course will be held in a teaching lab using the STATA software package widely used by economists and other social scientists. You will learn how to use STATA for the following: importing data from an external source into STATA; inspecting and becoming familiar with the dataset; producing the main descriptive statistics for the dataset (e.g., mean, median, standard deviation and scatter diagrams); analyzing the data to test hypotheses of interest.

ECON.4090 Innovation and Development - Credits: 3

This course integrates ideas from the history of economics with national development experiences to construct a theory of development. Fundamental to economic development is the innovation process through which business enterprises, situated in particular nations, generate productivity. The first part of the course focuses on the advanced nations, particularly Britain, United States, and Japan. Then we look at the emerging economies of South Korea, Taiwan, Singapore and Hong Kong, followed by the emerging economies of China and India. We explore why Russia is lacking in innovative enterprise. We conclude by asking how the integration of the theory and history of economic development can inform strategies to promote economic development characterized by stable and equitable growth.

ECON.4100 Economic Growth and Development (Formerly 49.410) - Credits: 3

In this course, we try to solve the puzzles of why some countries are so rich and some are so poor and why some countries grow so quickly and some grow so slowly. After introducing the basic analytical framework, we will investigate various possible reasons in explaining the observed country differences. Those possible explanations include differences in countries’ investment rates, population growth rates, human capital accumulation rates, production technologies, openness to international trade, and government policies. Issues of income inequality and their effect on economic growth will also be addressed. This course is designed for Economics majors or minors who have fulfilled the following prerequisites, and master level students from other departments, such as the Regional Economic and Social Development Department. Pre-req: 49.201 Economics I (Microeconomics) 49.202 Economics II (Macroeconomics)

ECON.4150 Introduction to Environmental Economics (Formerly 49.315/415) - Credits: 3

This course provides an introduction to the field of environmental and natural resource economics. It is designed to give students an overview of how economic principles can be applied to environmental management and policy. Topic areas and applications include evaluation of environmental policies, valuation of environmental goods and services, climate change, and management of renewable and non-renewable resources. Students will learn to critique articles and other media and have intelligent discussions related to the topics listed above.

ECON.4160 Experimental and Behavioral Economics - Credits: 3

This course will introduce students to the experimental economics methodology. Experimental economics utilizes lab and natural experiments to investigate decision-making and motivations for observed behavior. After and overview of the method, the course will explore several specific topics where experimental economics has made particular contributions to the discipline. Experimental results often motivate theories of behavior that incorporate concepts such as altruism, reciprocity, and inequality aversion. Such, non-traditional, models of behavior were once considered to be solely the realm of psychology. As a result, this course will also serve as an introduction to behavioral economics - the incorporation of motivations other than self-interest into one’s utility function.

ECON.4850 Internship in Economics (Formerly 49.485) - Credits: 1-3

Economics majors who locate an internship experience in a public or private, profit or non-profit organization which provides an opportunity to observe and apply Economics concepts to decision making and processes in the production of goods or services may with permission of the Economics Department chair receive three credits for satisfactory completion of the experience. Students are expected to have
completed over 20 credits of economics classes before undertaking the internship. A five-page paper describing what was learned in the internship together with a note from the student’s supervisor indicating hours worked and satisfactory completion of assigned work is required.

ECON.4991 Independent Studies (Formerly 49.499) - Credits: 1-3
A course to permit the advanced student to do research in topics of special interest in economics under faculty supervision. This course also may be utilized to offer topics to individual students where there are insufficient number of registrants for a regular class. Restricted to Economics majors.

ECON.5130 Foundations Of Comparative Regional Development (Formerly 57.513)(Formerly POLI.5130) - Credits: 3
This course offers an initial grounding in economic, historical, political, and sociological methodologies and introduces discipline-based and interdisciplinary approaches to regional development. It introduces students to: identifying and assessing structural factors influencing regional development, defining regional development challenges, and generating problem-solving strategies and public policies. The course highlights the relationship between theory and application, and looks at development at the community, national, and international levels. It makes extensive use of case materials on regional development, including a unit on the development of the Massachusetts economy. Students will learn how to find, prepare and analyze data on regional economies and will learn several basic quantitative tools for regional analysis.

ECON.5150 Politics and Economics of Public Policy (Formerly 57.515)(Formerly POLI.5150) - Credits: 3
The course will provide students with both a set of analytical frameworks to understand how and why specific public policies develop, and a set of normative perspectives to assess what makes for good public policy. Our treatment will be interdisciplinary drawing from areas of economics and political science. Following some grounding in the political economy of the role of government and policy making in a market based economy such as the United States, we will do case studies to understand and to evaluate policies from a variety of current areas of interest to the students and professors. Students will be introduced to basic ideas of cost benefit analysis, program evaluation, and implementation analysis.

ECON.7300 Microeconomic /Organization Theory (Formerly 49.730) - Credits: 3
This course is an introduction to microeconomic theory. The focus in on the behavior of individual consumers and firms in competitive settings. Topics will include consumer preferences and utility, consumer choice, market demand, production theory and market structure.

ECON.7310 Statistics (Formerly 49.731) - Credits: 3
This course covers descriptive statistics, random variables and expected value, discrete and continuous probability distributions, joint distribution functions, sampling distributions, point and interval estimation, and hypothesis testing, and non-parametric statistics. This course will also provide a brief introduction to linear regression and analysis of variance (ANOVA).

ECON.7330 Econometrics I (Formerly 49.733) - Credits: 3
After a brief review of the required mathematics for the course, the primary focus will be on the multivariate linear model. Topics include: consistency and asymptotic normality of the parameter estimates, sampling distributions, hypothesis testing, parameter restrictions, and specification test and corrections for violation of model assumptions. This course will also include working with various statistical packages.

ECON.7340 Econometrics II (Formerly 49.734) - Credits: 3
This course is a continuation of Econometrics II; the focus will be on the more advanced techniques used in estimation and inference problems in social science research. Possible topics include nonlinear models, the generalized method of moments, limited dependent variable and sample selection problems, multi-equations models, time-series models, and panel data analysis. Statistical packages will be utilized for a hands-on approach to the techniques.

FAHS.2200 Designing the Future World (Formerly 57.220) - Credits: 3
All purposeful human activity involves design. Every day we are surrounded by the products of design processes–buildings, cars, entertainment, corporations, schools, even laws and regulations. They make our lives easier in many ways, but they may also create significant social and environmental problems. In the past, designers often did not consider the impact of their designs on society, or ignored the negative consequences. Our culture and legal system usually permitted, or even encouraged, this irresponsibility. Today, a small group of scholars, businessmen and women, and activists are rethinking how we design the things around us, with the goal of addressing the most pressing social and environmental issues. This class will introduce students to some of these issues, the people who are confronting them, and the ways in which all of us can
contribute to designing a better Future World. With a series of hands on projects, coupled with readings and other resources, students will work to design aspects of the future. In the process you will learn about possible solutions to complex, important problems, but also learn valuable life skills such as problem framing, problem solving, critical thinking, active learning, communication, and simple construction methods. No previous experience is required-only curiosity and eagerness to learn.

FAHS.3601 Creative Community Workshop (SS) - Credits: 1-3

This course seeks to motivate and guide students toward the improvement of their community in a measurable, actionable, and continuable manner. The course encourages creativity and promotes serviceable thinking, from concept to delivery. Students will be expected to work in a team structure to solve problems, process information, explore and pursue entrepreneurial opportunities, make decisions, communicate verbally within their team and being able to present their ideas to external audiences. The course satisfies Social Sciences Perspective (SS).

HONR.3400 Seminar: Special Topic in Honors (Social Science Perspective) - Credits: 3

Seminar: Special Topics in Honors offers students the opportunity to engage in depth with a subject that is of special interest in an Honors-level seminar. The course will address an inquiry-based topic that spans or falls outside the boundaries of any individual major on campus, but integrates methodology, content, and/or approaches from two or more.

HSCI.3060 Introduction to Gerontology (Formerly 30.306) - Credits: 3

This course examines human aging from a multidisciplinary and developmental perspective. The course will focus on the adult years of the life span. The social-psychological factors involved in adjustments to the aging process, to retirement, to family, to leisure, to aloneness, to death and bereavement will be discussed together with such special concerns of the elderly as widowhood, finances, religion, sexuality and health problems. Rehabilitative strategies such as remotivation and reality orientation are included.

HSCI.3080 Global Health (Formerly 30.308) - Credits: 3

The focus of this course is on examining health issues from a global perspective including issues related to maternal and child health, aging, infectious diseases, sanitation, and health inequality. Nutritional and environmental health issues in diverse societies are analyzed. Social determinants of health and access to health care in developing and developed countries are emphasized. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

LGST.1030 Introduction to Paralegal Studies (Formerly 41.103) - Credits: 3

This course familiarizes students with the role of paralegals in both the public and private sector. Other topics include principles of jurisprudence and basic legal concepts and terminology.

LGST.2100 Restorative Justice (Formerly PCS.205/41.210) - Credits: 3

This course will introduce students to the fundamental principles and practices of restorative justice as a method of building positive peace. Students develop a working knowledge of the general theories of restorative justice, as well as practical hands-on experience with peacemaking techniques. Traditional assumptions about justice and the adversarial legal process will be explored and challenged. The relationship between restorative justice, restorative practices, and other conflict resolution methods such as mediation will be discussed. Practical challenges in implementing restorative justice on the ground will also be examined.

LGST.2340 Criminal Law (Formerly 41.234) - Credits: 3

This course studies substantive criminal law, with emphasis on general principles of criminal culpability, such as the act requirement, the mens rea requirement, and causation. Topics include detailed coverage of the elements of personal and property crimes, such as homicide, rape, assault, battery, robbery, burglary, theft, arson, and fraud. The course will also cover the law of attempted crimes, accomplice liability, and defenses.

LGST.2500 Disability and the Law: Legal Rights of People with Disabilities (Formerly 41.250) - Credits: 3

This course examines the history and progress of the disability rights movement in America, the current state of the law, trends, and prospects for the future, with particular focus on those laws designed specifically to address the needs of people with disabilities.

LGST.2610 Introduction to Legal Concepts (Formerly 41.261) - Credits: 3

This course serves as an introductory legal course. It is a survey of many specific topics, such as constitutional law, contracts,
intellectual property law, and current legal topics of interest. More importantly, the course emphasizes critical legal thinking, legal ethics, and human values.

LGST.2620 Introduction to Business Law (Formerly 41.262) - Credits: 3

This course introduces students to the fundamentals of business law. The main emphasis is on key aspects of contract law, including the agreement, consideration, writings, third-party rights, illegality, performance, breach, defenses, and remedies. The course also covers agency law, employment law, sections of the Uniform Commercial Code, and a variety of other legal issues and topics that influence and intersect with modern business practices. This course is highly recommended for pre-law students, CPA students, and paralegal students.

LGST.2870 Legal Writing (Formerly 41.287) - Credits: 3

This course trains students to produce effective legal work product as drafters of client letters, memoranda of law, pleadings, briefs, and other legal documents.

LGST.3600 Legal Issues in Racism (Formerly 41.360) - Credits: 3

This course presents a study of racial discrimination in the United States. Emphasis is placed on relevant constitutional provisions, statutory provisions, and on United States Supreme Court cases.

LGST.3630 Corporate and Property Law (Formerly 41.363) - Credits: 3

This course studies the law pertaining to business entities and structures. Partnerships, limited partnerships, and joint ventures are studied at the outset of the course. The main emphasis is on elements of the corporate structure. The last part of the course deals with personal and real property with coverage of wills and trusts. This course is highly recommended for pre-law students, CPA students, and paralegal students.

LGST.3650 The Legal Environment of Business (Formerly 41.365) - Credits: 3

This class explores the intersection of business and the law in modern American society. This class builds on the concepts covered in Business Law and explores current legal topics that affect doing business in the United States and abroad. Topics covered may include the U.S. Constitution and the courts system, white collar crime, cyber law, the laws of intellectual property, international trade, consumer protection, bankruptcy, product liability, administrative law, and labor and employment law, amongst others.

LGST.3660 International Law (Formerly 41.366) - Credits: 3

This course provides a broad introduction to international law with emphasis on current issues. Within public international law, topics covered will include the recognition of new states, organizations such as the United Nations and the European Union, the use of force, human rights, international crimes, the global environment, and international courts and tribunals. Within private international law, topics surveyed will include legal aspects of international trade and foreign investment, labor, intellectual property, cyber theft, and taxation. Current issues discussed will include global warming, recent corruption scandals, the Eurozone crisis, and legal issues facing global technology companies.

LGST.3670 Environmental Law (Formerly 41.367) - Credits: 3

This course examines the legal and administrative problems of protecting the quality of the human environment. Federal and state legislation on environmental policy is studied. Public interest litigation as a supplement to the enforcement of environmental law is discussed. The course also focuses on the practical problems of balancing the needs of business, the global competitiveness of the United States, the increasing demand for natural resources, and the need to protect, preserve, and restore the environment. The importance of sustainable development and environmental ethics are discussed.

LGST.3700 Real Estate Law (Formerly 41.370) - Credits: 3

This course examines contracts for the sale of real estate, deeds, title examinations, security for real estate transactions, methods and problems of co-ownership, zoning ordinances, brokerage contracts, leases and landlord, and tenant rights and liabilities.

LGST.3720 Sports, Entertainment and Art Law (Formerly 41.372) - Credits: 3

This course challenges students to engage in analytic reading, critical thinking and problem solving related to the legal issues facing the sports, entertainment and art worlds. Topics may include contracts, intellectual property rights, employment law, labor law, and other areas of interest.

LGST.3760 Family Law (Formerly 41.376) - Credits: 3

This course examines the law pertaining to business entities and structures. Partnerships, limited partnerships, and joint ventures are studied at the outset of the course. The main emphasis is on elements of the corporate structure. The last part of the course deals with personal and real property with coverage of wills and trusts. This course is highly recommended for pre-law students, CPA students, and paralegal students.
This course studies the critical family law issues facing society today. Subject matter examined may include the law of marriage, custody, adoption, divorce, child support, juveniles, right to die, fetal tissue transfer to prolong the life of another, reproduction control, and surrogate parenting. This course is taught from a legal and human values perspective.

LGST.3770 Elder Law (Formerly 41.377) - Credits: 3
This course introduces students to the major architectural components of the legal environment of the elderly, including Medicare, Medicaid, SSI, pensions, nursing homes, assisted living, estate management, and related issues.

LGST.3780 Comparative European Community Law (Formerly 41.378) - Credits: 3
This course deals with the relationship between European Community law and the law of the United States; the operation and impact of community law in the United States; and the role of the European courts in interpreting community law. International treaties, laws, and regulations affecting the free movement of people, goods and services are traced.

LGST.3790 The Relationship of Law, Logic, and Ethics (Formerly 41.379) - Credits: 3
This course examines the impact of ethical viewpoints on the structure of legal doctrines. It stresses the fact that the study of law is a study of ethics as well as logic.

LGST.3810 Women and the Law (Formerly 41.381) - Credits: 3
This course presents legal issues that often or particularly affect women. Topics may include sex discrimination, sexual harassment, rape, marriage, divorce, reproductive control, surrogate motherhood, and custody.

LGST.3830 Alternative Dispute Resolution (Formerly 41.383) - Credits: 3
The traditional trial is becoming increasingly rare in modern civil litigation; the large majority of disputes are resolved by other techniques. This course will examine alternative methods of dispute resolution such as negotiation, mediation, arbitration, and the mini trial.

LGST.3850 Immigration Law (Formerly 41.385) - Credits: 3
Studies the immigration, nationality, and naturalization laws of the United States. The topics discussed are: the immigrant selection system, the issuance of immigrant and nonimmigrant visas; grounds of excludability of aliens and waiver of excludability; grounds for deportation of aliens and relief from deportation; and change of status within the United States including legalization, refugee, and asylum status.

LGST.3860 Intellectual Property (Formerly 41.386) - Credits: 3
This course surveys the law of the protection of ideas, trade secrets, inventions, artistic creations, and reputation. The course will briefly review the law of patent, trademark, copyright, trade secret, and geographical indication. The course will cover the distinction between the various forms of intellectual property, and the statutory and common law methods of enforcing rights.

LGST.3870 Legal Research Methods (Formerly 41.387) - Credits: 3
This course introduces students to the fundamentals of legal research and writing. Students will gain hands-on experience in legal research and in the reporting of such research in written assignments, case briefs, and memoranda.

LGST.3880 Directed Study: Law (Formerly 41.388) - Credits: 3
This course permits students to engage in specialized study under the supervision of faculty.

LGST.3900 Litigation (Formerly 41.390) - Credits: 3
This course examines the practices and procedures involved in the litigation process. Topics may include: legal research, courts and jurisdictions, evidence and discovery, pleadings, motions, depositions, trials and appeals, and federal rules of procedure.

LGST.3920 Wills, Trusts and Estates (Formerly 41.392) - Credits: 3
This course provides an introduction to the law of wills, trusts, and estates. This course covers the fundamental legal concepts and vocabulary necessary to understand, draft, and work with the core estate planning tools. Practical examples and sample legal cases and materials will be provided and discussed. No prior legal knowledge is required, though some familiarity with the United States legal system or case law will be helpful.

LGST.4880 Directed Study in Law (Formerly 41.488) - Credits: 1-6
This course permits students to engage in specialized study under the supervision of faculty.
LGST.4890 Seminar in Law (Formerly 41.489) - Credits: 3
The course provides opportunity for small groups of advanced students to study selected legal topics.

LGST.4900 Legal Aspects of Cyberspace (Formerly 41.490) - Credits: 3
This course introduces students to the law of the Internet and regulation of lawful and unlawful computer activities. Traditional notions about privacy, defamation, contracts, freedom of expression, pornography, stalking, jurisdiction and intellectual property are challenged by the latest cyberspace technology. Much of the debate about control, which leads to questions about rights and responsibilities, centers around who, if anyone, should design the legal architecture of cyberspace. These and other topical subjects serve as the focus on the study of legal issues in cyberspace.

LGST.4970 Legal Studies Practicum (Formerly 41.497) - Credits: 3
This course consists of assigned fieldwork under the supervision and with the permission of the coordinator. The course is designed to broaden the educational experience of legal studies students by providing exposure to selected legal environments such as corporate legal departments, financial institutions, law firms, real estate departments, banks and government offices and agencies. This provides a correlation of theoretical knowledge with practical experience in an area of interest to students.

PCST.1250 Introduction to Peace and Conflict Studies (Formerly PCS 125) - Credits: 3
This course will focus on the causes of conflict, conflict resolution methods, and ways to sustain peace. The course will explain and define each of those areas. A mid-term will be administered to examine the students' grasp of the concepts and key terminology. The second part of the class will emphasize student participation and the application of concepts learned earlier in class. The final is a take home exam that will require the application of theory and praxis in the field of Peace and Conflict Studies.

PCST.4200 Gender, Work and Peace (Formerly PCS 420) - Credits: 3
"Gender, Work and Peace" will explore the relationship between human rights, gender and nonviolence in the 21st century. We will examine how current and future reality can be shaped by related policies, specifically those on the micro and macro level concerned with gender. Today we live in a period of global transition comparable to the period that followed the Industrial Revolution. It presents us with enormous challenges and opportunities regarding factors we will address in class: economic globalization, government restructuring, work-family balancing, environmental safety at work, gender inequalities and the connection between human rights and dignity at work.

PCST.4550 Mediation: Theory and Practice (Formerly PCS 455/555) - Credits: 3
Mediation is a form of dispute resolution in which a neutral person helps two or more parties discuss their conflict, explore wants and needs, generate options, and reach an agreement. Mediation has become more prevalent over the past few decades in the courts, community-setting, and schools because it empowers the disputing parties to reach a resolution that works for them. This course introduces mediation in the context of other forms of alternative dispute resolution, teaches the principles and theory behind mediation, and trains students in the fundamentals of the mediation process. Interactive exercises and mediation role-plays will be used to provide experiential practice. Upon completion of the course, students will be connected to opportunities to practice mediation in the local courts or with community organizations.

PCST.4580 Peace and Conflict Field Experience (Formerly PCS 458/558) - Credits: 3
A program of practical experience in the field of Peace and Conflict. Students can work in a variety of areas related to Peace and Conflict Studies. Students meet regularly as a class on campus with the designated instructor to discuss their experiences and to learn more about the settings in which they practice and the challenges that they confront.

PCST.4730 Seminar in Peace and Conflict Studies (Formerly PCS 473/502) - Credits: 3
Offered from time to time to highlight specialized areas of faculty interest and to acquaint the student with new developments from a broad range of theory and research and how these developments might affect the field of Peace and Conflict Studies.

PCST.4750 Community Conflict Resolution (Formerly 57.475) - Credits: 3
This course gives students an understanding of the main issues and solutions involved in community level conflict resolution; e.g., in neighborhoods, workplaces, and other institutions. It develops students' skills in practicing conflict resolution and/or evaluating programs in the field of dispute resolution. It is important to understand why conflict happens and how to resolve conflict.
PCST.4910 Directed Study (Formerly PCS 491) - Credits: 1-3

Through frequent consultation with the instructor, the student carries out the investigation of a particularly specialized area of interest. This course may be repeated for up to a total of 9 credits.

PCST.4960 Practicum in Peace and Conflict Studies (Formerly PCS 496) - Credits: 1-3

Specific requirements vary, but the Practicum experience enables Junior and Senior level students to work and study in a variety of areas related to Peace and Conflict Studies. Students meet regularly as a class on campus with the designated instructor to discuss their experiences and to learn more about the settings in which they practice and the challenges that they confront. Practicum may be repeated for a maximum of nine credits.

PCST.5010 Strategies of Conflict Transformation (Formerly PCS 501) - Credits: 3

This course will examine the underlying connections between causes of conflict on the local, national and global levels and the processes that advance peaceful resolution. The course is designed to provide a cross-disciplinary approach to the relevant social, political, economic and cultural conditions leading to conflict and the variety of approaches to solve such conflict through both violent and nonviolent means. The beginning of the course will focus on issues of power and inequality related to class, race (and related divisions of ethnicity, religion, caste, nationality, immigration status) and gender. We will look at structures and system of power ranging from the family, to the community, the workplace and the national and international dimensions. The goal is to link theoretical analysis with the study of practical problem solving.

PCST.5060 Research Methods (Formerly 57.506) - Credits: 3

This course is an applied survey of research methods appropriate for regional economic and social development. Students will learn data presentation and basic descriptive and inferential statistics, as well as the basics of researching data sources and primary data-gathering techniques (survey, case study, archival), and a framework for deciding when particular methods of data-gathering and analysis are appropriate. Students will apply the techniques as they learn them.

PCST.5080 Theories of Political and Criminal Violence - Credits: 3

The study of violence has been a central piece of debates in comparative politics that range from the causes of revolution to the analysis of civil wars. Since the 1990s, and as a result of the crucial changes the world experienced with the end of the Cold War, interest and research on civil wars increased notably, bringing in innovative theoretical insights. Yet, for the most part, research on political and criminal violence remains scattered across these different subfields, with research on civil war being the most active research field. This course aims to provide a broad overview of different bodies of research on violence and to analyze whether more dialogue between subfields could contribute to the accumulation of knowledge.

PCST.5120 Community Conflict Resolution (Formerly PCS 512) - Credits: 3

This course gives students an understanding of the main issues and solutions involved in community level conflict resolution; e.g., in neighborhoods, workplaces, and other institutions. It develops students’ skills in practicing conflict resolution and/or evaluating programs in the field of dispute resolution. It is important to understand why conflict happens and how to resolve conflict.

PCST.5230 Everyday Peace: Community-based Approaches to Peace and Peacebuilding (Formerly PCS 523) - Credits: 3

This course will introduce students to a range of issues in community-based approaches to everyday conflict and peacebuilding. Premised on the idea that peace cannot be
UNDERGRADUATE / CORE CURRICULUM BREADTH OF KNOWLEDGE CRITERIA

Housing is fundamental to the quality of life in communities, and housing conflict, policy and practice shape the availability of this fundamental good. This course will examine the economic, environmental, social, and cultural factors that shape housing and its sustainability. The contentious nature of housing and land use policy in the United States will be summarized, with students learning how housing policy impacts communities, states, and regions. The course will then give students a detailed understanding of the conflictive process through which housing is developed and the role the market, government, funders, workers, and housing consumers play in influencing the creation and development of housing. The course will highlight ways in which current housing development policy and practices are not sustainable, and will examine more recent efforts to establish standards and practices that enhance consensus and sustainability. Students will learn how to manage conflict and take a housing project through the various stages, such as project conceptualization, market analysis, design, site acquisition, financing, construction, and occupancy. While the course focuses on the U.S. context, students will learn of international efforts to establish standards and practices. Case studies of actual projects will be presented.

PCST.5250 Gender, Work and Peace (Formerly PCS 525) - Credits: 3

“Gender, Work and Peace” will explore the relationship between human rights, gender and nonviolence in the 21st century. We will examine how current and future reality can be shaped by related policies, specifically those on the micro and macro level concerned with gender. Today we live in a period of global transition comparable to the period that followed the Industrial Revolution. It presents us with enormous challenges and opportunities regarding factors we will address in class: economic globalization, government restructuring, work-family balancing, environmental safety at work, gender inequalities and the connection between human rights and dignity at work.

PCST.5270 Sustainable Housing Development and Land Use: Conflict, Policy, and Practice (Formerly PCS 527) - Credits: 3

Housing is fundamental to the quality of life in communities, and housing conflict, policy and practice shape the availability of this fundamental good. This course will allow students to collectively engage with key conceptual, methodological and praxis related issues in peacebuilding drawing from community-based and critical perspectives in the social sciences, we will focus on developing the notion of ‘everyday peace’, that is, building community capacities and promoting social justice as an antidote to the normalized and endemic violence in society. The course will critically examine relevant empirical literature as well as ongoing peace initiatives that utilize community-based approaches.

PCST.5390 Bridging Minds for Peace: Interfaith Perspectives and The Universal Moral System (Formerly PCS 539) - Credits: 3

There has been a consensus among the intellectuals and followers of religions that one of the major reasons for the accumulating political, economical, and environmental crises in the Middle East and around world is the absence of a grand vision that can guide the future and inspire humanity to create peace everywhere. The core premises of this theory are: Without peace among religions, there is no peace among nations; Without dialogue among religions, there is no peace among religions; Without a universal moral system, there is no dialogue among religions; A new model of international relations based on a set of morals universally accepted, can help human race to live in peace and justice; and the major religions have the set of morals that can be universally accepted by all, even the non-religious. This course will examine the possibilities and obstacles to bridging the religious divide through a universal, interfaith moral code.

PCST.5450 Politics of Repression and Dissent (Formerly PCS 545) - Credits: 3

A focus on the dark side of politics - political repression, including politically motivated imprisonment, torture, murder, and disappearance- and the struggle of critics to bring about change through non-violent and violent demonstrations, general strikes and armed resistance.

PCST.5550 Mediation: Theory and Practice (Formerly PCS 455/555) - Credits: 3

Mediation is a form of dispute resolution in which a neutral person helps two or more parties discuss their conflict, explore wants and needs, generate options, and reach an agreement. Mediation has become more prevalent over the past few decades in the courts, community-setting, and schools because it empowers the disputing parties to reach a resolution that works for them. This course introduces mediation in the context of other forms of alternative dispute resolution, teaches the principles and theory behind mediation, and trains students in the fundamentals of the mediation process. Interactive exercises and mediation role-plays will be used to provide experiential practice. Upon completion of the course, students will be connected to opportunities to practice mediation in the local courts or with community organizations.

PCST.5580 Peace and Conflict Field Experience (Formerly PCS 458/558) - Credits: 3

A program of practical experience in the field of Peace and
Conflict. Students can work in a variety of areas related to Peace and Conflict Studies. Students meet regularly as a class on campus with the designated instructor to discuss their experiences and to learn more about the settings in which they practice and the challenges that they confront.

PCST.5910 Directed Study in Peace and Conflict Studies (Formerly PCS 591) - Credits: 1-3
Through frequent consultation with the instructor, the student carries out the investigation of a particularly specialized area of interest. This course may be repeated for up to a total of 6 credits.

PCST.6010 Peace and Conflict Studies Study Abroad I (Formerly PCS 601) - Credits: 3
Graduate study abroad in an institution with a University-approved Graduate-level exchange program. The specific course to be taken will be approved by the Graduate Coordinator.

PCST.6020 Peace and Conflict Studies Study Abroad II (Formerly PCS 602) - Credits: 3
Graduate study abroad in an institution with a University-approved Graduate-level exchange program. The specific course to be taken will be approved by the Graduate Coordinator.

PCST.6030 Peace and Conflict Studies Study Abroad III (Formerly PCS 603) - Credits: 3
Graduate study abroad in an institution with a University-approved Graduate-level exchange program. The specific course to be taken will be approved by the Graduate Coordinator.

PCST.6310 Practicum in Peace and Conflict Studies I (Formerly PCS 631) - Credits: 3
The practicum allows students to intern at an organization related to the field of Peace and Conflict studies. The primary purpose of the Practicum is two-fold: 1) to allow students to apply, integrate, and evaluate the information and skills they have acquired in their masters-level academic course work; 2) to gain new understandings and competencies while contributing to a field setting. Students participate in placements for approximately 10 hours per week.

PCST.7330 Project in Peace and Conflict Studies I (Formerly PCS 733) - Credits: 3
The project will consist of a scholarly investigation, such as a review, report, synthesis or design in the student's field resulting in a written document.

PCST.7340 Project in Peace and Conflict Studies II (Formerly PCS 734) - Credits: 3
For a student who wants to complete a 2-semester project. The project will consist of a scholarly investigation, such as a review, report, synthesis or design in the student's field resulting in a written document.

PCST.7430 Master's Thesis in Peace and Conflict Studies (Formerly PCS 743) - Credits: 3
For graduate student actively engaged in research leading toward the submission of written thesis. A program of supervised study will be arranged between student and a faculty supervisor. This course may be repeated for credit, but only a total of 6 credits may be counted toward the Master's Degree.

PCST.7460 Masters Thesis in Peace and Conflict Studies (Formerly PCS 746) - Credits: 6
For graduate students actively engaged in research leading toward the submission of a written thesis. A program of supervised study will be arranged between the student and a faculty supervisor.

PCST.7610 Continued Graduate Research (Formerly PCS 761) - Credits: 1

POLI.1010 Introduction to American Politics (Formerly 46.101) - Credits: 3

POLI.1010SI Supplemental Instruction for Political Science - Navitas Only (Formerly 46.101SI) - Credits: 1
Supplemental Instruction for Political Science - Navitas Only. Credits do not count toward degree requirements.

POLI.1050 Introduction to Public Policy (Formerly 46.105) - Credits: 3
An introductory survey of the major forces and processes involved in the development of public policy; contemporary issues in public policy will also be considered.
POLI.1100 Introduction to Politics (Formerly 46.110) - Credits: 3
An introductory exploration of basic political concepts, ideologies, and themes. Stresses the importance of understanding politics for everyday life.

POLI.1110 Election of 2012 (Formerly 46.111) - Credits: 3
An examination of the American election process in this presidential election year. Attention especially is given to candidates, political issues, political parties, and financing, among other factors, within the process and their influence in the election outcome. Strengths and weaknesses of the election process and reform proposals and prospects will also be addressed.

POLI.1120 Introduction to Comparative Politics (Formerly 46.112) - Credits: 3
What is democracy? What factors explain the demise of some authoritarian regimes? How can we explain the persistent underdevelopment of certain countries? What factors explain why civil war emerges in some weak states but not in others? These are the kinds of questions that Comparative Politics seeks to answer and this class will introduce central topics and theories in comparative politics. It will also analyze variations in similarities across regions of the world using in-depth analysis and systematic comparison across and within countries. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

POLI.1210 Introduction to International Relations (Formerly 46.121) - Credits: 3
Surveys some recent methods and approaches used in the study of international politics and provides an introduction to current problems of foreign policies of major world powers. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

POLI.1750 Introduction to Environmental Politics (Formerly 46.175) - Credits: 3
This course introduces major concepts in environmental politics to provide a comprehensive understanding of the formation of environmental policy in the United States. Throughout the course, particular attention is paid to the role of government and markets in creating environmental crises and shaping policy responses.

POLI.2010 Research Methods in Political Science (Formerly 46.201) - Credits: 3
Introduces the Political Science major to the scope of politics as a discipline. Highlights value questions through analysis of the political, socio-demographic and constitutional background of selected contemporary public issues and policies.

POLI.2110 Media and Politics Around the World (Formerly 46.211) - Credits: 3
For centuries, politicians have depended on media to reach and persuade citizens, yet the role of media in politics remains much debated. This course introduces students to the theories on the relationship between media and politics using a case study approach. Because much of what we know about the media comes from studying media in the United States, we will start with cases in the U.S., but because much of what we need to know about media and politics involves media in other countries, we will spend much of the course looking at media and politics in developing and democratizing countries.

POLI.2120 American Media and Politics (Formerly 46.212) - Credits: 3
This course explores the role of the media in American politics and the role of politics in the American media. We focus first on the historical evolution of newspapers, radio, television, and the internet as vehicles of political news reporting. Next, we look at instances of journalistic bias and distortion in order to explore how corporate consolidation and commercial competition have affected the news industry. Finally, by studying a selection of major stories in depth, we will gain a better understanding of the factors involved in the conversion of political events and developments into seemingly significant news.

POLI.2150 African Politics (Formerly 46/57.225) - Credits: 3
The images of Africa most commonly seen in the US flood our minds with inconsistent messages. Africa is portrayued and discussed as a locus of ancient tribal conflicts, disease, famine, and suffering. While struggles do occur - just as they do in all places - understanding the diverse experiences of the peoples of Africa requires engagement with the cultures, politics, religions, and perspectives of people in more than fifty countries across a vast continent. While such engagement can hardly be accomplished in a semester, we will attempt to scratch at the surface in different ways that reveal ideas, experiences, and thoughts that reflect political life and culture in Africa south of the Sahara in a more reflective manner. Throughout this course, I challenge you to remember that politics as we usually conceive them - the policies, programs, and posturing of government and public organizations - are a backdrop to the way real people live their lives every day. Policies and political
systems are less important for the fact that they exist than for the ways in which they affect the lives of those they govern. With this approach, I hope we will be able to pick apart government structures, political organizations, and policy issues in ways that will shed light on the construction and culture of African politics. This requires a focus on power - who has it, how they use it, and to what ends.

POLI.2180 Introduction to Politics and Sports (Formerly 46.218) - Credits: 3

Analyzes the growing importance of sports in American life. Examines the psychological, political and social impact of sports on society. Discusses how sports have been shaped by such monumental events as war, the civil rights movement, and the changing economy.

POLI.2220 Politics of the Internet (Formerly 46.222) - Credits: 3

This course will examine the influence social media and web connectivity have had on political campaigns, campaign fundraising, political mobilization, and the recent proliferation of democratic movements.

POLI.2300 Law and the Legal System (Formerly 46.230) - Credits: 3

Presents an introduction to the nature of the legal process and the operation of the American legal system. Also discusses considerations of its political and social functions.

POLI.2310 Introduction Political Thought (Formerly 46.231) - Credits: 3

A critical survey of the history of Western political thought from Plato to the present.

POLI.2510 Politics of Identity (Formerly 46.251) - Credits: 3

This interdisciplinary course considers the way we construct self-identity through our affiliation with various cultural and political groups- from the “Red Sox nation” to linguistic, economic, nationalistic and ethnic groups. It examines the central role of nationalism; its symbols, traditions and expectations; the role of the media; and the benefits and risks of our allegiance to these groups.

POLI.2530 Introduction to Public Administration and Policy (Formerly 46.253) - Credits: 3

An examination of the little studied fourth branch of government. Bureaucratic power in the American political system is reconsidered.

POLI.2650 State and Local Politics (Formerly 46.265) - Credits: 3

Examination and study of politics and government at the state and local levels, with emphasis on Massachusetts and New England. Practitioners from state and local government will meet with the class.

POLI.3010 Quantitative Methods in Political Science (Formerly 46.301) - Credits: 3

This is a course in designing Quantitative Research and applying statistics for Political Scientific. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Quantitative Literacy (QL).

POLI.3020 Research and Writing for Political Science (Formerly 46.302) - Credits: 3

This course provides political science majors with opportunities to hone their research and writing skills. Students analyze representative scholarly and popular sources, explore writing for various venues; and practice editing and revising their work. With prior arrangements students may use this course to complete an honors thesis, pursue an independent research project, or revise and expand an especially promising research paper submitted in a previous course.

POLI.3040 Politics of Development (Formerly 46.304) - Credits: 3

This course considers the politics of the global development process, the actors involved and the contexts within which development occurs.

POLI.3070 American Political Thought (Formerly 46.307) - Credits: 3

A survey of the historical development of American political thought from the colonial era to the present.

POLI.3090 Political Psychology (Formerly 46.309) - Credits: 3

An in-depth examination of the acquisition and role of political attitudes, values, belief systems, and other psychological mechanisms in shaping political behavior and conflict.

POLI.3100 'Isms' in American Politics (Formerly
POLI.3110 Foundations of Law: Process & Skills (Formerly 46.311) - Credits: 3

Foundations of Law, Process & Skills presents a comprehensive introduction to the skills, process, expectations, and substantive law presented in the first year of law school. Many students in the social sciences consider the idea of pursuing law school, but have no meaningful avenue to explore the true flavor of the experience, or the commitment they would be taking on. Law School can be immensely rewarding, yet requires a substantial investment of time, personal dedication and financial obligation. The course will provide everything students need to know about the law school experience, while gaining invaluable academic skills in the process, whether or not they choose the law school path.

POLI.3120 Campaign and Election law (Formerly 46.312) - Credits: 3

This course instructs students on campaign and election law; including all relevant cases, statutes and regulations. Students will gain knowledge and skills useful for both future political campaign activity and postgraduate study.

POLI.3130 Electoral Politics (Formerly 46.313) - Credits: 3

This course will examine voting behavior in American elections: how voters make decisions, the changing nature of campaigns, the influence of money, media, and polling, and related matters.

POLI.3140 Parties and Interest Groups (Formerly 46.314) - Credits: 3

An examination of party systems and coalitions in the US, their changing nature over time, the history of realignment, and the relationship of parties to interest groups.

POLI.3160 Politics and Film (Formerly 46.316) - Credits: 3

Analysis of the role of film in creating, expressing, revealing, and responding to social and political ideas and values. Examines a variety of film and film styles and introduces students to elements of film theory, the theory of popular culture and the role of film in forming our ideas about the world.

POLI.3190 Survey Research (Formerly 46.319) - Credits: 3

The techniques, methods and uses of Survey Research in contemporary Politics and Policy.

POLI.3200 Gender Law and Politics (Formerly 46.320) - Credits: 3

Explores legal constructions of gender by examining Supreme Court cases, federal legislation, historical documents, news stories, and scholarly essays on sexual inequality in the United States. Topics include the evolution of the family as a legal (and illegal) reality; political regulation of reproduction and sexual activity; feminist critiques of economic inequality; the rise and fall of affirmative action; the changing role of gender in class consolidation; and ongoing debates about the relationships between public and private life.

POLI.3210 Soccer and Politics (Formerly 46.321) - Credits: 3

This course analyzes the social, political and business aspects of the World Cup, the most popular sporting event in the world. The course will study the evolution of the World Cup, from the 1930’s when fascist regimes used the Cup to buttress their doctrines to the emergence of new soccer powers like the U.S.

POLI.3230 Politics and Baseball (Formerly 46.323) - Credits: 3

Introductory look at the interaction between the world of baseball and the social and political structures which influence the sport.

POLI.3240 Politics of Football (Formerly 46.324) - Credits: 3

How the rise of pro football’s popularity reflects changes in American society during the 20th century. An examination of how politics, economics and television created a sport that has become an American obsession, and some argue, a new religion.

POLI.3290 Politics of College Sports (Formerly 46.329) - Credits: 3

Current controversies over the role of college sports within an academic environment with particular attention to Title IX, the pivotal law that altered gender in college sports.

POLI.3310 Animal Rights and Animal Welfare
This course examines how the structure of the human/non-human animal relationship affects and determines the nature of public policy formation on issues with impacts on non-human animals, both nationally and internationally.

POLI.3320 The Politics of Food (Formerly 46.332) - Credits: 3

The course will examine current debates in food politics over: regulatory politics and the appropriate reach of the state in food labeling, safety, and oversight; genetically modified food, organic and sustainable agriculture, the effects of economic globalization of the food supply chain and the future of the world food system.

POLI.3340 Islam and Politics (Formerly 46.334) - Credits: 3

The course will explain the nature of the relationship between Islam and Politics by examining the rise of the first modern Islamic movement, and by examining other Islamic movements that spread throughout the Muslim world.

POLI.3350 Constitutional Law: Powers & Principles (Formerly 46.335) - Credits: 3

A study of constitutional law focused on the powers and principles of American government. We will discuss the Declaration of Independence and Revolution, separation of powers, federalism, natural rights, and ordered liberty, emphasizing the case law on the origins of judicial review, the Commerce Clause, war powers, executive privilege, elections, criminal procedure, and search under the Fourth Amendment. Political Science offers two courses in constitutional law for students from any major who are preparing for law school or seeking a background in how constitutional law influences American politics and culture. POLI.3350 or POLI.3370 can be taken alone or both courses in either sequence. On campus and online versions are identical, so students can take each course in either format.

POLI.3380 Political Participation (Formerly 46.338) - Credits: 3

Political movements; voting and elections, parties and interest groups; civil disobedience in American politics. Consideration of causes, fluctuations and trends.

POLI.3390 Judicial Review Seminar (Formerly 46.339) - Credits: 3

An advanced examination of the contemporary controversy over judicial activism and constitutional interpretation.

POLI.3400 American Politics And Law (Formerly 46.340) - Credits: 3

Perspectives on American Politics and Law. Advanced study involving extensive reading, writing and discussion seeking understanding of the major transformations impacting contemporary American Society, Politics, Law, Economics and Culture; consideration of different interpretations of these changes, and the ways in which they are manifested in shifting political attitudes and coalitions, and new problems and conflicts.

POLI.3430 Congress (Formerly 46.343) - Credits: 3

Legislative Politics. An advanced study of representation, campaigns and elections, and the functioning of the American national congress within the American political system.

POLI.3440 American Presidency (Formerly 46.344) - Credits: 3

An examination of the nature of the American presidency and its functioning within the American political system. Specific attention is given to the problems and evolution of the presidency since World War I.

POLI.3490 Politics of Race and Ethnicity (Formerly 46.349) - Credits: 3

A study of the politics of race and ethnicity, focusing primarily on American society, and the racial and ethnic groups of the region.

POLI.3500 Urban Politics and Policy (Formerly 46.350) - Credits: 3

A study of the balance of liberty and authority under the Constitution, the Bill of Rights, the Fourteenth Amendment, due process, and equal protection, emphasizing the case law on freedom of religion, speech, press, gun rights, LBGT rights, race, abortion, gender, and the death penalty. Political Science offers two courses in constitutional law for students from any major who are preparing for law school or seeking a background in how constitutional law influences American politics and culture. POLI.3350 or POLI.3370 can be taken alone or both courses in either sequence. On campus and online versions are identical, so students can take each course in either format.
A study of political power in, and the political structures of urban areas and the major issues and conflicts currently confronting them.

**POLI.3510 Irish Politics (Formerly 46.351) - Credits: 3**

For students of Politics, Ireland is perhaps one of the most fascinating examples of a territory that has undergone, and continues to undergo dramatic transformations in its governing structures, its passionate struggles for freedom, civil wars, colonial resistance and modern nationalism. This class will study the political history of Ireland before and during its time as a part of the United Kingdom, through the partition of the island into two states, and up to the modern politics of both the Republic of Ireland and the British state of Northern Ireland. We will examine the results of the 1998 "Good Friday Agreement". Then we will dissect and evaluate modern Irish institutions of government, in the Republic and in the North. Students will research the competing ideologies and present arguments supporting the parties and organizations that propound these ideologies, like Sinn Fein, the IRA, the Ulster Unionist Party and Unionist paramilitaries in the North; the Fine Gael and Fianna Fail in the South.

**POLI.3530 Public Policy and Administration (Formerly 46.353) - Credits: 3**

An examination of the little studied fourth branch of government. Bureaucratic power in the American political system is reconsidered.

**POLI.3550 Government Fiscal Policy (Formerly 46.355) - Credits: 3**

An examination of government’s budgetary, taxation and expenditure decisions and activities.

**POLI.3560 Public Policy Analysis (Formerly 46.356) - Credits: 3**

This course examine issues in and techniques utilized in public policy analysis.

**POLI.3570 Thoreau in Our Time (Formerly 46.357) - Credits: 3**

This course traces Henry David Thoreau’s influence on major social and political transformations in American history from the abolitionist movement to the present day. We will focus first on Thoreau’s writings on slavery, commercial development, environmental history, and individual liberty. Then we will study his formative role in the civil rights and environmental movements of the twentieth century. Finally, through a mix of outside speakers and student presentations, we will explore how his writings continue to shape ongoing struggles to contend with climate change, advance social justice, and promote a greater sense of fairness in American life. The course will involve at least one trip to Walden Pond and a tour of Thoreau’s birthplace in Concord, Massachusetts. Course page: http://faculty.uml.edu/sgallagher/Thoreau_in_Our_Time.html.

**POLI.3580 Global Environmental Policy (Formerly 46.358) - Credits: 3**

This course explores contemporary international environmental issues from both theoretical and policy perspectives; consideration too of broader forces impacting international environmental politics.

**POLI.3590 British Politics (Formerly 46.359) - Credits: 3**

The context, background and forces shaping the contemporary politics of Great Britain.

**POLI.3600 European Politics (Formerly 46.360) - Credits: 3**

An analytical examination of selected modern European political systems, emphasizing similarities and differences in political culture, behavior, institutions, and performance.

**POLI.3610 Southeast Asian Politics (Formerly 46.361) - Credits: 3**

A study of Southeast Asian countries, their anti-colonial struggles and their patterns of political development. Attention is also given to the recent struggle among the former Indochinese states and the broader international involvement in the region.

**POLI.3630 Politics of China (Formerly 46.363) - Credits: 3**

A study of the recent development of governmental institutions, parties, and ideology in China. Emphasis is placed on the processes of nation-building in the post World War II period.

**POLI.3660 Russian Politics (Formerly 46.366) - Credits: 3**

Conflict and Change in the former Soviet Union. An examination of the relationship of politics to the functioning of post-Soviet societies. The influence of politics on economy,
education, family life, religion, etc.

POLI.3680 Middle East Politics (Formerly 46.368) - Credits: 3
The region will be analyzed using a comparativist lens, whereby the historical context of creating nation states in the region and the effect of colonialism will be applied to contemporary politics. Women, religious/ethnic minorities and the dynamics of the Arab Spring will also be addressed comparatively.

POLI.3700 Latin American Politics (Formerly 46.370) - Credits: 3
The context, background and forces shaping the contemporary politics of the Latin American region.

POLI.3740 Democracy and Development (Formerly 46.374) - Credits: 3
Explores the theories and experiences of countries newly converting to democracy in Asia, Africa, Latin America and the former Eastern Bloc. Also examines the strategies and prospects for development among the same countries.

POLI.3750 Politics of Pacific Rim (Formerly 46.375) - Credits: 3
An examination of the politics, policies and institutions of Japan, the "four tigers" and other countries of the Pacific rim area.

POLI.3780 International Political Economy (Formerly 46.378) - Credits: 3
An examination of the politics of global economic relations stressing the role of international institutions, multinational corporations and other international actors on the policies of the nation-state.

POLI.3800 American Foreign Policy (Formerly 46.380) - Credits: 3
A study of the processes of American foreign policy in the contemporary world.

POLI.3840 International Politics of Human Rights (Formerly 46.384) - Credits: 3
This course will address the history, content, structure, law, and politics of international human rights. Using interactive participatory class format students will learn analytical and critical thinking skills as well as written and oral communication skills.

POLI.3870 Politics of International Organizations (Formerly 46.387) - Credits: 3
This course will address the history, functioning, structure and politics of international organizations in world politics. International Governmental Organizations as well as Non-Governmental Organizations on the global and regional level will be analyzed and discussed. In a participatory and interactive class format students will develop analytical and critical thinking skills.

POLI.3900 Defense and Disarmament (Last Term 1994 Spring)(Formerly 45.390) - Credits: 3
An advanced study of the international security policies currently pursued by the United States, its allies and its adversaries; evaluation and analysis of the criticism of these policies and of the possibilities of achieving disarmament.

POLI.3980 The War on Drugs (Formerly 46.398) - Credits: 3
The war against drugs stands as both a major foreign policy priority for the US and the International community in general, and as a constant source of debate and contention. The aim of this course is to provide students with analytical tools, concepts, and information, which will enable them to critically evaluate the war on drugs beyond the common myths and misconceptions that often surround this highly controversial topic. By analyzing a wide range of countries around the world, students would gain an in depth and nuanced perspective of the relation between drug trade, violence, corruption, development, and democracy. Students will also gauge arguments and possible impacts on different drug policy options.

POLI.4010 Research Seminar (Formerly 46.401) - Credits: 3
Requires the writing of a substantial paper (or production of an equivalent project.) Typically, students should select a 300 level seminar course from among Departmental offerings that are of interest, all of which involve the writing of one or several papers, and select one paper or topic to expand upon. The student should then register in the Research Seminar section for the appropriate supervising instructor and expand the paper into a more substantial form.

POLI.4020 Women in Islam (Formerly 46.402) - Credits: 3
Focusing upon one of the most important topics in Islam, this course will go beyond conventional stereotypes and explore woman’s many and varied roles within Islamic cultures and societies.

**POLI.4060 The Politics of Identity in the Middle East**
(Formerly 46.406) - Credits: 3

The course will examine the ethnic, political, religious and social changes in the modern Middle East. The course will start with an introduction to the diverse identities all over the Middle East and then it will comparatively examine a number of those identities.

**POLI.4110 Dynamics Power and Authority**
(Formerly 46.411/57.511) - Credits: 3

This course surveys theories of power, authority, participation, and politics. Building on these theories, students will examine changing social, political, and economic patterns of inequality based on class, race (and related divisions of ethnicity, religion, caste, nationality), and gender. Reviews various approaches to altering these dynamics (business strategy, public policy, community and social movements). Cuts across units of firm, community, region, and nation, along with corresponding governmental institutions, and links theoretical analysis with study of practical problem solving. Instructor-initiated cases drawn from a variety of national experiences. Students will learn techniques of power analysis and prepare a power analysis project.

**POLI.4200 Reading and Simulation Experience**
International Organization (Formerly 46.420) - Credits: 3

Students take part in a simulation of the proceedings of a regional or international organization, e.g., U.N., O.A.S., O.A.U., or the Arab League. They study all aspects of the selected institution but concentrate on key economic, social and security issues discussed in the body’s debates. The course aims to give the student a clearer understanding of the forces and constraints which shape the foreign policies of individual states.

**POLI.4220 SMR: Political communication and Media Studies**
(Formerly 46.422) - Credits: 3

Advanced study in contemporary issues in Political Communication and Media Studies.

**POLI.4390 Justice and Trade in the Global Economy**
(Formerly 46.439) - Credits: 3

We know that we are part of a global economy and that many of the things we buy and consume are produced in other countries. But what do we know of how they are made? Do we understand that there may be hidden costs in the price we pay for goods at the supermarket, in a department store? Understanding the nature of global trade is critical for us to be effective citizens in the world. Perhaps more important is that we understand how goods are produced and traded - what many think of as “fair” trade. The subject of Fair Trade isn’t simply limited to the production and sale of coffee and chocolate. Fair Trade principles encompass environmental issues, human rights, and politics. Once aware of the ramifications of consumerism on all parts of the world, including the United States, people can make informed choices about the products they buy, the companies that employ them, and the political views they support. By the end of this course students should understand the major ideas and tools used to comprehend complex international and global trade relations. Students will understand the way in which goods are produced for global markets and the possible human and environmental costs such production entails.

**POLI.4400 Comparative National Security** - Credits: 3

The central goals of this course are two fold. The first is to explore the national security concerns and perspectives for the major countries and regions of the world. The second is to understand the connection between alternative constructions of national security and the security policies of nation-states. This is a heavily analytical course; critical thinking is required equipment. Students are expected to take the concepts and theories discussed in class and use them to analyze issues confronting societies and the policy responses mounted by political leaders.

**POLI.4440 Advanced Research Methods**
(Formerly 46.444) - Credits: 3

Both quantitative and qualitative methods will be examined with a focus on locating and utilizing available data to study social questions.

**POLI.4450 Politics of Repression and Dissent**
(Formerly 46.445) - Credits: 3

A focus on the dark side of politics - political repression, including politically motivated imprisonment, torture, murder, and disappearance- and the struggle of critics to bring about change through non-violent and violent demonstrations, general strikes and armed resistance.

**POLI.4460 The Politics of Discord between the Arab East and The West**
(Formerly 46.446) - Credits: 3

The course examines the roots of political discord in the Arab
East starting with colonialism and progressing to the contemporary state of dissension. Throughout the course the stress on the effect of this discord on comparative domestic politics and international relations in the region will be examined.

POLI.4470 Theories of Political and Criminal Violence  
(Formerly 46.447) - Credits: 3

The study of violence has been a central piece of debates in comparative politics that range from the causes of revolution to the analysis of civil wars. This course aims to provide a broad overview of different bodies of research on violence. The class will also revisit crucial debates in the study of violence, such as the problems of separating criminal and political violence (such as interstate wars). By the end of the class, students will be able to identify major theoretical and methodological approaches to violence, major debates and concepts, as well as key cases across the world.

POLI.4900 War and Peace in the Sovereign State System  
(Formerly 46.490) - Credits: 3

Despite much effort to limit the occurrence of interstate and intrastate war, such violence is still prevalent in the sovereign state system. This course will focus on the causes, dynamics, and outcomes of interstate and intrastate conflict and ways to sustain peace. We will examine the foundational works in the area of conflict before moving quickly into more recent research. The class will emphasize student participation and the application of concepts we learn in class. Students are asked to write a final paper exploring a concept of war and peace in the sovereign state system.

POLI.4910 Directed Study  
(Formerly 46.491) - Credits: 1-3

Directed study offers the opportunity to engage in an independent study or research project under the supervision of a department member. Working closely with the instructor, students define and investigate a research problem in an area of special interest and present the results of their investigation through a combination of readings and papers and/or a significant research paper.

POLI.4920 Directed Study In International Organizations  
(Formerly 46.492) - Credits: 3

Advanced and intensive reading and other activity in connection with the study of selected international organizations.

POLI.4960 Experiential Learning in Political Science  
(Formerly 46.496) - Credits: 3-9

This course provides students with a practical appreciation for the work of politics emphasizing a universal skill set for polycentric, experiential learning. The course is designed to help ease the transition from a political science degree to a variety of academic and professional paths.

POLI.4970 Practicum in the Law Requirement.  
(Formerly 46.497) - Credits: 3

A program of study and research which includes involvement in and first-hand knowledge and observation of the legal system and legal practice. Open only to political science majors and, with certain restrictions, legal studies minors. The course will be graded S (satisfactory) or U (unsatisfactory). Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL).

POLI.4980 Research and Internship/Service Experience Politics/Law  
(Formerly 46.498) - Credits: 3

Extensive Research/Writing undertaken in conjunction with an Internship/Service Experience in Politics and/or Law, by special arrangement and with permission of the instructor.

POLI.5110 Dynamics Power and Authority  
(Formerly 46.411/57.511) - Credits: 3

This course surveys theories of power, authority, participation, and politics. Building on these theories, students will examine changing social, political, and economic patterns of inequality based on class, race (and related divisions of ethnicity, religion, caste, nationality), and gender. Reviews various approaches to altering these dynamics (business strategy, public policy, community and social movements). Cuts across units of firm, community, region, and nation, along with corresponding governmental institutions, and links theoretical analysis with study of practical problem solving. Instructor-initiated cases drawn from a variety of national experiences. Students will learn techniques of power analysis and prepare a power analysis project.

POLI.5440 Advanced Research Methods  
(Formerly 46.544) - Credits: 3

The purpose of this course is to introduce students to the fundamentals of research while also conveying the need for skepticism as the foundation of scientific inquiry. Both quantitative and qualitative methods will be examined. Students will gain first-hand knowledge of the research process by formulating their own research questions, locating current literature to frame their topic, developing causal theories and then empirically testing these theories. With that in mind, the first goal of this course is for students to become critical
consumers of research in general and peace and conflict research in particular. The second goal is for students to develop theories about peace and conflict and research designs to test those theories. Students are encouraged to use this course to develop their thesis or projects.

**PSYC.1010 Introduction to Psychological Science** (Formerly 47.101) - Credits: 3

An introduction course that focuses on application of the scientific method to major areas of psychology: biological, cognitive, developmental, social and personality, and mental and physical health. The course addresses the importance of social and cultural diversity, ethics, variations in human functioning, and applications to life and social action both within these areas and integrated across them. The research basis for knowledge in the field is emphasized.

**PSYC.2010 Professional Development in Psychology** (Formerly 47.201) - Credits: 1

This course is intended for psychology majors to explore pathways to success as an undergraduate in psychology, especially including information about psychology as an empirical science, and careers and graduate school in psychology. Opportunities for research and service learning will be discussed. The course is required for all students who are planning to apply to one of the Concentrations in Psychology. (Prerequisite: 9 credits of coursework in Psychology)

**PSYC.2090 Social Psychology** (Formerly 47.209) - Credits: 3

Presents an introduction to the study of social behavior in interpersonal relationships, groups, organizations, and the community: Diversity in regard to groups of peoples, cultures, and views is emphasized. Topics include non-verbal communication, social attraction, attitudes and attitude change, group dynamics, prejudice, labeling, stereotyping, interpersonal influence, and applications to social problems. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**PSYC.2320 Psychology of Personality** (Formerly 47.232) - Credits: 3

An introduction to the study of human personality. This course uses both theory and contemporary empirical evidence to examine approaches to understanding individual differences. Theoretical approaches include psychoanalytic, humanistic, cognitive, trait, type, and behavioral. Applications to topics such as self-concept, anxiety, adjustment, and achievement motivation will be considered.

**PSYC.2550 Community Psychology** (Formerly 47.255) - Credits: 3

Surveys the field of community psychology, including principles of social justice, diversity, and social change. The course reviews historical antecedents, paradigms, conceptual models, strategies and tactics of social and community change and action; examples from selected contexts and social systems, including education, mental health, community organizations, the workplace, health care, justice system, and social services will be employed. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**PSYC.2600 Child and Adolescent Development** (Formerly 47.260) - Credits: 3

The developmental science of childhood and adolescence. Major theoretical perspectives, research methods, and ethical issues are presented with respect to prenatal development, infancy, childhood, adolescence, and the transition to adulthood. Empirical evidence for development in relevant contexts across biological, psychological, and social domains is examined.

**PSYC.2690 Research I: Methods** (Formerly 47.269) - Credits: 3

An introductory course on the fundamentals of empirical research in psychological science. Instruction will promote understanding and competence in the basic vocabulary of psychological research, addressing information literacy, measurement, reliability, and validity in observed variables and unobserved constructs. Students will learn critical components of experimental, quasi-experimental, and correlational designs, as well as the basics of descriptive statistics, hypothesis and statistical testing, and matching design to analysis strategies. Students will demonstrate this knowledge through the preparation of a research proposal. Finally, this course will provide students a strong basis from which to pursue advanced coursework in a variety of methodological approaches to psychological research. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

**PSYC.2720 Abnormal Psychology** (Formerly 47.272) - Credits: 3

Presents an introduction to the study of various patterns of mental, behavioral, and personality disorders including diagnosis, etiology, and treatment. Current research-based theoretical approaches will be discussed as a means to gain a better understanding of psychological, biological, and sociocultural causes. Emphasis will be placed on the important notion that mental health problems are not only linked to individual factors, but also to family, community/social,
cultural, societal, political, and historical factors.

PSYC.2730 Biological Psych (Formerly 47.273) - Credits: 3
Surveys issues and topics dealing with the physiological and evolutionary bases of behavior. Biological systems and processes that influence behavior are considered, with particular emphasis on brain mechanisms. Recent discoveries in the neurosciences will be presented. Methods of research are reviewed.

PSYC.2760 Theories of Learning (Formerly 47.276) - Credits: 3
This course provides an introduction to key concepts, theories, and experimental paradigms for studying learning and behavior in both human and non-human animals. Behavioral, cognitive, and physiological approaches are compared. You will learn about the scientific study of learning with an emphasis on how behavior changes as a function of experience. We will examine historical and current perspectives on a range of current issues of importance in the study of learning.

PSYC.2770 Sensation and Perception (Formerly 47.277) - Credits: 3
The course focuses on human sensations and perceptions. Students will examine how people know the objects and events of the world through hearing, seeing, smelling, tasting, moving, and touching. Students will also examine the foundations of experiences which correspond to independent measures of the world (veridical) and those which do not (illusory).

PSYC.2780 Cognitive Psychology (Formerly 47.278) - Credits: 3
Provides an introductory overview of the research on mental processes including but not limited to: attention, perception, memory, learning and decision-making. The course will also connect cognitive psychological research to other branches of study, as well as real world domains such as education, law, and health.

PSYC.3050 Psychology and Law (Formerly 47.305) - Credits: 3
this course is an introduction to many topics representing major fields of study within psychology and law. Topics may include: eyewitness testimony, lie detection, jury selection, child protection, forensic interviews, and the death penalty. In this course, students will be exposed to the diversity of interests among legal psychologists as well as innovative and important ideas, theories, and scientific research findings. Through readings, the study of actual cases, and presentations from guest speakers, students will gain more understanding of how psychologists study and contribute to the legal system.

PSYC.3080 Industrial/Organizational Psychology (Formerly 47.308) - Credits: 3
An introduction to the application of psychological principles and methods to the work domain. Students will develop an understanding of the individual, social, and environmental factors as they relate to organizational performance. Intended as an introduction to the field of Industrial/Organizational (I/O) Psychology, topics include personnel selection and evaluation, training and development, attitudes and motivation, leadership, group dynamics, diversity, organizational structure and climate, and job design and working conditions.

PSYC.3120 Learning and Behavior (Formerly 47.312) - Credits: 3
Examines various methods and techniques suitable for the modification of human behavior, based on the principles and findings of experimental studies of animal and human behavior. Considers how such methods can be used in education, mental health and corrections, and self-directed personal change.

PSYC.3280 Dynamics of Interpersonal Relations (Formerly 47.328) - Credits: 3
Presents an analysis of psychological dynamics in interpersonal behavior, emphasizing such topics as interpersonal communication, self-disclosure, personal styles of interaction and techniques of change. The primary focus is on the behavior of the students themselves.

PSYC.3320 History of Psychology (Formerly 47.332) - Credits: 3
Examines the historical roots of psychology from the pre-scientific psychologies of the ancient Greeks to the twentieth century schools of the introspectionists, the Gestalt psychologists, and psychoanalysts. Historical resolutions of recurring issues are contrasted with modern resolutions.

PSYC.3330 Psychology of Consciousness (Formerly 47.333) - Credits: 3
Introduces students to psychological theories and studies of the mind-body dualism, mind-brain identity, and the emergence of mind. Studies of psychosomatic disease and healing imagery, sleep and hypnosis, “subconscious” perception and “extra sensory” perception, multiple personalities and “split brain”
patients are discussed. The questions of animal awareness and computer consciousness are also considered.

PSYC.3350 Psychology and Women (Formerly 47.335) - Credits: 3

Considers such topics as: the psychology of sex differences; biological bases of psychological sex differences; the nature of female sexuality; clinical theory and practice concerning women; women as mental patients and mental health consumers; implications for psychology and for women’s status.

PSYC.3360 Culture and Psychology (Formerly 47.336) - Credits: 3

Provides an analysis to the impact of culture, socio-historical, and social influences on psychological processes and outcomes. Students will also learn about techniques for studying the influence of culture including cross-cultural methods and population-specific methods. Through careful analysis of research literature, this class will examine a variety of contexts within the U.S. and internationally. Topics will include identity development, immigration, acculturation, socialization, and social interactions among groups.

PSYC.3370 Community & Social Change - Credits: 3

The course uses a community social psychology framework to help students envision and become active participants in community and social change processes. In this course, the term social change refers to intentional and active efforts to address social inequalities/oppression and promote psychosocial wellbeing. We will define and analyze social problems using social justice and strengths-based approaches, understand and evaluate various community and social change strategies, and learn how to become effective change agents. These topics will be examined through intersecting lenses of race, ethnicity, culture, gender, class, sexualities, abilities, and globalization. Particular emphasis will be placed on conceptualizing and engaging in social change efforts alongside marginalized and historically underrepresented groups.

PSYC.3450 Health Psychology (Formerly 47.345) - Credits: 3

An examination of psychological aspects of human health, both physical and mental, and the processes of adjustment and growth. Consideration is given to the interplay of health and illness with emphasis on psychological methods of overcoming and preventing illness and of enhancing physical and emotional well-being.

PSYC.3510 Human Sexuality (Formerly 47.351) - Credits: 3

Addresses the biological, psychosocial, and attitudinal aspects of human sexuality through lectures, discussions, films from a variety of perspectives.

PSYC.3520 Psychological Testing (Formerly 47.352) - Credits: 3

A survey of major tests and techniques used to assess cognitive abilities, personality and vocational interests; an introduction to the various professional settings in which testing and assessment methods are used (e.g., school/education, mental health, rehabilitation, employment and personnel selection, criminal justice). Students learn to administer, score, and interpret specific tests and learn how to develop a case study or report based on test data and related information.

PSYC.3550 Sport and Exercise Psychology (Formerly 47.355) - Credits: 3

The course will cover topics such as motivation, arousal and anxiety in performance, performance enhancement, youth sport and family interactions, leadership, cooperation and competition, team cohesion, gender issues, exercise and mental health, and psychological factors in injury prevention and rehabilitation.

PSYC.3600 Adult Development and Aging (Formerly 47.360) - Credits: 3

Begins with an overview of recent theoretical perspectives on adult development and aging. In chronological sequence, it presents the stages of adulthood and concludes with death and dying. Topics covered include personal, family, and vocational development through adulthood, gender pattern differences, and the impact of changing demographics, including the lengthening of the life span.

PSYC.3610 Developmental Psychopathology (Formerly 47.361) - Credits: 3

Examines behavior problems of childhood and adolescence across developmental transitions with a focus on the interaction of risk and protective factors in the child and his or her social context (e.g., family, school, friendships). Problems such as depression, anxiety, conduct disorder, ADHD, learning disabilities, and the consequences of trauma and maltreatment are addressed.

PSYC.3620 Psychology of Developmental Disabilities (Formerly 47.362) - Credits: 3
This course examines a range of developmental disabilities, their etiology, consideration of underlying brain function, assessment procedures, and current diagnostic, treatment and educational approaches. In addition, the impact of disability on individuals and the families of those affected, cultural and social aspects of disability, and current practices in service provision will be considered.

**PSYC.3630 Introduction to Disability Studies (Formerly 47.363) - Credits: 3**

This course provides students with a wide range of interests and backgrounds with the opportunity to examine their own mental model (attitudes/values/assumptions) of disability. It includes an overview of the nature of intellectual disability and other disabilities and it provides opportunities to explore and understand the historical social response to disability. Students will look at a range of strategies for providing support and intervention and they will learn about how to effect change through a variety of strategies, including advocacy.

**PSYC.3680 Psychology of Decision-Making - Credits: 3**

We spend billions of dollars every year to address issues caused by poor decisions: jurors convict innocent defendants, employees do not adequately contribute to retirement accounts, young adults smoke cigarettes, etc. Why do people make irrational decisions? This course will provide a comprehensive overview of decision making with an emphasis on applying psychological theory and research to tackle issues in the areas of law, economics, health, etc. Students will learn theoretical concepts to improve their own decision-making as well as help them to positively influence the decisions of others.

**PSYC.3690 Research II: Statistics (Formerly 47.369) - Credits: 3**

An intermediate level course building on competence in quantitative reasoning skills and the fundamentals of research methods, and focusing on descriptive and inferential statistics and their application and interpretation. The course will include basic computational approaches; the primary goal is for students to develop the ability to articulate and apply statistical concepts, and communicate statistical results. The course includes topics in basic inferential statistics from z-scores up to and including chi-square and factorial ANOVA. Students will learn to use a database and conduct statistical analyses using standard software packages. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

**PSYC.3720 Comparative Psychology: Animal Behavior (Formerly 47.372) - Credits: 3**

Comparative psychology is a discipline that explores the behavior of animals, both human and non-human, using evolutionary theory as a unifying principle. The contributions of evolutionary pressures, genetics, development, learning, and social influence will be explored in variety of animal species and cross-species comparisons made where appropriate. Specific topics covered will include causes and development of behavior, control and organization of behavior, behavioral adaptations, mating systems and reproduction, parental care, defensive behaviors, aggression, foraging, communication, and animal cognition. Students will be required to complete a behavioral observation of a non-human species by traveling to a local zoo or using another live animal observation approach approved by the instructor. (e.g., “a zoo’s live animal webcam”)

**PSYC.4690 Research III: Laboratory (Formerly 47.375 and PSYC.3750) - Credits: 3**

An advanced course in which students design and carry out an empirical research project from start to finish, resulting in an individually written research report using APA style and an oral presentation. The primary goal is for students to experience discovery by completing an original study that reasonably extends the prior research literature. Topics may vary, reflecting the interests of the instructor. Students will perform literature reviews, formulate a research question, operationalize variables; develop research designs; obtained ethical review and approval; and collect, analyze, and interpret data. Students will also demonstrate knowledge of the research process in assessments that may include assignments, quizzes, or exams. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Critical Thinking &Problem Solving (CTPS).

**PSYC.4710 Seminar in Community Psychology - Credits: 3**

An advanced seminar to consider special topics in community psychology with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as racism, diversity, empowerment, and social change in the context of social and community life. This is a writing intensive course.

**PSYC.4711 Seminar in Community Psychology: Racism - Credits: 3**

An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is racism. In this course we will investigate roots of racism, kinds of racism,
reasons for perpetuation of racism, possible solutions to ending racism. Many believers that racism is a thing of the past. Yet, research shows that many of us are unconsciously racist and hurt communities of color without any malicious intent. We will explore our own postings in terms of racism. This is a writing-intensive course.

PSYC.4712 Seminar in Community Psychology: Immigration - Credits: 3

An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is immigration, a very important issue in the United States and around the world. In this seminar we will study the complex process of migration from a community social psychological point of view. Motivations, expectations, acculturation, immigrant status, deportations, policy and more will be covered. This is a writing-intensive course.

PSYC.4713 Seminar in Community Psychology: Prevent Youth Violence - Credits: 3

An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is youth violence, which continues to be a major public health concern in the United States. Preventing youth violence is an important component of creating peaceful and safe neighborhoods and just communities. In this course, we will use ecological and multicultural perspectives to understand different types of youth violence, the contexts in which they occur, and intervention strategies to address the violence. This is a writing-intensive course.

PSYC.4714 Seminar in Community Psychology: Bridging Differences - Credits: 3

An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course explores dilemmas that can emerge when working to bridge diverse groups in community-based work. The seminar will be organized around narratives that address multiple dimensions of diversity including race, ethnicity, gender, class, sexual orientation, disability, and religion. Too often, guidelines for addressing very complex diversity dynamics are presented as neatly packaged lists of recommendations. However, it is within the stories of the challenges and dilemmas that the complexity of the political, historical, social, and psychological dynamics of diversity are most evident. Students will explore examples of everyday diversity challenges and utilize psychological theories to better understand how the challenges can be shaped by struggles over limited resources, deep historical conflicts between groups, privilege dynamics, intragroup dynamics, organizational cultural norms, and/or other issues. This is a writing-intensive course.

PSYC.4720 Seminar in Personality Psychology (Formerly 47.472) - Credits: 3

Focuses on a variety of theoretical conceptualizations of the productive personality, psychodiagnostic tools and techniques and case histories. Students develop and enhance their professional skills with respect to presentation of self, writing, and psychological diagnostic techniques.

PSYC.4730 Seminar in Social Psychology (Formerly 47.473) - Credits: 3

An advanced seminar to consider special topics in social psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as social aspects of health and illness; inequalities in education; the impact of globalization; attitude formation and prejudice; and psychology of sex roles. This is a writing intensive course.

PSYC.4731 Seminar in Social Psychology: Social (In)justice - Credits: 3

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is social injustice, its causes, manifestations, explanations, and social psychological theories that help us understand them. We will explore how and why social injustice prevails in today’s world full of resources; why small number of people own majority of world’s wealth; why some countries are poorer than others. We will study our own standpoints and where they come from and we will work on possible remedies that could lead to a more just world.

PSYC.4732 Seminar in Social Psychology: Achievement Motivation - Credits: 3

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways,
and the potential for application with consideration of ethics and social responsibility. This course will cover psychological theory and research on the various factors that explain people’s motivation to achieve and their performance in different domains. These factors include emotions, needs, personality, efficiency, group membership, identity, goal type, and context. Course goals include honing students’ ability to understand, critique, write about, and discuss theoretical and empirical papers within psychology. Students will also develop their skills in generating testable hypotheses. This is a writing-intensive course.

**PSYC.4733 Seminar in Social Psychology: the Mind-Body Perspective in Communication - Credits: 3**

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on the role communication processes (including Intra-Personal, interpersonal, and Mediated-Communication) play in a variety of health related contexts, effects, and processes. Included will be: Self-regulation theories; placebo and nocebo effects; unconscious processes; biofeedback effects and mechanisms; hypnosis; imagery; pain management; emotion regulation; well-being; and the ability to consciously influence autonomic processes such as the immune and endocrine systems. This is a writing-intensive course.

**PSYC.4734 Seminar in Social Psychology: Health Campaigns - Credits: 3**

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will review the state of the science and art of effective medial health campaigns in light of how they are developed, delivered, and evaluated. Seminar participants will discuss and critically analyze campaigns relative to their effects on health-related awareness, knowledge, attitudes, and behaviors. This is a writing-intensive course.

**PSYC.4735 Seminar in Social Psychology: Workplace Diversity - Credits: 3**

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Over the course of our lives, many of us will be working in organizations that include diverse workers, and thus it is important to understand the issues that shape interpersonal and system dynamics within such settings.

In this seminar, we review theories and research relevant to how race, ethnicity, class, gender, sexual orientation, and disability dynamics affect workplace systems. Classes will be highly interactive and discussion-oriented as students learn about the challenges diverse organizations face in fostering positive working relationships and about strategies adopted to enhance the effectiveness of the diverse workplace. This is a writing-intensive course.

**PSYC.4736 Seminar in Social Psychology: Psychology of Sustainability - Credits: 3**

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. In this course we will explore unequal distribution of resources and power and the culture of consumerism in all parts of the world, including the United States. Once people are aware can make informed choices about what and why and how much they buy, about the companies that produce and sell the products and the political views they support. This is a writing-intensive course.

**PSYC.4740 Seminar in Developmental Psychology (Formerly 47.474) - Credits: 3**

An advanced seminar to consider special topics in developmental psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as psychology of the family and parent-child relations; infant development; adjustment during adulthood; and death and dying. This is a writing intensive course.

**PSYC.4741 Seminar in Developmental Psychology: Adolescent Identity - Credits: 3**

An advanced seminar to consider special topics in developmental psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will explore the phenomenon of adolescent identity development, beginning with Erik Erikson’s seminal work on the subject and continuing through contemporary treatments. We will examine development of identity from extended consciousness, a sense of autobiographical self (1-2 years), to a theory of mind (4-5 years), conception of a personal fable (10-14 years), and the emergence of full life stories (17-25 years). Specific issues of focus will include ethnic, social class, and gender role identity development, identity crises and resolutions, and representations of relationships with family,
friends, school, and work. Students will write and analyze their own life stories, as well as lead discussions, and prepare a research paper. This is a writing-intensive course.

**PSYC.4742 Seminar in Developmental Psychology: Psychology of Education - Credits: 3**

An advanced seminar to consider special topics in developmental psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar takes an intensive look at the psychology of education and of learning. We will read about theories of education, research on learning, and study some historical and current trends in both formal education (school) and informal learning environments (hobby subcultures, museums, camps, etc). Readings will include both historical examples (John Dewey, Jane Addams, Paolo Friere) and schooling systems, and policymakers in higher education. In addition to reading, class discussion, and engaging hands on exercises, students will plan and deliver a term-length creative project on the psychology of learning and education. This is a writing-intensive course.

**PSYC.4743 Seminar in Developmental Psychology: Trauma in Child Development - Credits: 3**

An advanced seminar to consider special topics in developmental psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Trauma is a relatively common experience of childhood. Far too many children and youth in the US are witnesses to domestic violence and victims of abuse, neglect, and other violent crimes. Worldwide, millions of children have been disabled, injured, orphaned, or recruited as child soldiers in armed conflicts. When natural disasters strike, children are often among those affected most severely. How do these experiences influence subsequent growth and development? This seminar examines the role of trauma in child development form an ecological perspective with a focus on neurophysiological, affective, and relational systems. This is a writing-intensive course.

**PSYC.4750 Seminar in Clinical Psychology (Formerly 47.475) - Credits: 3**

An advanced seminar to consider special topics in clinical psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as health psychology and behavioral medicine; the nature and causes of or interventions for specific psychological disorders (e.g., autism spectrum disorder, schizophrenia); the community mental health movement; clinical methods of assessment. This is a writing intensive course.

**PSYC.4751 Seminar in Clinical Psychology: Women's Health - Credits: 3**

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Physical health and illness do not occur in a vacuum. Rather, they are embedded in a complex and dynamic system. This biological (e.g., disease process), psychological (e.g., mental health status) and social (e.g., culture) factors. Topics will include reproductive health, cardiovascular illness, substance use, and eating behaviors. Sexual orientation, race, socioeconomic status and other issues of diversity will be integrated throughout the semester. Students will learn from reading and discussing scholarly articles and book chapters, critically watching relevant videos, and writing individual literature review papers. This is a writing-intensive course.

**PSYC.4752 Seminar in Clinical Psychology: Autism - Credits: 3**

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Autism spectrum disorder (ASD) is a complex neurological disorder that typically appears before the age of three and immediately and profoundly affects a young child's ability to communicate, develop language, form social relationships and respond appropriately to environmental cues. Over the last 15-20 years, autism has received an increasing level of attention in both scientific arenas and the popular press. Most recent estimates are that about 1 in 50 children are affected. This seminar will examine issues in the etiology, characteristics and treatment of autism and related developmental disabilities. The seminar will also explore some of the more prominent theories and controversies surrounding these disorders. Much of the seminar will be focused on a behavioral approach to understanding and treating children with autism and significant intellectual challenges. This is a writing-intensive course.

**PSYC.4753 Seminar in Clinical Psychology & Behavioral Medicine - Credits: 3**

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics
and social responsibility. This course examines physical health and illness by integrating information about biological processes, psychological characteristics, and social contexts. We will discuss the following topics throughout the course: the roles of personality, emotion, mental health, and human development in physical well-being; the relationship between health psychology and other disciplines such as nursing, anthropology and genetics; the significance of prevention and public policy in physical health; and the ways in which health psychology is important in a variety of health problems, such as heart disease, cancer, and obesity. This is a writing-intensive course.

PSYC.4754 Seminar in Clinical Psychology: Language Assessment and Intervention in Autism - Credits: 3

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course is designed to provide students with a working knowledge of behavioral language assessments and empirically validated interventions to improve language and communication for young children with autism and related disabilities. Successful completion of the course will help prepare students for a position as a behavior technician. Students will participate in class discussions, presentations, and application activities throughout the semester. This is a writing-intensive course.

PSYC.4755 Seminar in Clinical Psychology: Autism in Adolescents & Young Adults - Credits: 3

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on adolescents and young adults on the “high-functioning” end of the autism spectrum. Students will learn the behavioral and psychological characteristics associated with this population, diagnostic procedures, etiology, consider various interventions for this population, and discuss current controversies in the field. We will also consider the impact of autism spectrum disorders (ASD) on individual and their families. This is a writing-intensive course.

PSYC.4756 Seminar in Clinical Psychology: Sexual Offending - Credits: 3

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The purpose of this course is to examine current psychological theory and research relating to the causes and consequences of sexual aggression. It is designed to acquaint you with some of the key issues, questions, and findings in this field, as well as to allow you to develop some of the critical skills needed by research psychologists. The course is organized topically. We begin by reading and thinking about the social construction of masculinity and femininity (especially through representations in the media) and how these constructions might contribute to sexual aggression. The bulk of the course is devoted to an examination of psychological processes related to victimization and perpetration. The course concludes with a discussion of several special topics and an examination of rape prevention and education. Special topics may include a focus on juvenile and female offenders, specific risk factors for perpetration, campus sexual assault, pedophilia, child maltreatment, pornography, recidivism rates, offender laws, and victim testimonies. This is a writing-intensive course.

PSYC.4770 Seminar in Contemporary Trends (Formerly 47.477) - Credits: 3

An advanced seminar to consider current trends in psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as contemporary models of addictive behavior; the interaction of psychology and law; existential psychology; psychology of technological change. This is a writing intensive course.

PSYC.4771 Seminar in Contemporary Trends: Addictions - Credits: 3

An advanced seminar to consider special current topics in psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The focus of this seminar is on the psychology of addictions. Drawing upon current theory and research, we will look at the nature and causes of the problem behaviors associated with alcohol and drug use. We will also consider whether problems in such areas as shopping, eating, gambling, sex, video games, and the Internet can be understood as forms of addictions. In addition, we will examine the implications of whether or not such addictions should be viewed as diseases, and we will evaluate the relative importance of biological, psychological and socio-cultural factors. This is a writing-intensive course.

PSYC.4772 Seminar in Contemporary Trends: Psychology & Law - Credits: 3

An advanced seminar to consider special current topics in psychology with focus on critique of the theoretical and
empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course is an introduction to many topics representing major fields of study within psychology and law. Topics may include: eyewitness testimony, lie detection, jury selection, child protection, forensic interviews, and the death penalty. In this course, students will learn about the diversity of interests among legal findings. The main goal is to provide students with an understanding of relevant theory, empirical findings, and research methodology. Guest speakers will enhance learning. This is a writing-intensive course.

**PSYC.4773 Seminar in Contemporary Trends: Generational Identities and Relations - Credits: 3**

An advanced seminar to consider special current topics in psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on generational identities and intergenerational relations. Generation is an important dimension of human experience in modern societies and a key aspect of self-identity, but it is also linked to tensions and misunderstandings between people of different ages. Specific topics to be addressed include: cultural and historical differences in ideas about generation and cohort; the development of generational identities: generation, mass marketing, and consumerism; the politics of generation and intergenerational tensions; bilateral socialization and positive intergenerational exchange; similarities and differences between Baby Boomers, Gen-X’ers, and Millennials; ageism and age segregation, and; generativity and the future of our planet. This is a writing-intensive course.

**PSYC.4774 Seminar in Contemporary Trends: Psychology of Globalization - Credits: 3**

An advanced seminar to consider special current topics in psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on the social and psychological effects of globalization. Specifically, we will address how processes of globalization impact psychological functioning and development (including in the areas of identity, personality, mental health, and aging), social relations, and organizational and community dynamics. We will also explore the implications of global economic and environmental change for human rights and social and economic justice. This is a writing-intensive course.

**PSYC.4780 Seminar in Cognitive Psychology (Formerly 47.478) - Credits: 3**

An advanced seminar to consider special topics in cognitive psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as attention and memory; mental imagery; decision-making; language; applications of cognitive psychology to education. This is a writing-intensive course.

**PSYC.4781 Seminar in Cognitive Psychology: Educational Applications - Credits: 3**

An advanced seminar to consider special topics in cognitive psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar is designed to give you an in-depth look into the impact of cognitive psychology on education. We will look at basic processes, including those of attention, memory, and motivation, starting first from basic theoretical principles. We will then read papers that have taken these theoretical principles as a starting point and applied them to real-life issues in education, such as exam performance and students’ self-evaluations of their own performance. This is a writing-intensive course.

**PSYC.4790 Seminar in Behavioral Psychology - Credits: 3**

An advanced seminar to consider special topics in behavioral psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as conceptual issues in behavioral psychology; applied behavior analysis; and the applications of behavioral psychology to education, language, symbolic behavior, and attention. This is a writing intensive course.

**PSYC.4800 Concentration Practicum I (Formerly 47.480) - Credits: 3**

This is the first course in a two-course sequence that accompanies that required field placement for undergraduate psychology majors who are registered in a concentration. Practicum I must be taken before Practicum II. The accompanying field placement may either be a research or a service practicum. This is a general course, which will fulfill the requirement for students in any concentration. The course will focus integrating student placement experiences with relevant empirical literature. Topics will draw on the research literature to frame the placement experience and will include working in diverse environments, becoming aware of organizational structures, responding to work related stress, and understanding how the science of psychology applies to the
placement. Students will also integrate their placement experiences with the empirical literature from their respective concentrations by identifying and reviewing empirical work that addresses some aspect of their practicum.

PSYC.4810 Concentration Practicum II (Formerly 47.481) - Credits: 3

This is the second course in the two-course sequence that accompanies the required field placement for undergraduate psychology majors who are registered in a concentration. This course can only be taken after the successful completion of PSYC.4800 Concentration Practicum I, in the previous term. The field placement may either be a research or a service practicum. This is a general course, which will fulfill the requirement for students in any concentration. The second course will focus developing a research paper that integrates the empirical literature with the placement experience. The course will continue to focus on topics including working in diverse environments, working within organizations, responding to work related stress, understanding how the science of psychology applies to the placement, and writing informally and formally about placement experiences.

PSYC.4820 Dvptl Disabilities Fieldwork: Service Provision - Credits: 3

In this fieldwork course we explore standards for support and service provision within human services and compare experiences in field placements with these standards, seeking to understand the forces that support or interfere with realizing best practices in disability services. The foundation for this blended learning course (half the classes meet in-person, half online) will be 60 hours fieldwork with an individual with an intellectual/developmental disability. This course integrates course material with field placement experiences through presentation, discussion, group work, case study, and video materials that address course objectives. Each student will have the time to develop an understanding of a person with I/DD, and how individualized planning can facilitate social inclusion.

PSYC.4830 Dvptl Disabilities Fieldwork: Leadership & Advoc - Credits: 3

In this fieldwork course we explore standards for support and service provision within formal services and compare experiences in field placements with these standards, seeking to understand the forces that support of interfere with realizing best practices. The foundation for this blended learning course (half the classes meet in-person, half online) will be 60 hours of fieldwork within a human service organization or educational setting for people with an intellectual/developmental disability. This course provides a critical examination of the nature of organizations and the impact of leadership and advocacy on the lives of people with disabilities through integrating course material with fieldwork experiences through presentation, discussion, group work, case study, and video materials.

PSYC.4860 Community Service Learning (1, 2 or 3 credits) (Formerly 47.486/586) - Credits: 1-3

Students will take an applied role in the community where they will have the opportunity to provide some form of meaningful service to individuals, groups or communities. Students will meet regularly with a designated faculty member on campus to consider their experiences in the context of current psychological thought. In some instances, the commitment to community service may extend over the course of a full year. Graded as Satisfactory or Unsatisfactory. 1, 2 or 3 credits. This course may be repeated but no more than 12 credits total from any combination of PSYC.4860, PSYC.4880 and PSYC.4910 may be counted toward the degree.

PSYC.4880 Research Service Learning (Formerly 47.488) - Credits: 1-3

Students will take an applied role in faculty supervised research where they will provide a meaningful contribution to a research program or particular study. Students will meet regularly with a designated faculty member to discuss the research process and rationale for relevant components of the project including literature review, research design, procedures, data collection, entry, and analysis. In some instances the commitment to research may extend over the course of a full year. Graded as Satisfactory or Unsatisfactory, 1, 2 or 3 credits. This course may be repeated but no more than 12 credits total from any combination of psyc.4860, PSYC.4880, and PSYC.4910 may be counted toward the degree.

PSYC.4910 Directed Study: Psychology (Formerly 47.491) - Credits: 3

Through frequent consultation with the instructor, the student carries out the investigation of a particularly specialized area of interest. This course may be repeated, but no more than 12 credits from any combination of PSYC.486, PSYC.488, and PSYC.491 may be counted toward the degree.

PSYC.4920 Undergraduate Thesis in Psychology I - Credits: 3

For undergraduate students actively engaged in research leading toward the submission of a written thesis. Under faculty supervision, students will conceptualize and conduct an original, empirical study, refining and sharpening their research, presentation, and writing skills. A program of supervised work will be arranged between the student and a faculty supervisor, leading to the completion of an introduction and literature review, research plan, and IRB proposal.
PSYC.4930 Undergraduate Thesis in Psychology II - Credits: 3
For undergraduate students actively engaged in research leading toward the submission of a written thesis. Under faculty supervision, students will conceptualize and conduct an original, empirical study, refining and sharpening their research, presentation, and writing skills. A program of supervised work will be arranged between the student and a faculty supervisor, leading to the completion and presentation of a written thesis.

PSYC.4960 Practicum in Psychology (Formerly 47.496) - Credits: 3
A program of practical experience for Psychology majors only. Specific requirements vary, but the Practicum experience enables Junior and Senior level students to work and study in a variety of areas related to psychological practice and research (mental health agencies, community agencies and groups, work settings, schools, prisons, group homes, etc.). Students meet regularly as a class on campus with the designated instructor to discuss their experiences and to learn more about the settings in which psychologists practice and the challenges that psychologists confront. Practicum may be repeated for a maximum of nine credits. Graded Satisfactory or Unsatisfactory. (Field Placement Required)

PSYC.5000 Introduction to Community Social Psychology (Formerly 47.500) - Credits: 3
Introduces history and contemporary trends of community and social psychology with focus on how social and environmental forces affect individual and group quality of life. This course surveys the history, theoretical frameworks, core values, methods/approaches and orienting concepts in the field.

PSYC.5010 Applied Developmental Psychology (Formerly 47.501) - Credits: 3
Provides a life span developmental perspective on individual and social adaptation and change. Examines appropriate theory and research, and illustrates the influences of environmental, social and cultural factors.

PSYC.5020 Seminar in Community Social Psychology (Formerly 47.502) - Credits: 3
Offered from time to time to highlight specialized areas of faculty interest and to acquaint the student with new developments from a broad range of current psychological theory and research and how these developments might affect social and community life.

PSYC.5030 Applied Social Psychology (Formerly 47.503) - Credits: 3
Introduces students to social psychology as an applied discipline. Covers such applied topics as attitude change, aggression, helping behavior, attribution, and interpersonal influence.

PSYC.5040 The Family System (Formerly 47.504) - Credits: 3
Studies family processes and the interplay between the family and other social, cultural, and socio-economic systems. Topics include parental roles, changing family structures, racial and ethnic factors, and interactions between family, work, and community.

PSYC.5090 Psychological Approaches to Child Maltreatment (Formerly 47.509) - Credits: 3
The course addresses the painful topic of Child Maltreatment in the context of research on optimal, typical, and unacceptable treatment of children, as maltreatment cannot be considered apart from acceptable and even optimal treatment. The impact of maltreatment on the development of the child from the first growth of physical organs in the prenatal infant through the development of moral reasoning in the adolescent is addressed. Both theories and research will be discussed.

PSYC.5120 Applied Research Methods (Formerly 47.512) - Credits: 3
Considers strengths and limitations of various approaches to community and social psychological research. Develops skills for formulating research questions and translating them into practical study designs. Sensitivity to research ethics as well as research practicality and validity are emphasized. Pre- or Co-requisite: 47.500

PSYC.5220 Psychology of Diversity (Formerly 47.522) - Credits: 3
This course introduces students to theoretical, philosophical and experiential frameworks for thinking about diversity in our communities and society. It includes an examination of the experiences of diverse groups, especially traditionally oppressed groups and individuals. This course is designed to engage students in a process of introspection and self-examination about issues such as racism, sexism, classism, and homophobia. Emphasis will be placed on challenging one's own world view and the way it fits into institutional oppression, as well as the way it may affect our work as community change agents.
PSYC.5230 Women in the Community (Formerly 47.523) - Credits: 3

An examination of women’s roles in the home, community, and workplace; examines psychological consequences, social structural influences, and options for change. Topics include: housework and childcare; violence against women; workplace stratification issues; and women’s contributions to their communities.

PSYC.5260 Workplace Diversity (Formerly 47.526) - Credits: 3

This course will explore the challenges presented by the increasingly diverse workforce within the United States. Students will consider how work groups and organizations can effectively incorporate a diversity of perspectives. Students will consider issues of oppression, discrimination, and bias, with particular attention paid to the situation here in the Merrimack Valley. There will also be some focus on personal awareness and the development of skills for addressing diversity concerns.

PSYC.5270 Immigrant Psychology and Communities (Formerly 47.527) - Credits: 3

This course will focus on the immigrant experience and the various immigrant groups in the United States with emphasis on recent immigrants in Lowell and Massachusetts. Theories of acculturation and adaptation to a new cultural environment will be extensively examined in the course. An experiential approach will be integrated throughout the course via the incorporation of guest speakers, films, autobiographies/novels, and food. Students will have ample opportunities to read, reflect, discuss, and write about the immigrant experience. As our country is a country of immigrants, this course should have relevance to anyone working in the community.

PSYC.5420 Working with Groups (Formerly 47.542) - Credits: 3

This course uses a community-based approach to working with groups. Guided by an understanding of theoretical principles, students will gain insights about group dynamics and process. Students will develop and apply various skills, including assessment, enhanced communication, conflict resolution, problem solving, decision-making, and evaluation. Emphasis is placed on working within diverse groups, attaining outcomes, and utilizing resources. Organizational, prevention/intervention, and focus groups are examined.

PSYC.5430 Psychology and Law (Formerly 47.543) - Credits: 3

This course focuses on applications of psychological research and practice to the legal system. Drawing from the areas of social, cognitive, developmental, clinical, and neuropsychology, students will critically examine the legal process and compare the law's informal theories of human behavior to what psychologists know on the basis of theories and research. Topics covered include including the practice of scientific jury selection, jury deliberation and decision-making, police interrogations and confessions, use of the polygraph as a lie-detector test, eyewitness testimony, repressed and recovered memories, the use of hypnosis, child witnesses in sex abuse cases, the death penalty, the insanity defense, and the role of psychologists as trial consultants and expert witnesses.

PSYC.5450 Community and Organizational Change (Formerly 47.545) - Credits: 3

A review of skills, techniques, and qualities associated with effective community and organizational interventions. Topics include the possibility and desirability of change, methods for studying change, assessment of needs and resources, visioning and planning, membership recruitment and retention, strategy and tactics, leadership styles, publicizing, funding, advocacy, evaluation techniques, and the personal qualities of the change agent. Both cultural factors and the community context of interventions will be discussed. Application to specific cases will be made. Students will have the opportunity to apply course material to settings outside the classroom.

PSYC.5460 Grant Writing (Formerly 47.546) - Credits: 3

This course will be a hands-on course in grant writing. One of the first lessons that you will learn is that grant writing is only to a small degree about writing. Successful grants emerge from working effectively with others to draw out ideas, capture those ideas to create a program or a plan for research, show how the plan is an appropriate one to respond to the "Request for Proposals", and package those ideas so that they make sense to the people who will review the proposal. Grant writing is increasingly a team building activity. Whether or not you obtain the funding is sometimes less important than the networking and planning that you do as a part of developing a grant proposal.

PSYC.5610 Introduction to Behavioral Intervention in Autism (Formerly 47.561) - Credits: 3

This course provides an introduction to the causes and diagnosis of autism, scientific validation, applied behavior analysis, and ethical treatment. Students also learn to write functional objectives, plan positive reinforcement, and design an applied measurement system in the context of developing Individualized Family Service Plans and Individualized Education plans. The issue of culturally appropriate interventions is addressed. Prerequisite: coursework in the
psychology of child development, or permission.

PSYC.5620 Teaching and Positive Behavioral Support in Autism (Formerly 47.562) - Credits: 3

This course covers the application of specific behavioral teaching procedures, including prompting, reinforcement, shaping, chaining, error correction and generalization methods, and the development of instructional plans. Emphasis is placed on procedures and plans to teach communication, social, self-help and per-academic skills. Application of such methods in inclusive classroom settings is also considered.

PSYC.5630 Management Strategies in Applied Behavioral Intervention - Credits: 3

This course provides instruction on areas of the 4th edition task list related to ethically providing behavior analytic services as established by the Behavior Analysis Certification Board and codes of conduct for behavior analysts in the field of applied behavior analysis. Building on knowledge of applied behavior analysis and autism gained in the two prerequisite courses, students will enhance their understanding of best practices in the assessment and treatment of individuals diagnosed with an autism spectrum disorder and how ABA strategies are implemented and evaluated.

PSYC.5650 Measurement and Experimental Design in Behavioral Intervention (Formerly 47.565) - Credits: 3

This course provides advanced coverage of measurement methods used in behavioral intervention. It also offers in-depth coverage of the "within-subject" experimental designs commonly used in behavioral research and practice. Component analysis and parametric analysis methods, and ethical considerations in research, are also covered.

PSYC.5660 Functional Analysis and Treatment of Challenging Behavior (Formerly 47.566) - Credits: 3

This course covers the purpose, rationale and methods used in conducting and interpreting functional analyses of challenging, or "maladaptive", behaviors (self-injury, stereotypy, aggression). It also describes the full range of behavioral procedures used to decrease or eliminate these behaviors, with emphasis placed on ethical interventions and the desirability of least restrictive and non-aversive strategies.

PSYC.5680 Behavioral Intervention Program Models in Autism (Formerly 47.568) - Credits: 3

This course explores how educational environments can be designed to maximize learning. Different models of effective, evidence-based behavioral interventions are analyzed. The use of teaching activity schedules and staff training to build supportive educational settings is also covered.

PSYC.5710 Autism and Developmental Psychopathology (Formerly 47.571) - Credits: 3

This course is designed to explore Autism Spectrum Disorders (ASDs) in the developing person and in changing social contexts (e.g., family, school, employment) across development. An empirical and theoretical review of developmental transformations and reorganizations across the lifespan provides the basis for examining biological, social, psychological, and cultural contributions to the continuity and discontinuity of both adaptive and maladaptive processes over time as well as an analysis of individual and environmental risk and protective factors across development. Special attention is given to the changing competencies and challenges of developmental periods and their role in the assessment, display, meaning, and implications of ASDs from infancy through adulthood.

PSYC.5720 Legal and Ethical Issues in Professional Practice (Formerly 47.572) - Credits: 3

This course will explore the legal and ethical issues facing professionals working with individuals diagnosed with disabilities, particularly those on the autism spectrum. The goal is to provide behavior analysts and other professionals the opportunity to develop skills in dealing with the complex legal and ethical issues that arise when working in human service fields.

PSYC.5740 Community and Social Interventions in Autism (Formerly 47.574) - Credits: 3

This course will focus on current perspectives of community-based programming for individuals on the autism spectrum, particularly among the adolescent and adult age range. We will overview the challenges experienced by those with an autism spectrum disorder (ASD) during adolescence and adulthood, and consider the issues involved in designing, implementing, and evaluating social and community interventions for this population.

PSYC.5860 Community Service Learning (1, 2, or 3 credits) (Formerly 47.486/586) - Credits: 1-3

Students will take an applied role in the community where they will have the opportunity to provide some form of meaningful service to individuals, groups or communities. Students will meet regularly with a designated faculty member on campus to consider their experiences in the context of current psychological thought. In some instances, the commitment to community service may extend over the course of a full year.
Graded as Satisfactory or Unsatisfactory. 1, 2 or 3 credits. This course may be repeated but no more than 12 credits total from any combination of PSYC.4860, PSYC.4880 and PSYC.4910 may be counted toward the degree.

PSYC.6110 Program Evaluation (Formerly 47.611) - Credits: 3

A skill-oriented approach that considers both formative and summative evaluation techniques. Emphasizes mastery of the technical aspects of the evaluation process, and includes consideration of the importance of program evaluation in community psychology, health, education, etc.

PSYC.6250 Advanced Community Dynamics: Lowell (Formerly 47.625) - Credits: 3

An examination of principles that influence community structure, function, and evolution over time. Students will learn how community patterns and activities can best be understood and how community problems and concerns can best be addressed, employing psychological and other conceptual frameworks and perspectives. Specific emphasis will be placed on the historic and diverse city of Lowell. Prerequisites: 47.500 and 47.512.

PSYC.6310 Capstone Practicum I in Community Social Psychology (Formerly 47.6310) - Credits: 3

Provides supervised field experience in a setting appropriate to the student’s area of specialization, plus on-campus class meetings. An average of approximately ten hours of fieldwork in an approved setting for two consecutive semesters is required.

PSYC.6320 Capstone Practicum II in Community Social Psychology (Formerly 47.632) - Credits: 3

Continuation of PSYC.6310, which is pre-requisite.

PSYC.6400 Theories of Change in Applied Psychology (Formerly 47.640) - Credits: 3

Examines major theories of development and change relevant to Applied Psychology; and discusses the use of theories in posing and answering research questions. A major focus of research and practice is on understanding and promoting change (in structures, functions and processes of cognition, emotion, behavior and relationships) over time. In this course, students will examine major theories of change (development, therapeutic and school/community/contextual change), learn to place these theories in comparative, historical and philosophical context, examine efforts in theory integration, and test the direct relevance of theories to posing and answering their own research questions.

PSYC.6410 Fundamentals of Prevention Science - Credits: 3

This graduate course will examine theoretical, empirical, and practical foundations of prevention science for designing and evaluating diverse interventions to prevent human social problems and promote healthy development. The seminar will cover the origins and multidisciplinary roots of prevention science, key concepts, current trends and directions, theoretical approaches, program theory, methodology, research to practice, policy development, and dissemination. Special consideration will be given to conceptual issues in the field such as prevention versus promotion, stages of program development, scaling up, methodological approaches such as randomized controlled trials, quasi-experiments, process and impact assessment, cost-benefit analysis, statistical methodology, dissemination.

PSYC.6500 Advanced Quantitative Methods (Formerly 47.700/PSYC.7000) - Credits: 3

This course is designed to provide an overview of the most widely used methods employed by psychologists and other behavioral scientists. You will learn about the common research tools and strategies that psychologists’ use in the production of knowledge. The course will provide you with a basic understanding of the strengths and weaknesses of the various research strategies used by psychologists so that you can become an informed consumer of research both in the behavioral sciences and the media. In addition, you will begin to develop and practice a set of research skills that will prepare you for advanced study in the behavioral sciences.

PSYC.6630 Experimental Analysis of Behavior Interventions (Formerly 47.663) - Credits: 3

This course will explore the basic principles of the experimental analysis of behavior and their application to an understanding of learning. Emphasis will be placed on the historical underpinnings of the field, the methods of analysis, and current issues in the field.

PSYC.6710 Supervised Practicum in Behavioral Intervention in Autism: I (Formerly 47.671) - Credits: 3

This is the first of a two-semester practicum course to supplement supervised fieldwork experience students receive as a requirement for the Master of Science in Applied Behavior Analysis and Autism Studies. Students practice engaging in the necessary skills to become an effective behavior analyst and a scientist-practitioner. The assignments, activities, and
discussions will enhance student’s understanding of the fundamental concepts, principles, and behavior change programs used in the field. All students must have an off-site, approved placement that includes direct work with clients.

PSYC.6720 Supervised Practicum in Behavioral Intervention in Autism:II (Formerly 47.672) - Credits: 3

This is the second of a two-semester practicum course to supplement supervised fieldwork experience students receive as a requirement for the Master of Science in Applied Behavior Analysis and Autism Studies. Students practice engaging in the necessary skills to become an effective behavior analyst and a scientist-practitioner. The assignments, activities, and discussions will enhance student’s understanding of the fundamental concepts, principles, and behavior change programs used in the field. All students must have an off-site, approved placement that includes direct work with clients.

PSYC.6750 Seminar in Health Psychology - Credits: 3

This course focuses on the application of psychological principals to the subspecialty of health psychology. Students will learn about the major topics in health psychology, including health behaviors, stress and health, health moderators, and prevention. Students will be exposed to psychological theories and research methodologies used in health psychology, and to current literature in the field.

PSYC.6810 Health Campaigns: Effects and Processes (Formerly 47.681) - Credits: 3

The intent of this course is to provide the student with a thorough understanding of the effects and processes of health campaigns -- including theoretical foundations, empirical findings, and practical applications. The emphasis will be on applying this information to diverse aspects of human health, including individual physical and mental health as well as the broader fabric of public health and societal functioning. As the course evolves, students will apply and extend the course concepts through critical analysis of existing health campaigns and through the design of a proposed campaign of their choosing.

PSYC.6910 Directed Study in Community and Social Psychology (Formerly 47.691) - Credits: 3

This course is designed as an independent study under the supervision of a member of the department of a subject not offered in the standard curriculum.

PSYC.6920 Directed Study in Applied Behavior Analysis and Autism Studies (47.692) - Credits: 1-3

This course is designed as an independent study under the supervision of a member of the department of a subject not offered in the standard curriculum.

PSYC.6930 Directed Study in Applied Psychology and Prevention Science (Formerly 47.693) - Credits: 3-9

Designed as an independent study under faculty supervision in a topic not offered elsewhere in the curriculum.

PSYC.7010 Narrative Methods (Formerly 47.701) - Credits: 3

Narrative refers to real or imaginary events related often by means of language, but also by means of pictures, songs, and dance. Narrative often involves a sequence of events, representation of the meaning of those events, and description of the context in which they occurred. Narrative is the primary means by which we make sense of our experiences and represent ourselves to and develop intimacy with others. There are important documented differences in narration due to culture, cognition, emotion, age, and gender. To adequately analyze narration requires expertise in a wide variety of analytic methods and is the overarching goal of this course.

PSYC.7030 Selected Topics in Applied Psychology and Prevention Science (Formerly 47.703) - Credits: 3

Presents a careful consideration of selected topics in the area of Applied Psychology and Prevention Science.

PSYC.7330 Master’s Project in Community-Social Psychology (Formerly 47.733) - Credits: 3

For graduate students actively engaged in developing a change-oriented intervention leading to the submission of a written project report. A program of supervised study will be arranged between the student and a faculty supervisor. Prerequisite: Approval of major advisor.

PSYC.7430 Master’s Thesis in Community Social Psychology (Formerly 47.743) - Credits: 3

For graduate students actively engaged in research leading toward the submission of a written thesis. A program of supervised work will be arranged between the student and a faculty supervisor. This course may be repeated for credit, but only a total of 6 credits may be counted toward the Master’s degree. Prerequisite: 47.500 and 47.512 and permission of the faculty member who will supervise the thesis.

PSYC.7440 Master’s Thesis in Applied Behavior Analysis and Autism Studies (Formerly 47.744) -
Credits: 3

For graduate students actively engaged in research leading toward the submission of a written thesis. A program of supervised work will be arranged between the student and faculty supervisor. This course may be repeated for credit, but only a total of 6 credits may be counted toward the Master’s degree.

PSYC.7460 Master’s Thesis in Community Social Psychology (Formerly 47.746) - Credits: 6

For graduate students actively engaged in research leading toward the submission of a written thesis. A program of supervised work will be arranged between the student and a faculty supervisor. Only a total of 6 credits may be counted toward the Master’s degree. Prerequisite: 47.500 and 47.512 and permission of the faculty member who will supervise the thesis.

PSYC.7630 Dissertation (Formerly 47.763) - Credits: 1-9

Faculty supervision of doctoral dissertation.

PUBH.1021 Introduction to Public Health (Formerly 30.102) - Credits: 3

Public health topics, both historical and contemporary are of importance to all citizens and to societal decisions. This survey course provides a foundation for understanding public health through exposure to current health care and policy issues viewed through the perspective of multiple disciplines. Methodology for understanding population health and developing critical thinking and decision-making skills in the analysis of public health issues using a population-based perspective will be developed. The course will provide an ecological understanding of the causation and prevention of disease with an emphasis on health issues that affect society as a whole.

PUBH.2110 Sustainable Development (Formerly PUBH/57.211) - Credits: 3

This course examines workplace and regional factors that shape the prospects for sustainable prosperity and worker and community empowerment. The course begins by reviewing recent trends in the distribution of income and wealth and the industrial structure of the New England economy. The historical dynamics shaping work organization and regional development are examined. Several industry case studies are selected because of their importance to the regional and national economy. The case studies provide focus for studying the strategic choices made by firms in mature industries and newly emerging regions; the basis of competitive advantage for Japanese firms and the response of American rivals; and the influence of the product cycle and regional institutions on capture or retention of emerging and mature industries. The final section of the course focuses on the prospects for sustainability of the organization of production and its environmental impact, incentives for skill development and technological innovation, and shared prosperity. A central course objective is to foster an understanding of the links between the workplace and region in the pursuit of sustainable development and shared prosperity.

SOCI.1010 Introduction to Sociology (Formerly 48.101) - Credits: 3

Serves as the basic course in sociology. Emphasis is directed at the ways in which social institutions such as government, schools, the economy, social class, and the family develop and influence our lives. It is concerned not only with presenting various ways to understand our relationship to society but also with ways to change it. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

SOCI.1020 Social Anthropology (Formerly 48.102) - Credits: 3

Using the comparative approach to society, this course examines several distinct cultures as a means of understanding both the universal constants and the variations in human societies.

SOCI.1110 A Novel Approach to Sociology (Formerly 48.111) - Credits: 3

Examines major sociological themes through analysis of literature, primarily major works of fiction.

SOCI.1120 Sociology Goes to the Movies (Formerly 48.112) - Credits: 3

This course is designed to give students the opportunity to survey primary sociological texts and view films, offer commentary on and analysis of social behavior.

SOCI.1150 Social Problems (Formerly 48.115) - Credits: 3

This entry level course uses the core concept of social problems to introduce basic social science reasoning-how social scientist define research questions, develop systematic methods to study them, gather evidence, search for pattern, in link findings to existent knowledge,. Cases provide opportunities to discuss how private problems develop into public issue, illustrating
sociology as a discipline that evolves in response to social conflicts and inequalities. The course also meets General Education requirements for Ethics and Diversity.

**SOCI.2010 Foundations of Social Analysis (Formerly 48.201) - Credits: 3**

This intermediate-level class deepens students' analytical skills beyond intro level preparing for more abstract work in Theory and Methods courses. It also prepares students for more complex integration of theory, methods and issue content in 300 level courses. This course will attend to developing students' ability to recognize, and write social science research papers.

**SOCI.2050 Public Sociology (Formerly 48.205) - Credits: 3**

Public sociology includes sociological initiatives targeting non-university audiences and serving the public good. This course will 1) introduce and critique the various conceptualizations of public sociology linking them to broad schools of sociological theory; 2) explore alternative field models and methods, preparing students for field projects in future semesters; and 3) expose students to sociological practitioners and practices compatible with the mission of the university and department. From a liberal arts perspective, the course stresses critical thinking and communication skills.

**SOCI.2100 Sociology of Food (Formerly 48.210) - Credits: 3**

This course is about Sociology of food exploring the connection between food, society and culture. Our food choices are influenced by age, gender, ethnicity, class and religion. History of food and methods of food production contribute to understanding of social relations among individuals and social changes in society. This course will examine 1. role of food in society, culture and change, 2. changes in food production from simple to complex societies and 3. problems associated with new systems of food production locally and globally.

**SOCI.2110 Sociology of American Education (Formerly 48.303/SOCI.3030) - Credits: 3**

Course introduces students to ongoing debates in the field of Sociology regarding the American educational system, its structures and functions and how it relates to issues of inequality by race, class and gender. Students are expected to explore, examine and evaluate the current issues relating to the system of education in the United States.

**SOCI.2120 Cultures of the World (Formerly 48.212) - Credits: 3**

Focuses on a different country or region each time it is given. Students examine the traditional culture, recent history, economic development, class structure, and international relations of the area covered.

**SOCI.2130 Sociology of Immigration (Formerly 48.307/SOCI.3070) - Credits: 3**

The United States is frequently described as a country with a proud history of immigration. As a result, citizens and residents of the U.S. often identify their home as a nation of people who make up a melting pot country. While useful and insightful, the melting pot metaphor requires comparison with additional explanations of immigration and immigrant experiences. In order to provide deeper comprehension of the topic matter, this course offers sociological examination of immigration processes, laws, and debates. Three areas compose the main portion of class content: historical accounts and theories, legislation, and the social, economical, and political experiences of immigrants.

**SOCI.2140 Sociology of Sports (Formerly 48.340/SOCI.3400) - Credits: 3**

Examines the history of modern sports at the amateur and professional levels and international competition. The impact of race, sex, economics, and politics on the institution of sports will also be examined.

**SOCI.2150 Peacemaking Alternatives (Formerly 48.215) - Credits: 3**

Examines various positive alternatives to war and violence, including disarmament, nonviolence, conflict resolution, and the United Nations. Students do volunteer work with an activist agency or interview an activist. The course stresses the historical and contemporary role of peace movements and allied social-change movements such as feminism, civil rights and environmentalism.

**SOCI.2160 Sociology of War and Peace (Formerly 48.216) - Credits: 3**

The purpose of this course is to examine critically the social forces that contribute to war, war's social consequences, and the possibilities for creating a more peaceful world.

**SOCI.2170 Social Movements (Formerly 48.382/SOCI.3820) - Credits: 3**

Considers organized action undertaken to alter the social
position of a group. Organization, techniques of action, motivation of participants, and group ideologies are studied. Materials from historical, social, psychological, and sociological sources are used.

**SOCI.2200 Self-Assessment and Career Development (Formerly 48.220) - Credits: 3**

Studies the meaning of work in our society. Class participants will assess their own life experiences and develop plans to integrate interests, values, and abilities into meaningful and realistic life/work options.

**SOCI.2250 Sociology of Disability (Formerly 48.225) - Credits: 3**

This course is organized around several key questions that are used to study the concepts of disability and ability from a variety of sociological and interdisciplinary perspectives. Specifically, the course explores representations of disability in popular culture and medical discourses to discuss disability and ability as social constructs. By looking at various literary and cultural representations, this course investigates constructions of the disabled and abled body, how this becomes politicized, and the implications of these constructions.

**SOCI.2310 Sociology of Families (Formerly 48.231) - Credits: 3**

This course uses a sociological approach to understand family forms, practices, and controversies in contemporary society, with particular emphasis on families in the United States. We will look closely at how family experiences and opportunities have changed over time, and also how they vary by gender, age, class, race/ethnicity and sexual orientation. What functions do families perform in modern society? How are they changing? How do these changes affect our lives?

**SOCI.2340 Race and Ethnicity (Formerly 48.234) - Credits: 3**

This course locates and studies the sociological dynamics of race and ethnic relations in the United States as it pertains to all groups. The course material presents theories and models that explain periods of conflict and cooperation between diverse sets of people. While providing some historical background, the course focuses primarily on recent and contemporary situations.

**SOCI.2360 Climate Crisis and Society (Formerly 48.236) - Credits: 3**

Focusing on case studies of recent and pending environmental disasters, this course will trace how political, social, economic and cultural arrangements and choices contribute to environmental catastrophes and their resolution. In order to identify possibilities for agency, students will play several environmental games in which they will assume roles in the global economy, governmental and civil society to identify possibilities for agency. As a final project, students will describe a recent disaster identifying both structures that create environmental stresses and the options that might exist for structural changes. The project is intended to develop both critical thinking and communication skills.

**SOCI.2400 Sociology of Gender (Formerly 48.240) - Credits: 3**

This course is an interdisciplinary introduction to the field of gender studies. A variety of topics are presented, such as gender stratification, work and family, sexual identities, media representations of women and men, women's movement, and violence against women. Feminist theories and methods are also introduced.

**SOCI.2450 Introduction to Labor Studies (Formerly 48.245) - Credits: 3**

This foundational course has two overarching learning objectives: (1) to give students basic empirical knowledge and analytical tools to understand the context of work in the United States at the dawn of the twenty-first century and (2) to give students an understanding of how labour unions work, what has been their impact historically, and what their role is in contemporary society. The course will be explicitly interdisciplinary, drawing on readings from history, sociology, economics, political science, and psychology to offer and introduction to understanding work and labor through and analytic lens. In addition, the course will include a service-learning component in collaboration with the UML Labor Education Program.

**SOCI.2550 Sociology of Deviance (Formerly 48.255) - Credits: 3**

Analysis of how social institutions define and respond to various forms of social deviance, from individual mental illness to gang violence to illegal acts by governments and corporations. Attention will be paid to the construction and management of deviant identities, the role played by social status, and the social importance of institutions of social control.

**SOCI.2560 Political Sociology (Formerly 48.256) - Credits: 3**

Focuses on the development and use of power in modern society. Emphasis is placed on the relationship of American
political institutions to economic institutions, to social class, and to supporting ideologies.

SOCl.2700 Self and Society (Formerly 48.270) - Credits: 3
An examination of the relationship between individuals and the social world around them. The course examines the underlying structures that pattern human interaction. Topics include the social construction of the self, the construction of social reality, and the sociology of emotions, among others.

SOCl.2710 Sociology of Work (Formerly 48.371 and SOCl.3710) - Credits: 3
In the United States, work is a fundamental part of people's identities, consumes huge amounts of our time and effort, is a vital part of our economic and social development, and is linked inextricably to gender, racial-ethnic, and class inequalities. This course will take a sociological perspective, challenging students to take a step back and look analytically at work, something with which most of us are intimately familiar.

SOCl.2760 Sociology of the Gun (Formerly 48.276) - Credits: 3
This course examines the social impact of guns on the American psyche, from deer hunters and intergenerational family bonds to street gangs and broken families, from collectors and recreational users to hospital trauma. Self-defense issues are discussed within the context of the Second Amendment. The conflict between pro-gun and anti-gun special interest groups and the evolution of an American gun culture will be studied.

SOCl.2800 Drugs and Society (Formerly 48.280) - Credits: 3
This course is designed to introduce students to the cultural and polititical qualities of drugs in society. The course provides a historical and cross-cultural overview of the use of organic and simple processed substances, as well as a history of drug policy in the United States.

SOCl.3010 Sociology of Human Rights (Formerly 48.301) - Credits: 3
Examines the politically divergent definitions of rights and freedoms. Attention will be paid to the activities of international human rights organizations to the human rights policies of the major powers. Various current human rights issues will be examined. Case histories may include the Soviet Union, Northern Ireland, South Africa, Afro-Americans, Armenians and Palestinians.

SOCl.3020 Seminar on Homelessness: Lowell and Mumbai - Credits: 3
This course will focus on understanding housing insecurity by looking closely at what it means to be homeless in two very different cities, located across the world from each other: Lowell, USA and Mumbai, India. In doing so, we will use this comparison to highlight the root causes of homelessness within a global context, including how certain social situations, policies and innovations may exacerbate and/or improve this situation. Simultaneously, students will gain a first-hand understanding of homelessness in Lowell through performing 3-4 hours of service per week at a local shelter and/or drop-in center.

SOCl.3040 Science, Technology and Society (Formerly SOCl.2220) - Credits: 3
The complex relationships between science, technology, and society are commonly obscured by a popular belief in the value-neutrality and objectivity of science and technology. Being able to analyze that belief as a myth is necessary in order to engage in critical analysis of the ways in which science, technology and society are mutually constituted. Social inequalities are both built into and perpetuated by science, technology, and engineering. Likewise, science, technology, and engineering shape and are shaped by various societal power relations. This course will provide the analytical tools necessary to understand science, technology, and engineering as fundamentally social enterprises and to understand how they shape society.

SOCl.3050 Sociology of Family Law (Formerly 48.305) - Credits: 3
Examines some social issues in family law, the changes therein, and the social climate and consequences accompanying these. By using the sociological method of inquiry to examine family law cases, the relationship between law and society as instruments of order and change are exemplified.

SOCl.3100 Ethnicity in Massachusetts (Formerly 48.310) - Credits: 3
Massachusetts is well known for its rich immigrant history and culture. This course examines the social history of and conditions faced by immigrants upon arrival to Massachusetts, the ways they are affected as they settle in communities and their social and cultural impact locally and state-wide. Selected ethnic groups/communities are examined to understand the common processes and experiences as well as differences among them.
SOCI.3110 Sociological Perspective on Communication & Social Change (Formerly 48.311) - Credits: 3

Most social interactions and interventions involve communication. Thus, communication patterns present critical issues for sociological inquiry. This course introduces communication as a central yet often ignored element of social life. It surveys existing communication theories, then focuses on models used by marginalized populations in efforts to democratize communication systems. Finally, it introduces tools for communication strategizing. As a final product students will conduct a frame analysis of a current social topic. From a general liberal arts perspective, the course will stress critical thinking and writing skills.

SOCI.3160 Youth and Society (Formerly 48.316) - Credits: 3

Youth (or adolescence) constitutes a historically and socially constructed stage of the life course between childhood and adulthood. Since the early twentieth century, society’s view of this life period has been ambivalent, at once glorifying the age of youth while also fretting over the problems that youth face. This course takes a sociological view of the study of youth/adolescence with particular attention to: (1) how this stage of the life course intersects with race, gender, immigration status and sexuality; (2) how society has responded to youth over time through a range of youth-serving organizations and media representations; and (3) how youth have responded as agents in their own public representations and development.

SOCI.3170 Sociology of Genocide (Formerly 48.317) - Credits: 3

The deliberate destruction of an ethnic group is an historical event and a social process. This course addresses such questions as: Why do genocides occur? Why do people become genocide perpetrators? How do genocides affect survivors and their offspring? How can genocide be prevented? Focus is on Native American, Armenian and Jewish experiences and recent cases of ethnic cleansing.

SOCI.3200 Community Service (Formerly 48.320) - Credits: 3

Course uses fieldwork approach to understand social problems and to discipline study and career pursuit in the area of public service.

SOCI.3210 Classical Social Theory (Formerly 48.321) - Credits: 3

This course offers a critical examination of major classical sociological theories. It emphasizes the relationship between the individual and society and the competing pressures for social order and social conflict.

SOCI.3220 Contemporary Social Theory (Formerly 48.322) - Credits: 3

This course offers a critical examination of major contemporary sociological theories, including critical theory, neo-Marxism, critical race theory, feminist theory, and postmodernism.

SOCI.3250 Global Conflicts (Formerly 48.325) - Credits: 3

SOCI.3300 Fast Food, Hot Planet: Sociological Approaches (Formerly 48.330) - Credits: 3

With an eye on climate change sustainability, this course maps the social and historical dimensions of crisis and inequalities of food production and distribution. In addition to exploring food security's relation to sustainable food production, students will strengthen critical thinking, writing, and library research skills.

SOCI.3350 Sociology of Intimacies and Sexualities - Credits: 3

In this course, students will investigate the relationship between society and sexualities, including: social categorizations of sex, gender, and sexuality; social and cultural representations of intimacy and sexuality; and social and institutional control of sexualities and sexual behavior and practice. Students will read theoretical and methodological works from the field of sexualities studies, including sociological, feminist, post-colonial, and queer theorists. By the end of the course, students will be able to articulate a sociological perspective on intimacy and sexualities.

SOCI.3410 Wealth, Status and Power (Formerly 48.341) - Credits: 3

Focuses on the phenomenon of social class distinctions with particular emphasis on social class in America. The approach is both historical and sociological.

SOCI.3450 Urban Sociology (Formerly 48.345) - Credits: 3

Deals with issues related to the quality of life in American cities. Students taking this course may engage in research projects on the city of Lowell and the role of the University of Massachusetts Lowell within that city.
SOCI.3510 The Sociology of Health and Health Care (Formerly 48.351) - Credits: 3

With the passage of the Affordable Care Act, the U.S. Health Care system is undergoing a radical change as profound as any in U.S. history including those for minority and woman’s rights. A large segment of the population has struggled to obtain even basic health care coverage. The changes taking place are analyzed in a historical and comparative context by examining health care in other countries. Special attention is given to understanding the professions in medicine and the role medical professions have had in shaping medical care. At the micro level, the course examines evolving health care provider/patient relationships to better understand the level of control patients can exert over their health care decisions.

SOCI.3520 Latinos/as in the United States - Credits: 3

By 2060, Latinos are forecast to comprise over 28 percent of the US population. While the presentation of Latinos/as in public discourse often frames them as recently arrived immigrants, Spanish-speaking peoples in the US have a long and rich history. This course focuses a sociological lens on the historical and contemporary experiences of a community whose emergence requires deep analysis. Emphasis is placed on immigration policy, demographic shifts, labor market discrimination and bilingual education.

SOCI.3550 Black Experience in American Life (Formerly 48.355) - Credits: 3

SOCI.3570 The Sociology of Religion (Formerly 48.357) - Credits: 3

An investigation of religious institutions and experiences. Emphasis is placed on the influence of religion on social change.

SOCI.3600 Sociology of Non-Violence (Formerly 48.360) - Credits: 3

An analysis of non-violent efforts to achieve social change through demonstrations, civil disobedience, etc. Movements led by Mahatma Gandhi, Martin Luther King, Jr., and others are examined.

SOCI.3610 Sociology of Law (Formerly 48.361) - Credits: 3

The course examines the role of social forces in defining the law. Topics include the legal profession, white-collar crime, and the importance of race, class and gender in the criminal justice system.

SOCI.3620 Social Welfare Policy (Formerly 48.362) - Credits: 3

The course examines the development of social welfare policy in the United States as well as alternative strategies for social welfare provision. Particular attention is paid to the role of race/ethnicity, class, and gender in the formation of social welfare policy.

SOCI.3700 Intersections of Disability and Gender - Credits: 3

This course is organized around several questions that will be used to help engage students in the study of the concepts of disability and gender from a variety of sociological and interdisciplinary perspectives. The course will explore feminist representations of disability and gender in popular culture discourses to discuss disability as well as gender as social constructs. By analyzing books, movies, television, cartoons, and the internet, we will look at how conceptualizations of disability and gender intersect and are represented in these “texts” and the possible influences on perceptions and definitions of disability.

SOCI.3800 Sociology of Mass Media (Formerly 48.380) - Credits: 3

Examines ownership and control patterns of electronic and print media and their impact on media content and censorship.

SOCI.4020 Quantitative Methods for Social Research (Formerly 48.402) - Credits: 3

An introduction to methods of social research, with emphasis on quantitative research methods. Presents basic statistical techniques used in social research as well as the computer software used for analyzing social science data. For majors only.

SOCI.4030 Qualitative Methods for Social Research (Formerly 48.403) - Credits: 3

Qualitative research methods. Discusses various strategies employed by qualitative researchers with special emphasis on field research. For majors only. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Critical Thinking & Problem Solving (CTPS).

SOCI.4040 Learning from the Field (Formerly 48.404) - Credits: 3

Provides students with the opportunity to directly observe and participate in the operation of a social service organization.
SOCl.4050 Feminist Methodologies (Formerly 48.405) - Credits: 3

Despite the recent growth of feminist methodologies, there is no one way of doing feminist methodologies. The growing body of literature in this area addresses the distinctive challenges and strengths of doing this research. Gender Studies scholars especially seek to question the framing of a study, managing of emotions, and ethical dilemmas. We will explore feminist strategies for creating, implementing, and analyzing a project that is grounded in the everyday lives of people while situating them in a social, political, and economic context. We will explore the interdisciplinary intersections where these challenges push at the boundaries of the disciplines of your major field of study. We will also investigate how to use a variety of qualitative approaches while doing a feminist project and the ways in which feminism can enlighten understandings of “traditional” qualitative methods.

SOCl.4210 Seminar on the Family (Formerly 48.421) - Credits: 3

Study of the family structures and gender roles in various human societies. Prerequisites: 48.101 plus either 48.231 or 48.241.

SOCl.4690 Seminar on Global Society (Formerly 48.469) - Credits: 3

Considers the spread of industrial society globally. Emphasizes economic, political and cultural changes in various parts of the world and in the USA.

SOCl.4720 Seminar on Ethnic Communities (Formerly 48.472) - Credits: 3

This course examines a variety of issues, problems and prospects immigrants experience as they attempt to "make it in America". Immigrant America is increasingly ethnically diverse and this course focuses on the factors underlying migration and the ethnic communities migrants settle into with the aim to understand the cultural and contextual basis of their lives, their success and challenges.

SOCl.4840 Internship I (Formerly 48.484) - Credits: 3

SOCl.4845 Civil Society and Social Change in Valencia, Spain - Credits: 3-6

Students will study civic community in the third largest city in Spain to understand the unique linguistic and socio-political history of the region. The region provides rich opportunity for sociological analysis of socio-linguistic diversity within a modern national and global context. Readings, papers and field tips will emphasize the cultural construction of community and society. In addition, students who choose the six-credit option will spend 120 hours working in an individually defined internship placement in Valencia during six weeks after the end of the Spring semester. In addition students will be assigned hands-on activities and readings that will facilitate learning in the internship placement settings.

SOCl.4910 Directed Studies in Sociology (Formerly 48.491) - Credits: 3

The student, through regular and frequent consultation with an instructor, develops a course of directed reading in sociology and defines a problem for individual research. Prerequisite: permission of instructor.

SOCl.4920 Directed Studies: Sociology (Formerly 48.492) - Credits: 1

A one-credit, short course available only to qualified seniors. Prerequisite: Permission of Department Chairperson.

SOCl.4950 Thesis in Sociology (Formerly 48.495) - Credits: 3

A program of study which affords the advanced student with an additional opportunity to pursue a previously explored problem in greater depth or to initiate a new study. The purpose is to sharpen and refine techniques for scholarly research and presentation in the student's major discipline. Prerequisites: demonstrated proficiency in an area selected for directed study and permission of instructor.

SOCl.4960 Practicum Experience (Formerly 48.496) - Credits: 3

A program of on-campus and/or off-campus experience for sociology majors and minors only. Specific requirements vary depending upon department policies and the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural, or artistic area and for applying techniques of problem solving and/or skills that are appropriate to the student's major discipline. May be repeated to a maximum of six credits. Students are graded satisfactory and unsatisfactory. The practicum experiences may not be substituted for a required course in the major. Prerequisite: permission of Chairperson.

UTCH.2010 Knowing and Learning in Math and Science (Formerly UTL.201) - Credits: 3

The course starts by imparting the understanding that there is a
science to learning and by having students examine ideas of what it means for an individual to know or understand something. This course focuses on several essential questions which enable students to explore how knowing and learning are structured with specific emphasis on mathematics and science. Students will come to understand what it means to know something, how we can understand student thinking and how theories of learning inform instructional decisions; in particular students will explore the idea that learning is a social activity. Students are prompted to reflect on their own ways of looking at various ideas and concepts and to consider alternative perspectives. Students will conduct an analysis of reasoning processes through a clinical interview process, one-on-one with learners engaging in problem solving. This course is required for the STEM TEACHING MINOR.

WLKH.3490 Literature, Politics and Genocide in Cambodia (Formerly 59.349) - Credits: 3

This course will examine various literary and political responses to the Cambodian genocide, particularly personal accounts or literary testimony by survivors and government sanctioned legal proceedings. The course will consider how the literary and political responses to the Cambodian genocide have at different times paralleled, complimented and opposed each other. The course will also ask whether their overall effect contributes to or detracts from the serving of justice and the process of healing for the survivors. To pursue these questions, we will read selections from novels and poetry written by Cambodian survivors side by side with accounts of political activities of the Cambodian government and the international community to bring the perpetrators of the genocide to justice.
FINA.2000 Personal Finance - Credits: 3
This course emphasizes the development of individually focused financial information and a comprehensive financial plan designed to enable the individual to manage his or her financial affairs. The course also integrates personal goals, such as buying a home, retirement, investing, and insurance needs, to help assure that the financial plan incorporates the major decision stages an individual will face.

MATH.1020 Freshman Seminar in Mathematics (Formerly 92.102) - Credits: 1
This course is designed to orient undergraduate math majors to the university and to their chosen field. Students will learn about the mathematics program, the mathematics faculty and their research interests, careers in math-related areas, internship opportunities, and university resources.

MATH.1070 Elementary Math for Teaching: Numbers and Operations (Formerly 92.107) - Credits: 3
The Number and Operations course for elementary and middle school teachers examines the three main categories in the Number and Operations strand of Principles and Standards of School Mathematics (NCTM) -- Understanding numbers, representations, relationships, and number systems; the meanings of operations and relationships among those operations; and reasonable estimation and fluent computation. No credit in Science or Engineering.

MATH.1080 Elementary Math for Teaching: Algebra and Data Analysis - Credits: 3
This course seeks to support students in furthering their understanding of elementary mathematics concepts. The goal is for students to not only pass the MTEL for elementary mathematics, but to lay the groundwork for graduate work in elementary mathematics education. Specifically, we use an integrated approach to algebra that draws on real-world data to the extent possible. To this end, learners will gain experience in selecting and developing a number of data representations, organizing data, looking for patterns in the data and, finally, using words, symbolic notation, graphs and tables to generalize those patterns. No credit in Science or Engineering.

MATH.1110 Quantitative Reasoning (Formerly 92.111) - Credits: 3
An introduction to the mathematics concepts and skills important in modern society, even for non-technical pursuits. The course will emphasize conceptual understanding as well as a facility in performing elementary computations. Topics to be examined will include types of reasoning, problem-solving methods, techniques of estimation, algebraic essentials, and the nature of probability and statistics. No credit in Science or Engineering.

MATH.1110SI SI for Quantitative Reasoning & Introduction to Statistics (Formerly 92.111SI/92.2830SI) - Credits: 2
This course provides supplemental instruction in mathematics to students whose Elementary Algebra Accuplacer exam scores indicate the need for such instruction. The credits in this course can not be used to satisfy the credits required for graduation, but may be used to satisfy the credits required for full time student status.

MATH.1115 Fundamentals of Algebra (Formerly 90.111) - Credits: 3
Intended for students with little or no background in basic algebra or whose background is not current. Topics covered include: the real number system, factoring fractions, linear equations, functions, graphs, systems of equations, and the quadratic equation. Students will not receive credit for this course toward any degree program at the University of Massachusetts Lowell.

MATH.1200 Precalculus Mathematics I (Formerly 92.120) - Credits: 3
Intended for students whose background in basic algebra is current. Topics covered include: linear equations, slope of a line, quadratic equations, functions, transformations, inequalities, curve sketching, and systems of equations. Note: Students who score 45 or lower on the ALEKS math assessment should consider enrolling in MATH.1115 first. Credit is given for only one of the following courses; MATH.1200, or MATH.1210.

MATH.1210 Management Precalculus (Formerly 92.121) - Credits: 3
Review of algebra. The Real Numbers, inequalities and intervals on the number line, factoring, radical notation, properties of exponents, scientific notation, and operations on rational expressions. Function definition and graph of linear/nonlinear functions such as quadratic, cubic, absolute value, piecewise-defined, rational, and power function. Additional topics with functions included such as transformations of graphs and symmetry, composite functions, one-to-one and inverse functions. Solving linear and quadratic equations algebraically and graphically. Solving systems of equations in two variables algebraically and graphically. Modeling systems of equations in three variables and solving them analytically and with matrices using TI-84
implementation. Modeling with linear as well as quadratic and power functions with the aid of a graphing calculator and Excel spreadsheets. Business applications are included.

**MATH.1210SI Management Pre-Calculus Supplemental Instruction (Formerly 92.121SI) - Credits: 1**

Taken simultaneously with MATH.1210, this 1-credit course offers students taking MATH.1210 supplemental instructions to foster a greater opportunity for successful completion of Management Precalculus. The course credit cannot be used to satisfy the credits required for graduation, but may be used to satisfy credits required for full-time student status.

**MATH.1220 Management Calculus (Formerly 92.122) - Credits: 3**

Review of difference quotient, least squares modeling, limit of difference quotient, differential calculus: derivatives, differentials, higher-order derivatives, implicit differentiation, relative and absolute maxima and minima of functions, and applications of derivatives to business and economics. Integrals and applications to business. No credit in Science or Engineering.

**MATH.1220SI Management Calculus Supplemental Instruction (Formerly 92.122SI) - Credits: 1**

Taken simultaneously with MATH.1220, this 1-credit course offers students taking MATH.1220 supplemental instructions to foster a greater opportunity for successful completion of Management Calculus. The course credit cannot be used to satisfy the credits required for graduation, but may be used to satisfy credits required for full-time student status.

**MATH.1230 Precalculus Mathematics II (Formerly 92.123) - Credits: 3**

A continuation of Math 1200. Covers exponential and logarithmic functions, trigonometric and inverse trigonometric functions, and trigonometric identities.

**MATH.1250 Calculus A (Formerly 92.125) - Credits: 3**

Serves as a first course in calculus and provides a brief review of analytic geometry and trigonometric functions. The course progresses to the study of inverse functions, limits, continuity, derivatives, rules for differentiation of algebraic and transcendental functions, chain rule, implicit differentiation, linear approximation, differentials, and maximum and minimum values.

**MATH.1260 Calculus B (Formerly 92.126) - Credits: 3**

Serves as a continuation of MATH.1250. The course covers L’Hospital’s Rule, optimization problems, Newton’s method, sigma notation, integration, area between curves, volume, arc length, surface area, integration by parts, trigonometric substitution, partial fraction decomposition, and improper integrals.

**MATH.1270 Preparation for Calculus (Formerly 92.127) - Credits: 4**

A review of precalculus (algebra and trigonometry) together with development of problem solving skills. No credit in Science or Engineering.

**MATH.1280 Calculus IA (Formerly 92.128) - Credits: 4**

Provides a review of pre-calculus algebra and trigonometry integrated with the first half of Calculus I: limits, continuity, derivatives, basic derivative formulas, chain rule, implicit differentiation. Students are expected to have taken pre-calculus and trigonometry in order to be successful in this course.

**MATH.1280SI Calculus IA Supplemental Instruction (Formerly 92.128SI) - Credits: 1**

Taken simultaneously with MATH.1280, this 1-credit course offers students retaking MATH.1280 supplemental instructions to foster a greater opportunity for successful completion of Calculus IA. The course credit cannot be used to satisfy the credits required for graduation, but may be used to satisfy credits required for full-time student status.

**MATH.1290 Calculus IB (Formerly 92.129) - Credits: 4**

Provides a review of pre-calculus, algebra and trigonometry integrated with the second half of Calculus I. Inverse trig functions and their derivative, logarithmic functions and their derivative, related rates, L’Hospital’s Rule, optimization problems, curve sketching, linearization, Newton’s Method, hyperbolic functions and their derivative, antiderivatives. Completion of this course is equivalent to MATH.131 0 Calculus I.

**MATH.1290SI Calculus IB Supplemental Instruction (Formerly 92.129SI) - Credits: 1**

Taken simultaneously with MATH.1290, this 1-credit course offers students retaking MATH.1290 supplemental instructions
to foster a greater opportunity for successful completion of Calculus IA. The course credit cannot be used to satisfy the credits required for graduation, but may be used to satisfy credits required for full time student status.

MATH.1310 Calculus I (Formerly 92.131) - Credits: 4
Serves as a first course in calculus. Functions, limits, continuity, derivatives, rules for differentiation of algebraic and transcendental function; chain rule, implicit differentiation, related rate problems, linearization, applied optimization, and curve sketching. Introduction to area and integration. Students are expected to have taken pre-calculus and trigonometry in order to be successful in this course.

MATH.1320 Calculus II (Formerly 92.132) - Credits: 4
Serves as a continuation of Calculus I. Integration and techniques of integration including the substitution method, integration by parts, trigonometric integrals, trigonometric substitution, integration of rational functions by partial fractions, numerical integration, and improper integrals. Volumes using cross-sections, the disk method, the washer method and the shell method. Arc length and surface area. Infinite series, power series, Maclaurin and Taylor series. Polar coordinates and areas and lengths in polar coordinates.

MATH.1380 Calculus for the Life Sciences I (Formerly 92.138) - Credits: 4
This is a single variable calculus course with applications to the life sciences. Review of basic algebra, trigonometry, functions and graphs. Limits and derivatives, including differentiation rules, curve sketching and optimization problems. Implicit differentiation. Study of exponential and logarithmic functions motivated by growth, decay and logistic modes. Introduction to integration, techniques, applications and the fundamental theorem.

MATH.1390 Calculus for the Life Sciences II (Formerly 92.139) - Credits: 4

MATH.1410 Honors Calculus I (Formerly 92.141) - Credits: 4
This course covers the same topics as MATH.1310 Calculus I, but in an enriched environment.

MATH.1420 Honors Calculus II (Formerly 92.142) - Credits: 4
This course covers the same topics as MATH.1320 Calculus II, but in an enriched environment.

MATH.1510 Explorations in Mathematics (Formerly 92.151) - Credits: 3
This course is not so much about the mathematics of formulas, equations, rules and errors, as about mathematics that can be experienced: counted, drawn, seen, created; quite simply: played with. Officially, we will encounter concepts of combinatorics, geometry, number theory and Boolean logic. Unofficially, we will experiment with puzzles and patterns and develop as much mathematics from them as we can. Prerequisites: high school mathematics and willingness to explore. No credit in science or engineering. This course satisfies the Quantitative Reasoning requirement.

MATH.2100 Functions and Modeling (Formerly 92.210) - Credits: 3
Engage in lab-based activities designed to strengthen their problem-solving skills and expand knowledge of the topics in secondary mathematics, focusing especially on topics from precalculus and the transition to calculus. Explore a variety of contexts that can be modeled using families of functions. Topics include conic sections, parametric equations and polar equations. Multiple representations, transformations, data analysis techniques and interconnections among geometry, probability and algebra. Quantitative approaches and building relationships between discrete and continuous reasoning will be recurrent themes.

MATH.2190 Discrete Structures I (Formerly 92.321 and MATH.3210) - Credits: 3
Presents propositional logic, combinatorics, methods of proof, mathematical systems, algebra of sets, matrix algebra, relations and functions, recursion and generating functions, applications to computer science, and graph theory.

MATH.2210 Linear Algebra I (Formerly 92.221) - Credits: 3
Elementary set theory and solution sets of systems of linear equations. An introduction to proofs and the axiomatic
methods through a study of the vector space axioms. Linear analytic geometry. Linear dependence and independence, subspaces, basis. Inner products. Matrix algebra. Applications of the above will also be discussed.

**MATH.2220 Linear Algebra II (Formerly 92.222) - Credits: 3**

Linear transformations, Linear operators, change of basis, inner product and the diagonalization problem. Quadratic forms. Convex sets and geometric programming, input/output models for an economy, Markov chains, other applications of linear algebra.

**MATH.2250 Calculus C (Formerly 92.225) - Credits: 3**

Serves as a continuation of MATH.1260. This course covers integration by parts, integration of trigonometric integrals, trigonometric substitution, partial fraction, numeric integration, improper integrals, L'Hôpital's Rule, indeterminate forms, sequences, infinite series, integral tests, comparison tests, alternating series tests, power series, Taylor series, polar coordinates, graphs and areas in polar coordinates, and parametric equations.

**MATH.2260 Calculus D (Formerly 92.226) - Credits: 3**

Serves as a continuation of MATH.2250. This course covers curvature, cylindrical surfaces, dot and cross products, curves and planes in three space, cylindrical and spherical coordinates, functions of two variables, chain rule, directional derivatives and gradient, tangent planes, and double and triple integrals in rectangular, polar, cylindrical and spherical coordinate systems.

**MATH.2270 Elementary Math for Teaching: Geometry and Measurement (Formerly 92.227) - Credits: 3**

This is a mathematics content course which covers the geometry/measurement strands of the Massachusetts Curriculum Frameworks in Mathematics at a collegiate level. The goal is not only to prepare students for the elementary mathematics MTEL, but to lay the groundwork for graduate work in elementary mathematics education. The course centers around "Big Ideas" such as Equivalence, Proportionality, Transformations; and Shapes & Solids. No credit in Science or Engineering.

**MATH.2310 Calculus III (Formerly 92.231) - Credits: 4**

Extends the concepts of Calculus I and II that deal with functions of a single variable to multi-variable functions, vector-valued functions and vector fields. Vectors and vector-valued functions, the dot and cross products, curves in space and the calculus of vector-valued functions. Multi-variable functions, limits, continuity, and differentiation. Partial derivatives, directional derivatives, the gradient, Lagrange multipliers and optimization. Double and triple integrals in Cartesian, polar and spherical coordinates. Vector fields and the fundamental theorems of vector calculus developed, line and surface integrals, Green’s theorem, Stokes’s theorem, and the divergence theorem.

**MATH.2320L Math Lab I (Formerly 92.232) - Credits: 1**

An introduction to mathematics related software. Topics from Calculus & Differential Equations will be explored using a symbolic package like Maple. The course will also introduce LaTeX, the standard for typesetting mathematics.

**MATH.2340 Differential Equations (Formerly 92.234) - Credits: 3**


**MATH.2360 Engineering Differential Equations (Formerly 92.236) - Credits: 3**

Introduction to differential equations with an emphasis on engineering applications. Topics include first-order equations, higher-order linear equations with constant coefficients, and systems of first-order equations. Applications of each topic are introduced and qualitative, analytical, and numerical solution techniques are studied. Laplace transform methods are discussed. The software package MATLAB is used throughout the course for both analytical and numerical calculations.

**MATH.2410 Honors Calculus III (Formerly 92.241) - Credits: 4**

Covers the same topics as MATH.2310 Calculus II, but in an enriched environment.

**MATH.2440 Honors Differential Equations (Formerly 92.244) - Credits: 3**

Introduction to differential equations. Topics include first-order equations, second-order and higher-order linear
equations, systems of first-order linear equations with constant coefficients, and Laplace transforms.

**MATH.2720 Introduction to Programming with MATLAB (Formerly 92.272)** - Credits: 3

This course will introduce basic programming concepts using MATLAB as the programming environment. Topics include an introduction to MATLAB, array manipulation, graphics, script files, data input and output, relational and logical operators, conditional statements, loops, and iterative procedures. Additional topics will be discussed as time permits. Additional topics will be chosen from the following: finding roots of nonlinear equations, random number generation, Markov processes, simple statistics, interpolation, and the basics of Fourier analysis.

**MATH.2830 Introduction to Statistics (Formerly 92.283)** - Credits: 3

An introduction to descriptive statistics, graphing and data analysis, probability laws, discrete and continuous probability distributions, correlation and regression, inferential statistics. No credit in Sciences (except Biology and EEAS) or Engineering. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

**MATH.2830SI SI for Quantitative Reasoning & Introduction to Statistics (Formerly 92.111SI/92.2830SI)** - Credits: 2

This course provides supplemental instruction in mathematics to students whose Elementary Algebra Accuplacer exam scores indicate the need for such instruction. The credits in this course can not be used to satisfy the credits required for graduation, but may be used to satisfy the credits required for full time student status.

**MATH.3010 Introduction to Applied Mathematics I (Formerly 92.301)** - Credits: 3

Discusses vector analysis, Green's Theorem, Divergence Theorem, Stokes' Theorem, Fourier series, integrals, and partial differential equations of physics and engineering.

**MATH.3020 Introduction to Applied Mathematics II (Formerly 92.302)** - Credits: 3


**MATH.3220 Discrete Structures II (Formerly 92.322)** - Credits: 3

Examines graph theory, trees, algebraic systems, Boolean algebra, groups, monoids, automata, machines, rings and fields, applications to coding theory, logic design, and sorting.

**MATH.3300 Symbolic Logic (Formerly 92.330)** - Credits: 3

An introduction to symbolic logic. Symbolic logic provides a framework of formal reasoning with applications in mathematics, cognitive science, computer science and philosophy. Topics include propositional logic, boolean algebras and rings, first-order logic and systems of deduction. Time permitting, we will touch on Tarski’s notion of model, and the completeness and incompleteness theorems of Godel.

**MATH.3600 Mathematic Structure for Computer Engineers (Formerly 92.360)** - Credits: 3


**MATH.3620 Numerical Analysis I (Formerly 92.362)** - Credits: 3

Focuses on the theory and application of numerical techniques including error analysis. Also discusses solution of linear, nonlinear and differential equations, interpolation, numerical integration, and curve fitting. Computer solutions are emphasized.

**MATH.3630 Intro to Data Analysis (Formerly 92.363)** - Credits: 3

Computer analysis of data derived from research conducted in physical, social, and life sciences. Data preparation. Data modification, file manipulation, and descriptive statistics using SPSS. Programming ability is not required. No credit in Science or Engineering.

**MATH.3750 Senior Seminar I (Formerly 92.375)** - Credits: 1

Student works with an advisor to develop a proposal for a senior project that will be carried out as part of MATH.4750 Senior Seminar II. Generally taken during the spring of the junior year. Prerequisite: Permission of instructor.
MATH.3810 Mathematical Physics (Formerly 92.381) - Credits: 3

Intended for students having completed 2 full years of physics and math, this course is designed to develop competency in the applied mathematical skills required of junior and senior level physics majors. Covering topics involving infinite series, power series, complex numbers, and linear algebra along with vector and Fourier analysis, students will be trained with the rigor required to solve a wide range of applications in the physical sciences. Physics majors only.

MATH.3850 Applied Statistics (Formerly 92.385) - Credits: 3

Introduction to experimental design, data analysis and formal statistical procedures from an applied point of view.

MATH.3860 Probability and Statistics I (Formerly 92.386) - Credits: 3

Provides a one-semester course in probability and statistics with applications in the engineering sciences. Probability of events, discrete and continuous random variables cumulative distribution, moment generatory functions, chi-square distribution, density functions, distributions. Introduction to estimation, hypothesis testing, regression and correlation. No credit for both MATH.3860 and MATH.4070, Math majors should take MATH.4070.

MATH.4030 Mathematical Analysis (Formerly 92.403) - Credits: 3

The real numbers, completeness, sequences of real numbers, functions, continuity, uniform continuity, differentiability, the Riemann integral, series or real numbers, sequences and series of functions, uniform convergence, power series.

MATH.4070 Probability and Mathematical Statistics I (Formerly 92.407) - Credits: 3

Addresses the topics of probability, random variables, discrete and continuous densities, expectation and variance, special distributions (binomial, Poisson, normal, etc.), moment generating functions, joint and conditional distributions, transformations of variables, sampling, and the central limit theorem.

MATH.4100 Computers and Calculators in the Classroom (Formerly 92.410) - Credits: 3

This course explores the roles of mainframes, PC’s and hand calculators in instruction, examine some of the available software and consider their use in a variety of areas of secondary mathematics, such as algebra, geometry (Euclidean and analytic), probability and statistics and introductory calculus. No credit in Science or Engineering.

MATH.4110 Complex Variables I (Formerly 92.411/511) - Credits: 3

A first course in theory of analytic functions of one complex variable: complex differentiability and the Cauchy-Riemann equations, Cauchy Integral Theorem and Cauchy Integral Formula, Taylor and Laurent series, zeroes of analytic functions and uniqueness, the maximum modulus principle, isolated singularities and residues. Applications.

MATH.4130 Number Theory (Formerly 92.413) - Credits: 3

Studies congruencies and the Chinese Remainder Theorem, Primitive roots, quadratic reciprocity, approximation properties of continued fractions, Pell’s equation. Recent application of number theory such as primality testing, cryptology, and random number generation will also be covered.

MATH.4190 Mathematica - Credits: 3

A project-based course starting with an introduction to the basic features of Mathematica. A project that allows the student to focus on certain features in more detail is required and occupies the second half of the course.

MATH.4200 Mathematical Problem Solving (Formerly 92.420/520) - Credits: 3

Focuses on: mathematical resources, ability to use heuristics, the student’s beliefs about the use of mathematics to solve problems, and the student’s self-confidence as a problem solver. Effective strategies for incorporating problem solving in the curriculum will also be discussed.

MATH.4210 Abstract Algebra I (Formerly 92.421/521) - Credits: 3

Elementary group theory, groups, cosets, normal subgroups, quotient groups, isomorphisms, homomorphisms, applications.

MATH.4260 Topology (Formerly 92.426/526) - Credits: 3

Metric spaces, topological spaces, connectedness, compactness, the fundamental group, classifications of surfaces, Brouwer’s fixed point theorem.
MATH.4270 Geometry (Formerly 92.427/527) - Credits: 3
This course is designed for current and prospective geometry teachers. In addition to the development of Euclidean geometry, students will become familiar with geometry applications in Geometer’s Sketchpad software, and to a lesser degree with other geometry software applications including Geogebra, and Cabri. There will be an introduction to spherical and hyperbolic geometry and triangle measurements will be computed for each. Calculus based derivations of area and volume for surfaces and solids will be generated and related to Euclidean geometry topics.

MATH.4350 History of Mathematics (Formerly 92.435/535) - Credits: 3
Examines ancient numeral systems, Babylonian and Egyptian mathematics, Pythagorean mathematics, duplication, trisection, and quadrature, Euclid’s elements and Greek mathematics after Euclid, Hindu and Arabian mathematics, European mathematics from 500 to 1600, origins of modern mathematics, analytic geometry, the history of calculus. Also covers the transition to the twentieth century and contemporary perspectives.

MATH.4450 Partial Differential Equations (Formerly 92.445) - Credits: 3

MATH.4480 Mathematics of Signal Processing (Formerly 92.448) - Credits: 3

MATH.4500 Mathematical Modeling (Formerly 92.450) - Credits: 3
Applications of mathematics to real life problems. Topics include dimensional analysis, population dynamics wave and heat propagation, traffic flow.

MATH.4660 Stat Program Using SAS (Formerly 92.466) - Credits: 3
An introduction to creation and manipulation of databases and statistical analysis using SAS software. SAS is widely used in the pharmaceutical industry, medical research and other areas. Cannot be used as a Math Elective.

MATH.4750 Senior Seminar II (Formerly 92.475) - Credits: 3
Undergraduate seminar on advanced mathematical topics. Students are required to develop an understanding of an advanced subject beyond the scope of an existing course or synthesize two or more different areas form their curriculum. Students are required to participate in the seminar, present their results to the Department and write a substantial thesis in their topic area. Essential course elements include library research, original research, and both verbal and written exposition. The first semester is a graduation requirement for majors in mathematics.

MATH.4760 Senior Seminar III (Formerly 92.476) - Credits: 3
An optional second semester seminar to allow for continuation of study initiated in Senior Seminar I.

MATH.4860 Probability and Math Statistics II (Formerly 92.486) - Credits: 3

MATH.4900 Selected Topics (Formerly 92.490) - Credits: 1-3
Individual study for the student desiring more advanced or more specialized work. Course may not be substituted for scheduled offerings. Prerequisite: Permission of Department Chair.

MATH.4910 Directed Study in Algebra (Formerly 92.491) - Credits: 3
Individual study for the student desiring more advanced or more specialized work in algebra. May be repeated for a total of six semester credits. Course may not be substituted for scheduled offerings.
MATH.4940 Directed Study in Statistics (Formerly 92.494) - Credits: 3

Individual study for the student desiring more advanced or more specialized work in Statistics. May be repeated for a total of six semester credits. Course may not be substituted for scheduled offerings. Prerequisite: Permission of Department Chair.

MATH.4960 Mathematics Practicum (Formerly 92.496) - Credits: 1-3

Unpaid internship in the Department of Mathematical Sciences. This allows students to receive up to 3 (free elective) credits while working on an approved project. Students who have a position and who wish to take advantage of this Practicum should see the department Internship Coordinator.

MATH.5000 Discrete Structures (Formerly 92.500) - Credits: 3

An introduction to discrete mathematics, including combinatorics and graph theory. The necessary background tools in set theory, logic, recursion, relations, and functions are also included. Masters degree credit for Teacher Option Only.

MATH.5010 Real Analysis (Formerly 92.501) - Credits: 3

The class is aimed to give rigorous foundations to the basic concepts of Calculus such as limits of sequences and functions, continuity, Riemann integration. The main focus is given to rigorous proofs rather than computations. Tentative topics are: Real numbers (algebraic, order and distance structures); Archimedean property; Sequences and their limits. Bolzano-Weierstrass theorem; Cauchy sequences and completeness; Limit of a function; Continuity of a function at a point and on a set; Uniform continuity; Open and closed sets, idea of compactness, compactness of a closed interval; Sequences of functions, uniform convergence; Riemann integration. Prerequisites: Calculus I-III or equivalent, Discrete Structures or equivalent.

MATH.5070 Applied Functional Analysis I (Formerly 92.411/511) - Credits: 3

A first course in theory of analytic functions of one complex variable: complex differentiability and the Cauchy-Riemann equations, Cauchy Integral Theorem and Cauchy Integral Formula, Taylor and Laurent series, zeroes of analytic functions and uniqueness, the maximum modulus principle, isolated singularities and residues. Applications.

MATH.5090 Probability and Mathematical Statistics (Formerly 92.509) - Credits: 3

This course provides a solid basis for further study in statistics and data analysis or in pattern recognition and operations research. It is especially appropriate for students with an undergraduate science or engineering major who have not had a rigorous calculus-based probability and statistics course. The course covers the topics in probability models, random variables, expected values, important discrete and continuous distributions, limit theorems, and basic problems of statistical inference: estimation and testing.

MATH.5100 Computers and Calculators in Classroom (Formerly 92.510) - Credits: 3

Explores the roles of computers and calculators in instruction, examines some of the available software, and considers their use in a variety of areas of school mathematics, such as algebra, geometry (Euclidean and analytic) probability and statistics, and introductory calculus. Mathematics Masters degree credit for Teacher Option Only.

MATH.5110 Complex Variables I (Formerly 92.513) - Credits: 3

Study of primes, congruences, number-theoretic functions, Diophantine approximation, quadratic forms and quadratic number fields. Additional topics as time permits.

MATH.5130 Number Theory (Formerly 92.513) - Credits: 3

MATH.5200 Mathematical Problem Solving (Formerly 92.420/520) - Credits: 3

Focuses on: mathematical resources, ability to use heuristics, the student’s beliefs about the use of mathematics to solve problems, and the student’s self-confidence as a problem solver. Effective strategies for incorporating problem solving in the curriculum will also be discussed.

MATH.5210 Abstract Algebra I (Formerly 92.421/521) - Credits: 3

Elementary group theory, groups, cosets, normal subgroups,
quotient groups, isomorphisms, homomorphisms, applications.

MATH.5230 Linear Algebra (Formerly 92.523) - Credits: 3
Sets and maps; vector spaces and linear maps, matrix of linear maps, solving systems of equations, scalar products and orthogonality, eigenvalues and applications. Masters degree credit for Teachers Option Only.

MATH.5260 Topology (Formerly 92.426/526) - Credits: 3
Metric spaces, topological spaces, connectedness, compactness, the fundamental group, classifications of surfaces, Brouwer’s fixed point theorem.

MATH.5270 Geometry (Formerly 92.427/527) - Credits: 3
This course is designed for current and prospective geometry teachers. In addition to the development of Euclidean geometry, students will become familiar with geometry applications in Geometer’s Sketchpad software, and to a lesser degree with other geometry software applications including Geogebra, and Cabri. There will be an introduction to spherical and hyperbolic geometry and triangle measurements will be computed for each. Calculus based derivations of area and volume for surfaces and solids will be generated and related to Euclidean geometry topics.

MATH.5300 Applied Mathematics I (Formerly 92.530) - Credits: 3
Infinite Series, Complex Algebra, Ordinary Differential Equations, Special Functions, Fourier Series, Vector Spaces, Operators and Matrices.

MATH.5310 Applied Mathematics II (Formerly 92.531) - Credits: 3

MATH.5350 History of Mathematics (Formerly 92.435/535) - Credits: 3
Examines ancient numeral systems, Babylonian and Egyptian mathematics, Pythagorean mathematics, duplication, trisection, and quadrature, Euclid’s elements and Greek mathematics after Euclid, Hindu and Arabian mathematics, European mathematics from 500 to 1600, origins of modern mathematics, analytic geometry, the history of calculus. Also covers the transition to the twentieth century and contemporary perspectives.

MATH.5450 Partial Diff Equations (Formerly 92.545) - Credits: 3

MATH.5500 Mathematical Modeling (Formerly 92.550) - Credits: 3
Applications of mathematics to real life problems. Topics include dimensional analysis, population dynamics wave and heat propagation, traffic flow. Pre-requisite: 92.132 Calculus II.

MATH.5510 Calculus of Variations (Formerly 92.551) - Credits: 3
The first variational problem, necessary conditions. Euler’s equation. Generalization to dependent and independent variables. Constraints and Lagrange multipliers. Application to dynamics and elasticity. Direct methods.

MATH.5550 Applied Math for Life Scientists (Formerly 92.555) - Credits: 3
The objective of this course is to give students an opportunity to learn how to use a computer algebra system in the context of reviewing some of the key mathematical topics that are used in the life sciences. The first half of the course includes a review of mathematical topics ranging from trigonometry through differential equations. A parallel introduction to a computer algebra system is also included in the first half. In the second half, students will study a mathematical topic such as pattern recognition or models for growth and complete a project using the computer algebra system. (UMassOnline).

MATH.5630 Computational Mathematics (Formerly 92.563) - Credits: 3
MATH.5640 Applied Linear Algebra (Formerly 92.564) - Credits: 3

Use of iterative algorithms to find exact or approximate constrained solutions to large, and often sparse, systems of linear equations, and on applications, such as medical imaging, in which such problems arise. Maximization of likelihood and entropy. Emphasis on exploiting sparseness, accelerating convergence, and stabilizing calculations in the presence of noise. Block-iterative methods and bounds for singular values will be included. Basic results in matrix theory presented as needed.

MATH.5650 Special Functions (Formerly 92.565) - Credits: 3

Introduction to functions beyond those studied in calculus and which arise in applied mathematics, including gamma, beta, elliptic, Bessel, orthogonal polynomials ... Asymptotic approximation will be introduced.

MATH.5680 Approximation Theory (Formerly 92.568) - Credits: 3

Optimization without calculus; geometric programming; convex sets and convex functions; review of linear algebra; linear programming and the simplex method; convex programming; iterative barrier-function methods; iterative penalty-function methods; iterative least-squares algorithms; iterative methods with positivity constraints; calculus of variations; applications to signal processing, medical imaging, game theory.

MATH.5720 Optimization (Formerly 92.572) - Credits: 3

Optimization without calculus; geometric programming; convex sets and convex functions; review of linear algebra; linear programming and the simplex method; convex programming; iterative barrier-function methods; iterative penalty-function methods; iterative least-squares algorithms; iterative methods with positivity constraints; calculus of variations; applications to signal processing, medical imaging, game theory.

MATH.5750 Applied Statistics with R (Formerly 92.575) - Credits: 3

This is a methods course focusing on the applications of statistics using R programming language. Topics include: Study designs, review of inference and regression, categorical data, logistic regression, rates and proportions, and nonparametric methods. Additional topics may be considered if time permits. Only on of 92.575(R) and 92.576(SAS) may be applied toward a Masters degree in Mathematics.

MATH.5760 Statistical Programming using SAS (Formerly 92.576) - Credits: 3

An introduction to creation and manipulation of databases and statistical analysis using SAS software. SAS is widely used in the pharmaceutical industry, medical research and other areas. Cannot be used as a Math Elective.

MATH.5780 Statistical Inference and Data Mining (Formerly 92.578) - Credits: 3

Topics in nonasymptotic direct computational methods for statistical inference in data mining. Background in probability and statistics required.

MATH.5840 Stochastic Process (Formerly 92.584) - Credits: 3

Markov chains and processes, random walks, stationary, independent increments, and Poisson processes. Ergodicity. Examples (e.g., diffusion, queuing theory, etc.).

MATH.5850 Measure and Probability Theory (Formerly 92.587) - Credits: 3

This course presents the mathematical foundations of Probability Theory, including the concepts of Probability Space and random variable. Various types of convergence of sequences and measurable functions will be introduced, and precise statements and proofs of the probability limit theorems (Law of Large Numbers, Central Limit Theorems, etc.) will be given. Theory of measure and Lebesgue integration will be introduced. If time permits, conditional probabilities will be discussed.

MATH.5880 Mathematical Statistics (Formerly 92.588) - Credits: 3

Random variables, densities, joint and conditional distributions, expectations, variance, estimation, sufficiency and completeness, hypothesis testing, limiting distributions.

MATH.5900 Statistical Quality Control (Formerly 92.590) - Credits: 3

Overview of quality and managing quality, Define Measure Improve Control (DMAIC), the six sigma approach to quality, visual representation of data, Pareto charts, histograms, process capability vs specification (process) limits, t-tests, ANOVA, and other statistical hypothesis testing in quality, normal probability plots, control charts, measurement system analysis, application of regression analysis to manufacturing and/or design, Minitab.

MATH.5910 Linear Statistics Modeling and Regression (Formerly 92.591) - Credits: 3

Prerequisite: recommended: Linear Algebra.

MATH.5920 Multivariate Statistics (Formerly 92.592) - Credits: 3

Nonlinear model building via the method of least squares. Discriminant and factor analysis, principal components, profile analysis, canonical correlation, cluster analysis. Experience on real data sets.

MATH.5930 Experimental Design (Formerly 92.593) - Credits: 3

How to design, carry out, and analyze experiments. Randomized block designs, randomization, blocking, matching, analysis of variance and covariance, control of extraneous variables.

MATH.6510 Selected Topics in Mathematics (Formerly 92.651) - Credits: 3

Intended to satisfy individual student needs. Topics include various fields of mathematics.

MATH.6530 Selected Topics (Formerly 92.653) - Credits: 3

Advanced topics in various fields of mathematics and related fields. Since topical coverage varies from term to term, a student may be allowed to receive credit more than once for this course.

MATH.7420 Thesis Review (Formerly 92.472) - Credits: 1

MATH.7430 Master's Thesis in Mathematical Sciences (Formerly 92.743) - Credits: 3

Master's Thesis Research.
BIOL.2350 Genetics (Formerly 81.235) - Credits: 4

The theories of both classical and molecular genetics are explored with emphasis on the experimental evidence which has laid the foundation for contemporary understanding of genetics, included is the nature of the genetic material, gene action, genetic recombination, gene regulation, gene interaction, the production and inheritance of genetic phenotypes, chromosomal mechanics, and the behavior of genes in populations.

BIOL.3050 Introduction to Bioinformatics - Credits: 3

An introduction to the field of bioinformatics with some hands-on exploration of applications. Specific areas include scientific archives and information retrieval, genome organization, comparative genomics, transcriptomics, proteomics, structural bioinformatics, and systems biology. This course also imparts basic computational skills in data retrieval from the databases in molecular and structural biology.

BMBT.4000 Introduction to Biomedical Engineering (Formerly IB 400) - Credits: 3

Provides exposure to cutting-edge biomedical technologies in a number of different areas with a balance between biomedical engineering and biotechnology areas.

BMEN.1020 Biomedical Engineering Seminar - Credits: 1

This course provides undergraduate students in Biomedical Engineering the opportunity to expand their knowledge of Biomedical Engineering career opportunities and develop required skills. Content includes the development of professional skills (career opportunities, resume writing, etc) and an exploration of current research areas through presentations by faculty (and/or off-campus subject matter experts) and through literature review.

BMEN.1070 Introduction to Biomedical Engineering (Formerly 25.107) - Credits: 2

This course aims to introduce students to the field of Biomedical Engineering and to help students gain he sills necessary to succeed in the undergraduate degree program. The course will introduce the specialties within BME, discuss career options, and give a sample of all major considerations that go into the development of a biomedical device including how to conduct a literature search, the engineering design process, prototyping, and federal regulation considerations.

BMEN.1200 BME Application Programming - Credits: 3

Introduces programming logic for engineers. Covers fundamentals of procedural programming with applications in Biomedical Engineering and embedded systems. Topics include variables, expressions and statements, console input/output, modularization and functions, arrays, pointers and strings algorithms, structures, and file input/output. Introduces working with Matlab. Laboratories include designing and programming engineering applications.

BMEN.2100 Thermodynamics - Credits: 3

The laws of thermodynamics describe the relationship of heat and other forms of energy. In this course, the following concepts are introduced: the definition of systems; the first and second laws of thermodynamics; the properties of pure substances and mixture; and phase behaviors. This course emphasizes the application of thermodynamics to biological and biomedical systems.

BMEN.2200 Bioinstrumentation - Credits: 3

This course introduces fundamental of instrumentation for biological applications. In this course we will explore sources of signals, detection of these signals, signals to noise, and data processing. We will learn how to analyze circuits including energy storage elements, op-amps, and filters.

BMEN.2205L Bioinstrumentation Lab - Credits: 2

This course will be a Laboratory section associate with Bioinstrumentation (BMEN.2200). The lab will learn how to build basic circuits to collect physiologically-relevant data and analyze the data using concepts from signal processing.

BMEN.3010 Biomedical Engineering I - Credits: 3

This course is the first of a two semester sequence that form a survey of different topic areas within biomedical engineering. The course will emphasize a multidisciplinary approach to current topics in the range of academic disciplines in biomedical engineering.

BMEN.3015L Biomedical Engineering Lab I - Credits: 1

This course will be a Laboratory section associated with BMEN.3010 Biomedical Engineering I.

BMEN.3020 Biomedical Engineering II - Credits: 3

This course is the second of a two semester sequence that form a survey of different topic areas within biomedical engineering. The course will emphasize a multidisciplinary approach to current topics in the range of academic disciplines in biomedical engineering.
BMEN.3025L Biomedical Engineering Lab II - Credits: 1
This course will be a laboratory section associated with BMEN.3020 Biomedical Engineering II.

BMEN.3100 Transport Phenomena for Biomedical Engineering - Credits: 3
This course will provide an understanding and theories of transport in biological systems. It then builds on this knowledge base to show real world applications in the development and design of medical devices, artificial organs, drug delivery systems, and tissue engineering.

BMEN.3200 Quantitative Physiology - Credits: 3
This course provides an introduction to human physiology using a quantitative, systems oriented approach. Systems examined include: musculoskeletal; cardiovascular; respiratory; renal; gastrointestinal; and endocrine. Mathematical models, MATLAB simulation and engineering analyses are used to describe system performance where applicable.

BMEN.3205L Quantitative Physiology Lab - Credits: 2
Experiments involving the modeling and measurement of human physiology systems. Use of computer simulations to provide mathematical descriptions of physiological behavior. Calibration and validation of models through hands-on experiments. Focus on quantitative analysis of neural, cardiovascular, respiratory, muscular, and endocrine system functions.

BMEN.4020 Biomaterials - Credits: 3
This course will provide an introduction to materials used in biomedical applications. It will provide students with and understanding of the fundamental principles and language associated with current biomaterials research and to understand the issues associated with medical applications of these materials. The goal is to enable students in the course to read the biomaterials literature with critical understanding. The course will introduce principles of materials science and cell biology underlying the design of medical implants, artificial organs, and matrices for tissue engineering and covers surface chemistry and physics of selected biomaterials, surface characterization methodology, acute and chronic response to implanted biomaterials, and molecular and cellular interactions.

BMEN.4030 Medical Device Design I - Credits: 3
This course focuses on how to take a medical device invention forward from early concept to technology translation and implementation planning.

BMEN.4110 Tissue Engineering - Credits: 3
Tissue engineering utilizes engineering materials, cells, and other biochemical factors to develop and manipulate cells, tissues, or organs which can replace and/or support biological functions. In this course, we will explore the principles underlying tissue structure-function relationships; how to rationally alter, restore, or improve cellular environments; and clinical implementations.

BMEN.4310 Biomechanics - Credits: 3
The course provides an overview of musculoskeletal anatomy, the mechanical properties and structural behavior of biological tissues, and biodynamics. Specific course topics will include structure and function relationships in tissues and organs; application of stress and strain analysis to biological tissues; analysis of forces in human function and movement; energy and power in human activity; introduction to modeling viscoelasticity of tissues.

BMEN.4610 Drug Delivery - Credits: 3
This class describes the engineering of pharmaceutical delivery systems emphasizing design and application of materials and novel techniques to overcome challenges or barriers to effective drug delivery. Topics will include drug delivery fundamentals and transport mechanisms, drug formulation for delivery, and applications.

BMEN.4910 Biomedical Capstone I - Credits: 3
This is the first of a two course capstone sequence. It provides an integrative design experience in engineering. Students work in teams and apply their engineering problem solving skills on open-ended, real-world biomedical projects. This course has an emphasis on team work, communication, report writing, oral presentations, project definition and project planning.

BMEN.4920 Biomedical Capstone II - Credits: 3
This is the second of a two course capstone sequence. This course provides an integrative design experience in engineering. Students work in teams and apply their engineering problem solving skills on open-ended, real-world biomedical projects. This course has an emphasis on team work, communication, report writing, oral presentations, design, analysis, test and fabrication.

BMEN.4950 BME Selected Topics - Credits: 3
This course will provide an in-depth examination of a specific area of biomedical engineering. Specific topics will vary with the expertise of the instructor.
BMEN.4991 Directed Study: BME - Credits: 1-3
This course provides Biomedical Engineering students with the opportunity to pursue the study of a technical topic or project, individually under the supervision of a faculty member and, if desired, a responsible project engineering from industry. The course is to result in a term paper or technical report.

BMSC.4350 Applied Biomedical Genetics (Formerly 35.435 and HSCI.4350) - Credits: 3
This course covers the pathological aspects of human genetics, with emphasis on the molecular alterations that cause inherited and acquired human genetic diseases, as well as their diagnosis, therapies, and potential prevention. Mendelian, cellular, and molecular genetics are reviewed, as is the metabolic basis of inherited diseases. Current laboratory techniques used for studying and diagnosing genetic diseases will be explored, as will cutting-edge therapies, including gene therapy techniques, along with their legal, ethical, and moral implications. Students will learn the principles of genetic counseling, including cancer genetics, and how they integrate with other health care disciplines. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning. (AIL).

CHEM.1010 Applied Chemistry for Non-Scientists (Formerly 84.101) - Credits: 3
Provides an understanding of basic chemical principles -- atomic structure, bonding and interparticle forces, physical and chemical properties of matter through hands-on examination of matter and the application of principles to understanding the chemistry of current issues (e.g., environmental chemistry, biochemistry, food and drug chemistry) and the analysis of problems dealing with these issues. This course is not available for credit for Science or Engineering majors.

CHEM.1020 Forensic Science for the Non-Scientist (Formerly 84.102) - Credits: 3
This course presents the inherently fascinating topics of crime and criminal investigations as a pathway for teaching the fundamental chemical concepts most often covered in an introductory non-majors course. This course capitalizes on the surge of interest in the scientific investigation of crime (as sparked by CSI and other television shows) and will collate the theme of forensic science with the fundamentals of chemistry. The course material will be continually updated with each offering.

CHEM.1040 Consumer Science 4-1-1: An Essential Guide - Credits: 3
This course introduces chemical principles through the context of examining current and topical consumer items such as drugs, food, dietary supplements and personal care products. Information presented will enhance awareness and confidence in understanding the products, scientific reports, news articles and making decisions about the utilization of available products. Chemistry 1040 is a combined lecture and lab demonstration course for non-science majors designed to fulfill the science with lab perspective (SCL) breadth of knowledge degree requirement.

CHEN.1010 Technology and Human Built World (Formerly 10.101) - Credits: 3
CHEN.1070 Introduction to Chemical Engineering (Formerly 10.107) - Credits: 2
This course provides a hands-on introduction to chemical engineering and the skills, both technical and non-technical, that will be required to complete the undergraduate degree program. Through both assignments and projects, students learn to: identify a problem, develop alternative solutions, make critical decisions, and work as a member of a team. Technical skills that are introduced in this course include a basic introduction to linear algebra and descriptive statistics, basic technical communication through report writing, and computer programming basics using EXCEL/VBA.

CHEN.2010 Basic Principles of Chemical Engineering (Formerly 10.201) - Credits: 3
An introductory course that prepares students to solve material and energy balances on chemical process systems and lays the foundation for subsequent courses in thermodynamics, unit operations transport phenomena, reaction engineering and process dynamics and control.

CHEN.2020 Chemical Engineering Thermodynamics (Formerly 10.202) - Credits: 3
The course introduces fundamental thermodynamic principles presented from a chemical engineering perspective. The first and second law of thermodynamics, PV relationships for real and ideal fluids and methods for calculating enthalpy and entropy data, ad heat and work requirements for industrial chemical processes will be determined using mass, energy and entropy balances. Fundamental thermodynamic principles are used to examine applications involving processes with and without chemical reaction, common heat engines, flow processes and refrigeration cycles.

CHEN.2050 Fundamentals of Electricity (Formerly 10.205) - Credits: 3
An introduction to direct current and alternating current of
electric circuits with emphasis on practical application.

CHEN.3030 Fluid Mechanics (Formerly 10.303) - Credits: 3
This course introduces the student to several fundamental concepts and applications of fluid mechanics. It overviews the basic properties of fluids, the study of statics and fluid flow systems, and the development and application of the appropriate mass, momentum, and energy balance relationships needed to solve a variety of practical problems, with a particular focus on the macroscopic view. Emphasis is on the ability to apply the basic principles to the design and analysis of engineering systems involving applications in hydrostatics, internal, open-channel, and external flows, pump selection, flow measurement, etc. The course also focuses on proper problem solving strategy and on the correct use of units in engineering analysis.

CHEN.3040 Heat Transfer and Unit Operations (Formerly 10.304) - Credits: 3
The course provides an understanding of essential unit operations in chemical engineering practice. The design and operation of equipment for fluid flow (pumps, compressors) and heat transfer (heat exchangers, cooling towers, evaporators, boilers, condensers) as well as other fundamental operations and phase separation equipment (mixers/agitators, filters, settling tanks, and others) and discussed. The fundamental connections to heat transfer principles as well as fluid flow and mass transfer are considered. The analysis, design and operating characteristics of unit operations are illustrated through the solution of homework problems.

CHEN.3060 Transport Phenomena (Formerly 10.306) - Credits: 3
Introduction to the theory of the transport processes. Integral and differential approaches are used to develop the macroscopic and microscopic forms of the conservation laws. The conservation laws are used to solve practical problems in the chemical and nuclear industry.

CHEN.3080 Introduction to Material Science and Engineering (Formerly 10.308) - Credits: 3
A general overview of solid materials which are likely to be considered for engineering applications in, or be produced by the chemical process industries. They will be discussed from the viewpoints of their unit structures, appropriate phase diagrams, their chemical and physical attributes, and the association of these to end use applications. Discussion of metals, ceramics, polymers, and to a limited degree, composites.

CHEN.3100 Separation Processes (Formerly 10.310) - Credits: 3
This course is an introduction to separation processes based on mass transfer principles and equilibrium staging. Separation processes including distillation, absorption, liquid-liquid extraction, membrane/filtration, adsorption and settling base separations are introduced and examined. Unifying fundamental relations and concepts are emphasized along with practical applications for industrial processes.

CHEN.3110 Phase and Chemical Reaction Equilibria (Formerly 10.311) - Credits: 3
This course is a continuation of CHEN.2020 Chemical Engineering Thermodynamics and develops capacity to apply thermodynamic principles towards the solution of practical problems while maintaining the rigorous characteristics of thermodynamics analysis. The course extends the treatment of thermodynamic properties of pure fluids to the application of problems unique to chemical engineering involving vapor-liquid equilibrium, liquid-liquid and multiphase equilibrium, as well as the theory and application of solution thermodynamics and chemical reaction equilibria.

CHEN.3150 Unit Operations Laboratory (Formerly 10.315) - Credits: 3
Students perform laboratory base experimental analyses in fluid flow and heat transfer and fluid flow and heat transfer unit operations processes common in Chemical Engineering practice. The course is team based and students are expected to develop and improve in their ability to work and interact in a group environment. Written and oral reports are required. Safety in both lab and industrial practice are emphasized. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL) and Written & Oral Communication (WOC).

CHEN.3160 Unit Operations Laboratory II (Formerly 10.316) - Credits: 2
Experimental projects treat heat and mass transfer, including staged operations, in a unit operations format. Process measurement and calibration emphasised. Written reports required.

CHEN.3170 Applied Engineering Problem Solving (Formerly 10.317) - Credits: 3
This course introduces a variety of applied numerical methods as a means for solving a wide range of engineering problems. Methods to address linear and nonlinear equations, curve fitting, numerical integration, ordinary differential equations,
etc are studied, with emphasis on how to implement and apply these methods within standard computational environments (such as Matlab, Excel, etc.) to solve typical engineering problems. Good communication skills, effective application of the selected software tools, and proper problem-solving technique are stressed.

CHEN.3470 Elements of Thermodynamics and Heat Transfer (Formerly 10.347) - Credits: 3


CHEN.4030 Chemical Reaction Engineering (Formerly 10.403) - Credits: 3

Review of principles underlying rates of transformation of matter and energy; effect of temperature and catalysis on chemical reactions. Introduction to the basic ideas underlying chemical reaction engineering. May be taken for graduate credit.

CHEN.4090 Engineering Economics and Process Analysis (Formerly 10.409) - Credits: 3

This course brings together all the Chemical Engineering core principles applied to the development of economic process designs. Economic evaluations of manufacturing operations and projects including essential concepts in accounting, depreciation, time value of money, and the evaluation of investment alternatives are applied for process analysis and design objectives. The impact of management and production costs, product markets, regulatory, environmental and safe production practices, the analysis of corporate annual reports including balance sheets and income statements, and capital and operating costs are all considered in regard to efficient and economic processes. In addition to lecture materials students are required to complete comprehensive projects. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL), Critical Thinking &Problem Solving (CTPS) and Information Literacy (IL).

CHEN.4100 Chemical Plant Design (Formerly 10.410) - Credits: 3

This course is the logical continuation of CHEN.4090 (Formerly 10.409) The principles of technical and economic evaluation are applied to a chemical engineering problem. A group of students is given a statement of the problem. They are required to find information on raw materials, products, thermodynamic parameters and plant practices in order to develop the assumptions required to carry out an examination of technical and economic feasibility. Each group generates a final report for the problem. In addition to oral presentations, students are required to complete a comprehensive group design project. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL), Critical Thinking &Problem Solving (CTPS) and Information Literacy (IL).

CHEN.4130 Process Dynamics & Control (Formerly 10.413) - Credits: 3

An introduction to chemical process control. Description of processes and equipment by differential equations and the Laplace transform. Development of block diagrams. System stability is studied by both root locus and frequency response methods. May be taken for graduate credit.

CHEN.4150 Process Operations and Controls Laboratory (Formerly 10.415) - Credits: 3

Experimental projects dealing with heat transfer, mass transfer, separations processes, chemical reaction engineering, process dynamics, and process control. Written and oral reports required.

CHEN.4190 Special Senior Projects (Formerly 10.419) - Credits: 3

Original research projects primarily in the chemical engineering field and supervised by a staff member of the department. Written reports required.

CHEN.4200 Special Senior Projects (Formerly 10.420) - Credits: 3

Original research projects primarily in the chemical engineering field and supervised by a staff member of the department. Written reports required.

CHEN.4500 Nanoscale Trans. Phenomena for Manuf. Nanodevices (Formerly 10/22/26.450) - Credits: 3

An interdisciplinary course taught by faculty from the Chemical, Mechanical and Plastics Engineering Departments, who have special knowledge in nanoscale fluid mechanics and heat transfer. The course on nanoscale transport phenomena constitutes a bridge between existing fluid and heat transfer courses in multiple disciplines and emerging nanoscale science and engineering concepts to reflect the forefront of nanomanufacturing. The course is designed to incorporate recent advances in manufacturing polymer based nanodevices.
Key issues of the implementation and maintenance costs for fabrication will be addressed. Hands-on laboratory experiments will be performed to complement the lectures with the ultimate goal of designing and building a complete nanodevice at the end of the course. The course will prepare graduates for employment focused on designing and manufacturing nano/microfluidic systems, lab on ship devices, electronic devices, medical devices and other emerging technologies.

**CHEN.4910 Industrial Experience I (Formerly 10.491)**
- Credits: 0-12

Projects performed by students in the Cooperative Education Program at their place of employment and supervised by the employer and advisor from the department. Reports required upon completion of the project. "Variable credit course, student chooses appropriate amount of credits when registering."

**CHEN.4920 Industrial Experience II (Formerly 10.492)**
- Credits: 1-9

Projects performed by students in the Cooperative Education Program at their place of employment and supervised by the employer and advisor from the department. Reports required upon completion of the project.

**CHEN.4930 Industrial Experience III (Formerly 10.493)**
- Credits: 1-9

Projects performed by students in the Cooperative Education Program at their place of employment and supervised by the employer and advisor from the department. Reports required upon completion of the project.

**CHEN.4960 Selected Topics: Paper Engineering (Formerly 10.496)**
- Credits: 3

Topics in paper engineering. Content may vary from year to year to reflect contemporary applications of paper engineering.

**CHEN.5020 Principles of Chemical Engineering (Formerly 10.502)**
- Credits: 3

Introduction to the field of chemical engineering and solution of problems involving units and dimensions, mass balances, flow sheets and gas relationships.

**CHEN.5060 Colloidal, Interfacial and Nanomaterials Science and Engineering (Formerly 10.506)**
- Credits: 3

Unifying principle and the three main classes of colloids (dispersions, macromolecular solutions and micelles) are considered. Topics covered include surface tension, work and energy, effect of surface curvature, zeta potential, surface activity and diverse applications of interest to chemical engineers.

**CHEN.5080 Material Science and Engineering (Formerly 10.508)**
- Credits: 3

An advanced overview of solid materials that are likely to be considered for engineering applications in, or be produced by the chemical process industries. They will be discussed from the viewpoints of their unit cell structures, appropriate phase diagrams, their chemical and physical attributes, and the association of these to end use applications. Discussion of metals, ceramics, polymers, and composites. For Non-UML graduates.

**CHEN.5100 Advanced Separation Processes (Formerly 10.510)**
- Credits: 3

This course emphasizes separation processes requiring a rate analysis for adequate understanding, which includes most of the newer separation methods of industrial importance such as membrane, sorption and chromatographic separations. Unifying fundamental relations and concepts are emphasized. Graphical and numerical design procedures are covered.

**CHEN.5120 Industrial Chemistry (Formerly 10.512)**
- Credits: 3

Survey of the major sources and uses of chemicals, industrial chemical processes, fundamental raw materials, and career paths available in the chemical industry. More intensive treatment of selected industrial processes with emphasis of green/sustainable chemical processes.

**CHEN.5200 Advanced Thermodynamics (Formerly 10.520)**
- Credits: 3

Classical and statistical thermodynamics are applied to develop procedures for obtaining estimates of equilibrium properties required for chemical process design. An introduction to surface energy as an important parameter in the processing of colloids, especially in the nanometer size range, will also be undertaken.

**CHEN.5220 Chemical Process Design (Formerly 10.522)**
- Credits: 3

Process synthesis, definition, and characterization. Introduction to modular process simulation packages such as ASPEN PLUS, Recycle and tear stream analysis. Stream convergence, Unit
operations models, Flow sheet manipulation. Data records and physical property estimation techniques.

CHEN.5230 Nanodevices and Electronics Materials Processing (Formerly 10.523) - Credits: 3

Materials processing methods in electronics and related industries; crystal contamination control, growth, diffusion, etching, epitaxy, ion implantation, lithography, and other topics.

CHEN.5240 Self Assembly and Nanotechnology (Formerly 10.524) - Credits: 3

This course will describe two of the most fast-growing area/fields with both fundamental importance and practical relevance: self-assembly and nanotechnology. The first half of the course will discuss the theories and applications of self-assembly phenomena. The second half will focus on nanomaterials and nanotechnology.

CHEN.5260 Advanced Kinetics and Reactor Design (Formerly 10.526) - Credits: 3

The course will cover advanced chemical reaction kinetics, rate laws and reactor design with an emphasis on heterogeneous and catalytic reaction systems involving interphase and mass transfer effects.

CHEN.5280 Advanced Transport Phenomena (Formerly 10.528) - Credits: 3

An advanced study of the mechanisms of the transport processes. Transport equations are developed from both microscopic and macroscopic viewpoints. Analogies and similarities between the transport processes are discussed. Considerable emphasis is placed upon solutions to problems.

CHEN.5290 Recent Advances in Nanotechnology and Green Chemistry (Formerly 10.529) - Credits: 3

This course is designed to expose students to a variety of concepts in chemistry and challenge them to think critically about experiments used to interrogate these concepts. Organic polymer chemistry with an emphasis on electronically conducting polymers will be the main area of focus. Students would first be introduced to scientific subject matter outside their realm of familiarity and be expected to identify new concepts and links to existing experimental paradigms. The course is divided into 3 parts: (i) introduction to nanotechnology and green chemistry with a focus on nanoscale electronic polymers, (ii) green chemistry and the overlap area with nanotechnology, and (iii) green engineering.

CHEN.5300 Advanced Control Strategies (Formerly 10.530) - Credits: 3

An introduction to computer control and to some of the common control strategies applied to the design of complex chemical process control systems.

CHEN.5320 Principles of Chemical Engineering II (Formerly 10.532) - Credits: 3

Continuation of Principles of Chemical Engineering including real gas relationships, humidity, energy balances, and combined mass-energy balance systems. Introduction to the first law of thermodynamics. Note: Non-majors only.

CHEN.5330 Macromolecular Colloidal Science and Engineering (Formerly 10.533) - Credits: 3

This course treats both synthetic and natural macromolecules (i.e., polymers, and biopolymers), interrelating synthesis commercial manufacture, molecular, macroscopic and application properties as well as the colloidal nature of their solutions. Pertinent fundamental principles are reviewed.

CHEN.5340 Industrial Bioprocessing - Credits: 3

Students will learn principles and concepts of industrial bioprocessing. The course covers key concepts and practices of upstream, downstream and analytical bioprocessing technologies. In addition, recent FDA initiatives of Process Analytical Technology (PAT), Quality by Design, and Emerging Technologies will be covered. The course consists of 14 modules. Each module will cover subject matter provided by industry experts.

CHEN.5350 Cell and Microbe Cultivation (Formerly 10.535) - Credits: 3

This course presents the principles of biochemical engineering with an emphasis on the unit operation of cell cultivation for production of commercially important products, especially biopharmaceuticals. The bioreactor is viewed as a device for controlling the environment of recombinant and traditional cultures. Major topics include media design, kinetics of growth and production, expression systems, bioreactor types, cell physiology, and bioprocess economics.

CHEN.5370 Nanomaterials Characterization I (Formerly 10.537) - Credits: 3

This lecture course will provide an in-depth introduction to the principles, instrumentation and applications of most common nanomaterial characterization techniques. Nanomaterial
imaging, physical, chemical, and optical property analyses are the main focus of this class. Topics covered will include: electron microscopy (SEM/TEM), scanned probe microscopy (AFM), elemental analysis (EDX/XPS), crystal structure analysis (XRD/SAED), thermal analysis (DSC/TGA), laser based characterization (LSCM/DLS/Raman), chromatographic methods (GC), infrared spectroscopy, UV/Vis spectroscopy and contact angle goniometry. The analytical and quantitative applications of these techniques for investigating different types of nanomaterials will also be described. Lab demonstrations will be included in lectures.

CHEN.5380 Advanced Separations in Biotechnology (Formerly 10.538) - Credits: 3

This course provides in depth analysis of the two methods used most often in Bioseparations, filtration and chromatography. For both techniques, basic concepts are reviewed. Membrane, depth, sterile and tangential flow filtration, as well as ion exchange, hydrophobic interaction, and hydroxyapatite chromatography are considered. The emphasis for both methods is on specific applications, scale-up, validation and cleaning.

CHEN.5390 Mathematical Methods for Engineers (Formerly 10/24.539) - Credits: 3

Ordinary and partial differential equations, linear algebra, matrix/vector calculus, numerical methods, introduction to optimization methods, and other topics as time permits. Both analytical and numerical techniques are integrated to give good analytical skills coupled with practical problem solving tools. Extensive computer work with the MATLAB package is required. (Same as 24.539).

CHEN.5410 Nanomaterials Characterization II (Formerly 10.541) - Credits: 3

This hands-on laboratory course will cover the practical aspects of light, electron and scanned probe microscopy techniques discussed in Nanomaterials Characterization I (10.540). A variety of nanomaterials samples systems will be characterized using laser scanning confocal microscopy (LSCM), scanning electron microscopy (SEM), transmission electron microscopy (TEM) and atomic force microscopy (AFM). The laboratory experiments will provide practical experience in sample preparation techniques, optimization of instrumental conditions for imaging and spectroscopy, and data analysis and interpretation. Students will work on individual term projects involving real-world samples that are of interest to them, and use the techniques they learned in the course to characterize their samples.

CHEN.5440 Formulation of Biotherapeutics (Formerly 10.544) - Credits: 3

Biotherapeutics, particularly antibodies, are currently the fastest growing pharmaceuticals. Ideally, biotherapeutics are formulated in aqueous solutions and are often a great challenge due physical and chemical stability issues. This course addresses the latest trends and challenges in biologics formulation with a focus on the important role of preformulation in understanding the biological molecule itself for greater "formulatability" and "developability". The course will feature interactive discussions on early formulation screening, thorough biophysical and analytical characterization, improving the feedback loop in the early formulation-development interface, overcoming aggregation and other heterogeneity challenges, and improving overall product profile. In addition, the course will also cover an optimization of the formulation process through rational iterative approach and in-depth case studies. As a whole, this course focuses on providing you with additional tools and knowledge to help streamline solutions to formulation and stability issues for biologics.

CHEN.5450 Isolation and Purification (Formerly 81.545) - Credits: 3

Efficient isolation and purification of biological products, especially proteins, from complex natural mixtures.

CHEN.5480 Engineering Process Analytics (Formerly 10.548) - Credits: 3

This course covers multivariate statistical data analysis and experimental design. Students will learn how to extract information by analyzing various engineering datasets, and how to generate information-rich datasets via minimum experiments. Software for data analysis and experimental design will be utilized during tutorial and practice.

CHEN.5500 Biomedical Applications of Nanotechnology (Formerly 10.550) - Credits: 3

The course will aim to give students an introduction to the applications of nanotechnology in biomedicine. The course will cover the basics of nanomaterials including synthesis and characterization, use of nanotheranostics platforms for drug delivery and imaging, nanomaterials for tissue engineering; nanobiodevices and nanotoxicology. The course is designed for graduate students in the Chemical Engineering and the Biomedical Engineering/Biotechnology programs as well as seniors in Chemical Engineering.

CHEN.5520 Directed Study: Chemical Engineering (Formerly 10.552) - Credits: 3
CHEN.5550 Biopharmaceutical Regulatory Compliance (Formerly 10.555) - Credits: 3
This course examines the regulatory framework in which "drugs", "biologics" and "cellular therapies" are evaluated in the United States, including the laws, regulations and the state of industrial practice.

CHEN.5560 Materials for Aerospace and Energy Applications (Formerly 10.556) - Credits: 3
Material requirements for emerging applications in aerospace and energy sectors will be discussed. Mechanical, thermal and electrical and barrier properties of filled polymers and polymer nanocomposites will be studied. The effect of resin structure, filler additives, reactive diluents on the resulting properties will be reviewed. Scale-up issues will be studied using basic principles of chemical engineering.

CHEN.5860 Biotechnology Processing Projects Laboratory (Formerly 10.586) - Credits: 3
Development of manufacturing processes for the products of biotechnology are followed through a series of process unit operations. Following the synthesis, purification and formulation of a specific enzyme throughout the course, students examine interactions between process steps and evaluate the impact of each on the total production process. As a final project, students assume the role of project team leader, developing a commercial-scale production process for the enzyme.

CHEN.5930 Cooperative Education (Formerly 10.593) - Credits: 0
CHEN.6010 Seminar (Formerly 10.601) - Credits: 0
Required for all graduate students.

CHEN.6020 Graduate Seminar (Formerly 10.602) - Credits: 0
Required for all graduate students.

CHEN.6500 Nanoscale Transport Phenomena for Manufacturing Nanodevices (Formerly 10.650) - Credits: 3
An interdisciplinary course taught by faculty from the Chemical, Mechanical and Plastics Engineering Departments, who have special knowledge in nanoscale fluid mechanics and heat transfer. The course on nanoscale transport phenomena constitutes a bridge between existing fluid and heat transfer courses in multiple disciplines and emerging nanoscale science and engineering concepts to reflect the forefront of nanomanufacturing. The course is designed to incorporate recent advances in manufacturing polymer-based nanodevices. Key issues of the implementation and maintenance costs for fabrication will be addressed. Hands-on laboratory experiments will be performed to complement the lectures with the ultimate goal of designing and building a complete nanodevice at the end of the course. The course will prepare graduates for employment focused on designing and manufacturing nano/microfluidic systems, lab-on-a-chip devices, electronics devices, medical devices, and other emerging technologies.

CHEN.7200 Special Projects in Chemical Engineering (Formerly 10.720) - Credits: 3
Special projects undertaken by a student to expand his/her knowledge in specific fields related to his/her master’s project.

CHEN.7330 Graduate Project - Chemical Engineering (Formerly 10.733) - Credits: 3
Advanced research project required of students electing non-thesis option performed under the supervision of a senior faculty member in the Chemical Engineering Program. The project must be approved by an examining committee and the Department Chairperson.

CHEN.7360 Graduate Project - Chemical Engineering (Formerly 10.736) - Credits: 6
CHEN.7410 Thesis Review (Formerly 10.741) - Credits: 1
CHEN.7430 Master’s Thesis - Chemical Engineering (Formerly 10.743) - Credits: 3
Advanced research work required of students electing thesis option performed under the supervision of a senior faculty member in the Chemical Engineering Program. The thesis must be approved by an examining committee and the Department Chairperson.

CHEN.7460 Master’s Thesis - Chemical Engineering (Formerly 10.746) - Credits: 6
CHEN.7500 Doctoral Dissertation Review (Formerly 10.750) - Credits: 1
Doctoral Dissertation Review

CHEN.7530 Doctoral Dissertation/Chemical
Engineering (Formerly 10.753) - Credits: 1-3
Advanced research work required of students performed under the supervision of a senior faculty member in the Chemical Engineering Program. The dissertation topic must be approved by the doctoral committee.

CHEN.7560 Doctoral Dissertation/Chemical
Engineering (Formerly 10.756) - Credits: 6
CHEN.7590 Doctoral Dissertation/Chemical
Engineering (Formerly 10.759) - Credits: 9
CIVE.1070 Introduction to Engineering for Civil and Environmental (Formerly 25.107/14.107) - Credits: 2
This course provides an introduction to the elements of computer aided design using AutoCAD. Through assignments and projects, students learn various AutoCAD principles, i.e., graphic entities, hatch patterns, layering, and dimensioning, with special emphasis on completing a design project. Two-dimensional drafting and three-dimensional modeling and surface revolution are also discussed. This course is intended for freshmen in civil and environmental engineering majors.

CIVE.2250 Surveying I (Formerly 14.225) - Credits: 3
A presentation of the basic instruments used in survey processes including distance, angle and level measurements. Analysis and adjustment of random errors. Principles of closed and open traverses. Fieldwork practice in instrument use and office-type projects in contour mapping and the application of contoured topography to highway and water-control projects.

CIVE.2260 Geomatics (Formerly 14.226) - Credits: 3
Principles and practice of route surveys and designs. Topics include simple and compound circular curves, intersections of straight and curved baselines, vertical alignment principles including parabolic easement curves, earthwork operations and determination of volumes. Includes office-type projects illustrative of the application of surveying information to Civil Engineering projects such as water resources, sanitary sewers and property subdivision. Fieldwork instruction in basic traverse surveys, gathering of topographic information, and the staking-out of buildings and circular curves.

CIVE.2860 Probability and Statistics for Engineers (Formerly 14.286) - Credits: 3
Probability, statistics, reliability and decision with applications in engineering. Probability of events, discrete and continuous random variables, probability density functions and distributions, estimation, regression and correlation techniques, risk and reliability concepts.

CIVE.3010 Fluid Mechanics (Formerly 14.301) - Credits: 3
Fluid properties, fluid statics, fluid dynamics including continuity, impulse-momentum and energy equations. Pipe flow, turbomachinery, similitude and modeling, laminar and turbulent flow, boundary layer and closed conduct design.

CIVE.3100 Engineering Materials (Formerly 14.310) - Credits: 3
A treatment of the properties of engineering materials that influence the design, construction and maintenance of Civil Engineering works. Included are such materials as ferrous and non-ferrous metals, timber, asphalt, and cementitious materials. Supplemented by laboratory testing of various engineering materials.

CIVE.3110 Engineering Materials Laboratory (Formerly 14.311) - Credits: 1
Experiments and written reports. Testing and measurement techniques and material standards illustrating behavior of materials, including metals, wood, and Portland cement concrete.

CIVE.3300 Soil Mechanics (Formerly 14.330) - Credits: 3
Development of the fundamental principles of soil mechanics as utilized in soil and foundation engineering. Topics include: classification, index properties, strength and stress-strain behavior, effective stress principle, permeability, flow and consolidation. Introduction to basic soil mechanics laboratory practice.

CIVE.3320 Environmental Engineering Laboratory (Formerly 14.332) - Credits: 1
Laboratory experiments to illustrate analysis of environmental samples and experimental techniques, normally used in support of water and wastewater treatment facilities. Course emphasizes data acquisition and analysis, and engineering report writing.

CIVE.3330 Geotechnical Laboratory (Formerly 14.333) - Credits: 1
Laboratory experience that illustrates soil mechanics and fluid flow theory. Experiments are conducted in the soils and hydraulics laboratories. Course emphasizes data acquisition and analysis and writing engineering reports.
CIVE.3400 Transportation Engineering (Formerly 14.340) - Credits: 3

Development of the basic principles pertaining to the movement of people and goods by modern transportation systems. Techno-economic characteristics of the various transportation modes. Aspects of planning, design and operation of land, air and water transportation facilities. Development, structure and function of the U.S. transportation system.

CIVE.3410 Transportation Engineering Laboratory (Formerly 14.341) - Credits: 1

Practice techniques of data collection, analysis and presentation that are commonly used in the planning, design and operation of transportation facilities with primary emphasis on highway systems.

CIVE.3500 Structural Analysis I (Formerly 14.350) - Credits: 3

Principles of structural analysis applied to typical civil engineering structures as the initial step in the total design concept. Emphasis on classical methods of analysis of statically determinate and indeterminate structures. The personal computer as an analytical tool.

CIVE.3520 Reinforced Concrete (Formerly 14.352) - Credits: 3

Ultimate strength and elastic behavior of reinforced concrete structural members, continuity in building frames, deflections, shear reinforcement, development length and bar cutoffs, columns and footings.

CIVE.3620 Environmental Engineering (Formerly 14.362) - Credits: 3

Physical, chemical and biological principles of the treatment of water and wastewater are considered along with their application to treatment systems. The system components of wastewater and water treatment plants are studied to provide a basic design capability. Hazardous waste site remediation is also discussed.

CIVE.3720 Civil Engineering Systems (Formerly 14.372) - Credits: 3

Introduction to methods of operations research, management science and economic analysis used in the design, planning and managing of engineering systems. Main topics covered: systems modeling, optimization concepts, network analysis, mathematical programming, critical path analysis, decision analysis, economic consideration.

CIVE.4310 Foundation and Soil Engineering (Formerly 14.431) - Credits: 3

The application of soil mechanics to the design and analysis of foundations and soil structures. Topics include: soil origin and deposition, subsurface exploration, bearing capacity and settlement analyses, design of shallow foundations, earth pressures, retaining structures, and slope stability.

CIVE.4520 Steel Design (Formerly 14.452) - Credits: 3

An introduction to structural steel design with emphasis on use and interpretation of the AISC Manual and LRFD Specifications. Subjects include design of tension, compression, beams, and beam-column members, plus bolted and welded connections. Other topics may include composite beams, plate girders, building connections and plastic analysis and design.

CIVE.4600 Water Resources Engineering (Formerly 14.460) - Credits: 3

This course is a continuation and extension of Fluid Mechanics, with a focus on engineering applications of hydraulic and hydrologic engineering. This course covers fundamental concepts of open-channel flow, hydraulic structures, design of open channels, surface-water hydrology, and groundwater hydrology.

CIVE.4660 Introduction to LEED (Formerly 14.466) - Credits: 3

This course examines the principles of sustainability and how they are applied to engineering and the built environment. Areas covered include energy, water, materials, transportation, and green building principles. Issues of evaluation of sustainability, including life cycle analysis and rating systems, are also discussed. This course fulfills the educational requirements for eligibility to take the LEED (Leadership in Energy and Environmental Design) Green Associate exam.

CIVE.4700 Engineering Economics (Formerly 14.470) - Credits: 3

Presentation of mathematical principles of economic analysis, with emphasis on defining alternatives and predicting consequences of proposed investments. Emphasis is placed on the economic, social and environmental impacts of proposed Civil Engineering projects. The attractiveness of investments is judged by present worth, annual worth, rate of return, and benefit-cost ratio techniques. Sensitivity analysis, depreciation
and tax impacts in economic studies are also discussed.

CIVE.4750 Construction Management I (Formerly 14.475) - Credits: 3

Development of management skills and techniques to plan, schedule, supervise, and control construction projects. Project estimating; labor costs and productivity; construction plans, specifications and contracts; labor relations; time, cost and quality control; construction equipment and project decision making and financing.

CIVE.4800 Special Topics in Civil Engineering (Formerly 14.480) - Credits: 3

Contemporary topics in selected areas of study within civil engineering. Course content is chosen by the instructor to meet the interests of the students.

CIVE.4810 Special Topics (Formerly 14.481) - Credits: 3

Contemporary topics in selected areas of study within civil engineering. Course content is chosen by the instructor to meet the interests of the students.

CIVE.4830 Spec Topics: Civil Engineering (Formerly 14.483) - Credits: 3

Contemporary topics in selected areas of study within civil engineering. Course content is chosen by the instructor to meet the interests of the students.

CIVE.4850 Capstone Design (Formerly 14.485) - Credits: 3

Introduction to the essentials of engineering design and a forum for practicing the design process. Integrates many elements of the curriculum through a comprehensive design project to professional standards. Projects include the use of open-ended problems, feasibility analysis, complete design process, consideration of alternative solutions, and cost estimation. Students practice team effort, development of a system perspective, communication skills, reporting, and presentations.

CIVE.4910 Industrial Experience I (Formerly 14.491) - Credits: 0-12

The new Cooperative Education program for undergraduates combines academic studies with work experience in appropriate positions in the public or private sectors. It permits students to participate in the flexible schedule of study and work that is related to their academic fields of study and to receive academic credit for the work experience. Requires 500 hours of cooperative education engineering experiences, on a full-time or part-time basis, during any academic semester or summer. All co-op work must be pre-approved by the Co-op Coordinator. (Effective with Class of 2001-02, students in CEE are able to earn three credits after the successful completion of both Industrial Experience I and II). “Variable credit course, student chooses appropriate amount of credits when registering.”

CIVE.4920 Industrial Experience II (Formerly 14.492) - Credits: 3

The new Cooperative Education program for undergraduates combines academic studies with work experience in appropriate positions in the public or private sectors. It permits students to participate in the flexible schedule of study and work that is related to their academic fields of study and to receive academic credit for the work experience. Requires 500 hours of cooperative education engineering experiences, on a full-time or part-time basis, during any academic semester or summer. All co-op work must be pre-approved by the Co-op Coordinator. (Effective with Class of 2001-02, students in CEE are able to earn three credits after the successful completion of both Industrial Experience I and II).

CIVE.4930 Industrial Experience III (Formerly 14.493) - Credits: 3

CIVE.5010 Civil Engineering Research Seminar - Credits: 0

Research seminar for doctoral and Master’s students to listen to researchers from academia, industry, and government of research-related topics in civil and environmental engineering. Invited speakers will present recent research advances in fields of environmental engineering, geotechnical engineering, structural engineering and transportation engineering. Attendance is mandatory for doctoral and MS students with thesis option. Thesis requirements and research methods will be introduced in various talks.

CIVE.5030 Computer Based Analysis of Structures (Formerly 14.503) - Credits: 3

The course is an introduction to the finite element displacement method for framed structures. It identifies the basic steps involved in applying the displacement method that can be represented as computer procedures. The course covers the modeling and analysis of 2-dimensional and 3-dimensional structures, such as cable-stayed structures, arches, and space trusses, space frames, shear walls, and so on. The analysis is done for both static and dynamic loading. The study is done by using MATLAB, GTSTRUDL, and Mathcad software.
CIVE.5040 Advanced Strength Of Material (Formerly 14/10.504) - Credits: 3
Stress and strain at a point; curved beam theory, unsymmetrical bending, shear center, torsion of non-circular sections; theories of failure; selected topics in solid mechanics.

CIVE.5050 Concrete Materials (Formerly 14.505) - Credits: 3
This course introduces fundamental and advanced topics on the properties of concrete materials. Fundamental topics include the formation, structure, mechanical behavior, durability, fracture, and deterioration of concrete. Theoretical treatments on the deformation, fracture and deterioration of concrete are also addressed. Advanced topics include the electromagnetic properties of concrete, high performance concrete (HPC), high-strength concrete (HSC), fiber-reinforced concrete, other special concretes, and the green construction of concrete.

CIVE.5080 Practice of Structural Engineering (Formerly 14.508) - Credits: 3
This course covers the practice of structural engineering as it deals with the design of structures such as buildings and bridges, the identification of loads, and design variables, and design detailing for concrete and steel structures. The emphasis will be placed on the use and interpretation of the ACI318-09, AISD and AASHTO codes and the GTSTRUDL software.

CIVE.5110 Inspection and Monitoring of Civil Infrastructure (Formerly 14.511) - Credits: 3
In this course, principles and applications of inspection and monitoring techniques for the condition assessment of aged/damaged/deteriorated civil infrastructure systems such as buildings, bridges, and pipelines, are introduced. Current nondestructive testing/evaluation (NDT/E) methods including optical, acoustic/ultrasonic, thermal, magnetic/electrical, radiographic, microwave/radar techniques are addressed with a consideration of their theoretical background. Wired and wireless structural health monitoring (SHM) systems for civil infrastructure are also covered. Applications using inspection and monitoring techniques are discussed with practical issues in each application.

CIVE.5120 Structural Stability (Formerly 14.512) - Credits: 3
This course provides a concise introduction to the principles and applications of structural stability for their practical use in the design of steel frame structures. Concepts of elastic and plastic theories are introduced. Stability problems of structural members including columns, beam-columns, rigid frames, and beams are studied. Approaches in evaluating stability problems, including energy and numerical methods, are also addressed.

CIVE.5210 Reliability Analysis (Formerly 14.521) - Credits: 3
A review of the elementary principles of probability and statistics followed by advanced topics including decision analysis, Monte Carlo simulation, and system reliability. In-depth quantitative treatment in the modeling of engineering problems, evaluation of system reliability, and risk-benefit decision management.

CIVE.5270 Geotechnical and Environmental Site Characterization (Formerly 14.527) - Credits: 3
This course is designed to give students a comprehensive understanding of various site investigation and site assessment technologies employed in geotechnical and environmental engineering. The course begins with introduction to site investigation planning and various geophysical methods including: seismic measurements, ground penetrating radar, electrical resistivity, electromagnetic conductivity, time domain reflectometry. Drilling methods for soil, gas and ground water sampling; decontamination procedures; and long term monitoring methods are studied. Emphasis in this course is placed on conventional and state-of-the-art in situ methods for geotechnical and environmental site characterization: standard penetration test, vane shear test, dilatometer test, pressuremeter test and cone penetration tests. Modern advances in cone penetrometer technology, instrumented with various sensors (capable of monitoring a wide range of physical and environmental parameters: load, pressure, sound, electrical resistivity, temperature, PH, oxidation reduction potential, chemical contaminants) are playing a major role in site characterization. Principles underlying these methods along with the interpretation of test data will be covered in detail. The course will also look into emerging technologies in the area of site characterization. (3-0:3)

CIVE.5280 Drilled Deep Foundations (Formerly 14.528) - Credits: 3
CIVE.5290 Engineering with Geosynthetics (Formerly 14.529) - Credits: 3

Rigorous treatment in the mechanism and behavior of reinforced soil materials. Laboratory and insitu tests for determining the engineering properties of geosynthetics (geotextiles, geomembranes, geogrids and geocomposites). Design principles and examples of geosynthetics for separation, soil reinforcement and stabilization, filtration and drainage.

CIVE.5300 Driven Deep Foundations (Formerly 14.530) - Credits: 3

design and analyses of driven deep foundations including: Deep foundations classification and historical perspective. Effects of pile installation. Static capacity and settlement analysis of a single pile and a pile group under vertical loads. Insight of pile resistance including soil behavior and interfacial friction. Driven pile load test standards, construction, interpretation, and simulation. Dynamic analysis of driven piles, the wave equation analysis, dynamic measurements during driving and their interpretation. Reliability based design using the Load and Resistance Factor design (LRFD) methodology application for driven deep foundations.

CIVE.5310 Advanced Soil Mechanics (Formerly 14.531) - Credits: 3

Theories of soil mechanics and their application. Drained and undrained stress-strain and strength behavior of soils. Lateral earth pressures, bearing capacity, slope stability, seepage and consolidation. Lab and insitu testing.

CIVE.5320 Theoretical & Numerical Methods in Soil Mechanics (Formerly 14.532) - Credits: 3

Geotechnical practice employs computer programs that incorporate numerical methods to address problems of stability, settlement, deformation, and seepage. These methods are based on theoretical understanding of the behavior of soils, and correct use of commercial software requires that the engineer understand theoretical bases of the numerical algorithms and how they work. This course addresses the description of stress and strain in the context of geotechnical engineering and the basic concepts of numerical and computational methods, including discretization errors, computational procedures appropriate to different classes of problem, and numerical instability. It will then apply the insights to the three major problems of geotechnical analysis: settlement, stability, and fluid flow.

CIVE.5330 Advanced Foundation Engineering (Formerly 14.533) - Credits: 3

Design and analysis of shallow foundations, excavations and retaining structures including: site exploration, bearing capacity and settlement theories, earth pressures, braced and unbraced excavations, rigid and flexible retaining structures, reinforced earth, dewatering methods and monitoring techniques.

CIVE.5340 Soil Dynamics and Earthquake Engineering (Formerly 14.534) - Credits: 3

This course addresses the dynamic properties of soils and basic mechanical theory of dynamic response. It will apply these results to analysis and design of dynamically loaded foundations. A basic understanding of earthquakes - where they occur, their quantitate description, how the complicated patterns of motions are captured by techniques such as the response spectrum, and how engineers design facilities to withstand earthquakes, will be addressed. In particular, the course will consider three topics of current professional and research interest: probabilistic seismic hazard analysis (PHSA), soil liquefaction, and seismically induced displacements. The emphasis will be on geotechnical issues, but some time will be devoted to structural considerations in earthquake resistant design.

CIVE.5360 Soil Engineering (Formerly 14.536) - Credits: 3

The study of soil as an engineering material, and its use in earth structures (e.g. dams, road embankments), flow control, and compacted fills. Stability of natural and man made slopes, soil reinforcement and stabilization.

CIVE.5370 Experimental Soil Mechanics (Formerly 14.537) - Credits: 3

Application of testing procedures to the evaluation of soil type and engineering properties. Testing for classification, permeability, consolidation, direct and triaxial shear and field parameters. The technical procedures are followed by data analysis, evaluation and presentation. Critical examination of standard testing procedures, evaluation of engineering parameters, error estimation and research devices.

CIVE.5380 Soil Behavior - Credits: 3

Study of the physico-chemical and mechanical behavior of soil. Topics include: soil mineralogy, formation, composition, concepts of drained and undrained stress-strain and strength behavior, frozen soils.

CIVE.5390 Ground Improvement (Formerly 14.539) - Credits: 3
Design and construction methods for strengthening the properties and behavior of soils. Highway embankments, soil nailing, soil grouting, landslide investigation and mitigation, dynamic compaction, stone columns.

CIVE.5400 Urban Transportation Planning (Formerly 14.540) - Credits: 3

Objectives and procedures of the urban transportation planning process. Characteristics and current issues of urban transportation in the United States (both supply and demand). Techniques of analysis, prediction and evaluation of transportation system alternatives. Consideration of economic, environmental, ethical, social and safety impacts in the design and analysis of transportation systems.

CIVE.5410 Traffic Engineering (Formerly 14.541) - Credits: 3

Engineering principles for safe and efficient movement of goods and people on streets and highways, including aspects of (a) transportation planning; (b) geometric design; (c) traffic operations and control; (d) traffic safety, and; (e) management of transportation facilities. Topics include: traffic stream characteristics; traffic engineering studies; capacity and level-of-service analysis; traffic control; simulation of traffic operations; accident studies; parking studies; environmental impacts.

CIVE.5420 Transportation Network Analysis (Formerly 14.542) - Credits: 3

This course is to introduce engineering students to basic transportation network analysis skills. Topics covered include fundamentals of linear and nonlinear programming, mathematical representations of transportation networks, various shortest path algorithms, deterministic user equilibrium traffic assignment, stochastic user equilibrium traffic assignment, dynamic traffic assignment, heuristic algorithms for solving traffic assignment problems, and transportation network design.

CIVE.5430 Traffic Principles for Intelligent Transportation Systems (Formerly 14.543) - Credits: 3

The objective of this course is to introduce the student to the traffic principles that are pertinent for the planning, design and analysis of Intelligent Transportation Systems (ITS). The course is oriented toward students that come from different disciplines and who do not have previous background in traffic or transportation principles. It is designed as an introductory course that will enable the student to pursue more advanced courses in transportation systems subsequently.

CIVE.5440 Transportation Economics and Project Evaluation (Formerly 14.544) - Credits: 3

The course offers an overview of the fundamental principles of transportation economics. Emphasizes theory and applications concerning demand, supply and economics of transportation systems. Covers topics such as pricing, regulation and the evaluation of transportation services and projects. Prerequisites: Students should have knowledge of transportation systems and basic microeconomics.

CIVE.5450 Public Transit Plan and Design (Formerly 14.545) - Credits: 3

Planning and design of public transportation systems and their technical, operational and cost characteristics. Discussion of the impact of public transportation on urban development; the different transit modes, including regional and rapid rail transit (RRT), light rail transit (LRT), buses, and paratransit, and their relative role in urban transportation; planning, design, operation and performance of transit systems (service frequency and headways, speed, capacity, productivity, utilization); routes and networks; scheduling; terminal layout; innovative transit technologies and their feasibility.

CIVE.5460 Pavement Design (Formerly 14.546) - Credits: 3

Fundamentals of planning, design, construction and management of roadway and airport pavements. Introduction to the theory and the analytical techniques used in pavement engineering. Principal topics covered: pavement performance, analysis of traffic, pavement materials; evaluation of subgrade; flexible and rigid pavement structural analysis; reliability design; drainage evaluation; design of overlays; and pavement distresses.

CIVE.5470 Airport Planning and Design (Formerly 14.547) - Credits: 3

Planning and design of civil airports. Estimation of air travel demand. Aircraft characteristics related to design; payload, range, runway requirements. Analysis of wind data, runway orientation and obstruction free requirements. Airport configuration, aircraft operations, and capacity of airfield elements. Design of the terminal system, ground access system, and parking facilities.

CIVE.5480 Traffic Management and Control (Formerly 14.548) - Credits: 3

The course presents modern methods of traffic management, traffic control strategies and traffic control systems technology. Main topics covered, include: transportation systems
management (TSM); traffic control systems technology; control concepts - urban and suburban streets; control and management concepts - freeways; control and management concepts - integrated systems; traveler information systems; system selection, design and implementation; systems management; ITS plans and programs. The course will also include exercises in the use and application of traffic simulation and optimization models such as: CORSIM, TRANSYT and MAXBAND/ MULTIBAND.

CIVE.5490 Traffic Flow and Emerging Transportation Technologies (Formerly 14.549) - Credits: 3

Traffic flow theories seek to describe through precise mathematical models (a) the interactions between vehicles and the roadway system and (b) the interactions among vehicles. This course covers both conventional human-driven vehicles and the emerging connected and automated vehicles. Such theories form the basis of the models and procedures used in design and operational analysis of streets and highways. In particular, the course examines the fundamental traffic flow characteristics and the flow-speed-density relationship, as well as time and space headway, string stability, traffic flow stability, popular analytical techniques for traffic stream modeling at both microscopic and macroscopic levels, shock wave analysis, and simulation modeling of traffic systems.

CIVE.5500 Behavior of Structures (Formerly 14.550) - Credits: 3

Classical and matrix methods of structural analysis applied to complex plane trusses. Elementary space truss analysis. Elementary model analysis through the use of influence lines for indeterminate structures. The digital computer and problem oriented languages as analytical tools.

CIVE.5510 Advanced Steel Design (Formerly 14.551) - Credits: 3

Elastic and plastic design of structural steel systems, residual stresses, local buckling, beam-columns, torsion and biaxial bending, composite steel-concrete members, load and resistance factor design.

CIVE.5520 Design of Concrete Structures (Formerly 14.552) - Credits: 3

The main objective of this course is to expand the students' knowledge and understanding of reinforced concrete behavior and design. Advanced topics at material, element, and system level are built on quick reviews of undergraduate level knowledge and are related to current design codes.

CIVE.5530 Wood Structures (Formerly 14.553) - Credits: 3

Review of properties of wood, lumber, glued laminated timber and structural-use panels. Review of design loads and their distribution in wood-frame buildings. Design of wood members in tension, compression and bending; and design of connections.

CIVE.5560 Finite Element Analysis (Formerly 14.556) - Credits: 3

Finite element theory and formulation, software applications, static and dynamic finite element analysis of structures and components.

CIVE.5570 Structural Dynamics (Formerly 14.557) - Credits: 3

Analysis of typical structures subjected to dynamic force or ground excitation using direct integration of equations of motion, modal analysis and approximate methods.

CIVE.5580 Bridge Design (Formerly 14.558) - Credits: 3

Analysis and design of modern bridges, using computer software for the 3-D modeling of sample bridges under dead and live loading and seismic excitation. AASHTO specifications are used for the design of superstructures and substructures (abutments, piers, and bearings) under group load combinations.

CIVE.5590 Design of Masonry Structures (Formerly 14.559) - Credits: 3

Fundamental characteristics of masonry construction. The nomenclature, properties, and material specifications associated with basic components of masonry. The behavior of masonry assemblages subjected to stresses and deformations. Design of un-reinforced and reinforced masonry structures in accordance with current codes.

CIVE.5610 Physical Chemical Treatment Processes (Formerly 14.561) - Credits: 3

Course provides a theoretical understanding of various chemical and physical unit operations, with direct application of these operations to the design and operation of water and wastewater treatment processes. Topics include colloid destabilization, flocculation, softening, precipitation, neutralization, aeration and gas transfer, packed &tray towers, oxidation, disinfection, reverse osmosis, ultrafiltration, settlings, activated carbon adsorption, ion exchange, and
filtration.

CIVE.5620 Physical and Chemical Hydrology Geology (Formerly 14.562) - Credits: 3

Well hydraulics for the analysis of groundwater movement. A review of the processes of diffusion, dispersion, sorption, and retardation as related to the fate and transport of organic contaminants in groundwater systems. Factors influencing multi-dimensional contaminant plume formation and migration are addressed. It is the goal of this course to provide environmental scientists and engineers with the technical skills required to understand groundwater hydrology and contaminant transport within aquifers. A term paper and professional presentation in class regarding a relevant topic is required.

CIVE.5640 Hydrology & Hydraulics (Formerly 14.564) - Credits: 3

This course utilizes engineering principles to quantitatively describe the movement of water in natural and manmade environmental systems. Topics include: hydrologic cycle, steam flow and hydrographs, flood routing, watershed modeling, subsurface hydrology, and probability concepts in hydrology, hydraulic structures, flow in closed conduits, pumps, open channel flow, elements of storm and sanitary sewer design will be addressed.

CIVE.5670 Environmental Aquatic Chemistry (Formerly 14.567) - Credits: 3

This course provides environmental understanding of the principles of aquatic chemistry and equilibria as they apply to environmental systems including natural waters, wastewater and treated waters.

CIVE.5680 Environmental Fate and Transport (Formerly 14.568) - Credits: 3

The fate of contaminants in the environment is controlled by transport processes within a single medium and between media. The similarities in contaminant dispersion within air, surface water and groundwater will be emphasized. Interphase transport processes such as volatilization and adsorption will then be considered from an equilibrium perspective followed by the kinetics of mass transfer across environmental interfaces. A professional presentation of a select paper or group of paper concerning a course topic is required.

CIVE.5690 Micropollutants in the Environment - Credits: 3

This course focuses on the generation, fate and transformation, transport, and the impacts of micropollutants in the environment, with emphasis on soil and water matrices. Topics will include nanomaterials and organic micropollutants such as pharmaceuticals, antimicrobials, illicit drugs, and personal care products. Course delivery will be a combination of lectures, experimental analysis, and discussions of assigned reading materials.

CIVE.5700 Wastewater Treatment and Storm Water Management Systems (Formerly 14.570) - Credits: 3

The era of massive subsidies for construction of sanitary sewers and centralized, publicly operated treatment works (POTWs) has passed. Non-point pollution from sources such as onsite disposal systems has become a major focus of concern in our efforts to protect and improve ground and surface water quality. Much of the new construction in areas not already served by centralized collection and treatment must use the alternative technologies. This course is design oriented. The variously available technologies are studied in depth. Students evaluate various technologies as they may be applied to a complex problem for which information is available, and develop an optimum problem solution.

CIVE.5710 Surface Water Quality Modeling (Formerly 14.571) - Credits: 3

Theory and application of surface water quality modeling will be combined interactively throughout the course. Data from a stream will be utilized in order to bring a public domain model into operation.

CIVE.5720 Marine and Coastal Processes (Formerly 14.572) - Credits: 3

This course focuses on the coastal dynamics of currents, tides, waves, wave morphology and their effects on beaches, estuaries, mixing and sediment transport/accretion processes. Generalized global aspects of atmospheric and hydrospheric interactions with ocean currents are also presented.

CIVE.5730 Solid Waste Engineering (Formerly 14.573) - Credits: 3

Characterization, handling and disposal of municipal, industrial and hazardous wastes. Technologies such as landfills, recycling, incineration and composting are examined. A term paper and professional presentation in class regarding a relevant topic is required.

CIVE.5750 Groundwater Modeling (Formerly 14.575) - Credits: 3

Groundwater Modeling is designed to present the student with
fundamentals, both mathematical and intuitive, of analytic and numeric groundwater modeling. An introductory course in groundwater hydrology is a prerequisite for Groundwater Modeling, and the student should be familiar with IBM computers in running text editors and spreadsheets. The semester will start with basic analytic solutions and image theory to aid in the development of more complex numeric models. Emphasis will then switch to numeric ground water flow models (MODFLOW) and the use of particle tracking models (GWPATH) to simulate the movement of solutes in ground water. The numeric modeling process will focus on forming the problem description, selecting boundary conditions, assigning the model parameters, calibrating the model, and preparing the model report. Course topics include: Analytic Methods, Numeric Methods, Conceptual Model and Grid design, Boundary Conditions, Sources, and Sinks, and Particle Tracking.

CIVE.5760 GIS Applications in Civil and Environmental Engineering (Formerly 14.576) - Credits: 3

This course is to introduce students to the basic concepts of Geographic Information Systems (GIS) and GIS applications in Civil and Environmental Engineering. Topics to be covered include GIS data and maps, queries, map digitization, data management, spatial analysis, network analysis, geocoding, coordination systems and map projections, editing. Examples related to transportation, environmental, geotechnical and structural engineering will be provided to help students better understand how to apply GIS in the real world and gain hands-on experience. This course will consist of lectures and computer work.

CIVE.5780 Biological Wastewater Treatment (Formerly 14.578) - Credits: 3

Course covers the theoretical and practical aspects of biological wastewater treatment operations. Topics include kinetics of biological growth and substrate utilization, materials balance in chemostats and plug flow reactors, activated sludge process analysis and design, sedimentation and thickening, nitrification and denitrification, phosphorus removal, fixed-film processes analysis and design, anaerobic processes analysis and design, aerated lagoons and stabilization ponds, and natural treatment systems.

CIVE.5790 Green and Sustainable Civil Engineering (Formerly 14.579) - Credits: 3

This course focuses on various green and sustainable materials and technologies applicable to five areas of civil engineering: environmental engineering, water resources engineering, structural engineering, transportation engineering, and geotechnical engineering. This course also covers current building laws and introduces fundamentals of entrepreneurship and patent/copyright laws.

CIVE.5810 Engineering Systems Analysis (Formerly 14.581) - Credits: 3

The course presents advanced methods of operations research, management science and economic analysis that are used in the design, planning and management of engineering systems. Main topics covered, include: the systems analysis methodology, optimization concepts, mathematical programming techniques, Network analysis and design, project planning and scheduling, decision analysis, queuing systems, simulation methods, economic evaluation. The examples and problems presented in the course illustrate how the analysis methods are used in a variety of systems applications, such as: civil engineering, environmental systems, transportation systems, construction management, water resources, urban development, etc.

CIVE.5850 Transportation Safety (Formerly 14.585) - Credits: 3

Transportation Safety goes beyond the accepted standards for highway design. Providing a safe and efficient transportation system for all users is the primary objective of federal, state, and local transportation agencies throughout the nation. This class addresses fundamentals of highway design and operation, human factors, accident investigation, vehicle characteristics and highway safety analysis.

CIVE.5950 Hazardous Waste Site Remediation (Formerly 14.595) - Credits: 3

This course focuses on the principles of hazardous waste site remediation (with an emphasis on organic contaminants) using physical, chemical or biological remediation technologies. Both established and emerging remediation technologies including: bioremediation, intrinsic remediation, soil vapor extraction (SVE), in situ air sparging (IAS), vacuum-enhanced recovery (VER), application of surfactants for enhanced in situ soil washing, hydraulic and pneumatic fracturing, electrokinetics, in situ reactive walls, phytoremediation, and in situ oxidation, will be addressed. A term paper and professional presentation in class regarding a relevant topic is required.

CIVE.5960 Grad Industrial Exposure (Formerly 14.596) - Credits: 0
CIVE.6510 Special Topics in Civil Engineering (Formerly 14.651) - Credits: 3

Course content and credits to be arranged with instructor who agrees to direct the student.
An introductory course to computer programming using multimedia applications such as images, video and audio. Linear data structures representing multimedia data are manipulated with loops and conditionals in the Python language.

COMP.1005 An Introduction to Programming for Data Science - Credits: 3

Linguists, chemists, business analysts, social scientists, and essentially everyone needs computational approaches to structure, analyze and present their data. However, non-experts are often intimidated to start programming and may struggle to see the numerous possibilities it may open up for their field of study. Using the popular and easy-to-learn Python language, this course offers a practical introduction to basics of programming and how it can be used to analyze, structure, and visualize data. Students will also gain hands-on experience with a number of popular libraries useful for data preparation and analysis.

COMP.1010 Computing I (Formerly 91.101) - Credits: 3

Introduction to computing environments: introduction to an integrated development environment; C, C++, or a similar language. Linear data structures; arrays, records, and linked lists. Abstract data types, stacks, and queues. Simple sorting via exchange, selection, and insertion, basic file I/O. Programming style documentation and testing. Ethical and social issues. Effective Fall 2013, Co-req 91.103 Computing 1 Lab.

COMP.1020 Computing II (Formerly 91.102) - Credits: 3

Computing II focuses on the implementation and applications of data structures, including arrays, linked lists, stacks, queues, trees, binary trees, binary search trees, heaps, graphs, and hash tables. Recursive approaches are used. Performance analysis is discussed. Attention is paid to programming style, documentation, and testing. This course includes extensive laboratory work. Effective Fall 2013, Co-req: Computing 2 Lab.

COMP.1030L Computing I Lab (Formerly 91.103) - Credits: 1

This is the lab class for COMP.1010 Computing I. This class must be taken with COMP.1010 Computing I in the same semester.

COMP.1040L Computing II Lab (Formerly 91.104) - Credits: 1
This is a lab class for 91.102 Computing II. This class must be taken with 91.102 Computing II in the same semester.

COMP.1080 Intro to App Des & Mobile Comp (Formerly 91.108) - Credits: 3
This course is an introduction to design principles of applications ("apps") that run on mobile devices (smart phones and tablet computers). The course focuses on software interaction design and computational thinking. Students will gain theoretical knowledge and design skills in these domains by building a series of apps that run on the Android platform using MIT App Inventor software. The course will also include discussion of societal impacts of computing.

COMP.1120 Undeclared Science Seminar (Formerly 91.112) - Credits: 1
Discussions will be conducted on a wide range of topics in the sciences to familiarize the student with the programs, procedures, research, and educational opportunities at the University.

COMP.1130 Exploring the Internet (Formerly 91.113) - Credits: 3
An introduction to internet technologies and how they intersect with social, political, and economic issues. Includes: the history of the internet, how it’s presently managed, how information is transferred between servers and clients, collaborative web technologies, search engines, encryption, digital rights management, certificate authorities, phishing and other malware, and privacy concerns. Students will build a basic website using HTML and CSS.

COMP.2010 Computing III (Formerly 91.201) - Credits: 3
This course presents an introduction to object-oriented software development using the C++ programming language. The main ideas are encapsulation, class hierarchy and inheritance, polymorphism, copy control, operator overloading, dynamic memory management, and templates. Additional topics include the Standard Template Library (containers and iterators), class design diagrams, and exception handling.

COMP.2010R Computing III Lab - Credits: 1
This is the lab class for COMP.2010 Computing III. This class must be taken with COMP.2010 Computing III in the same semester.

COMP.2030 Assembly Language Programming (Formerly 91.203) - Credits: 3
Presents the organization and operation of a conventional computer, including principal instruction types, data representation, addressing modes, program control, I/O, assembly language programming, including instruction mnemonics, symbolic addresses, assembler directives, system calls, and macros, the usage of text editors, symbolic debuggers, and loaders, and the use of pseudocode in guiding structured assembly language programming.

COMP.2030R Assembly Language Programming Lab - Credits: 1
This is the lab class for COMP.2030 Computer Organization and Assembly Language. This class must be taken with COMP.2030 in the same semester.

COMP.2040 Computing IV (Formerly 91.204) - Credits: 3
Advanced C++ programming, which deepens students’ understanding of object-oriented analysis and design. Basic software engineering principles and practice, including work with APIs. Topics may include program translation, web software, parsing, and regular expressions.

COMP.2110 Computer Science for SRT Applications (Formerly 91.211) - Credits: 3
This course is an introduction to C programming, with applications in sound recording technology. Students will write and execute several programs that perform operations pertinent to SRT, including manipulating MIDI codes, performing simple signal processing functions, processing sampled data, and synthesizing sound algorithmically. Not for computer science majors.

COMP.2120 Special Topics: Sound Thinking (Formerly 91.212) - Credits: 3
Special Topics: Sound Thinking is an interdisciplinary elective for students at the sophomore level and above that explores the intersection of computing and music. The course explores the properties of sound, musical form, non-traditional notation, music programming, the computer as a musical instrument, and live performance. It is co-taught by Music and Computer Science faculty.

COMP.2300 Introduction to Computer Security (Formerly COMP.3611) - Credits: 3
This course introduces students to introductory concepts in
cybersecurity. The course will cover generic topics such as introduction to networks, security vulnerabilities in networking protocols, the confidentiality, integrity and availability (CIA) triad, basic cryptography concepts, key management, cryptographic protocols and practical applications of cryptography. For topics in computer security, this course will cover an overview of operation systems security (particularly Linux), password security, access control mechanisms, patching, vulnerability analysis, intrusion detection, auditing, system hardening, virtualization, and security policies. For topics in Network Security, this course will cover major threats affecting networks such as Denial of Service (DoS), brute-force, malicious packets, etc. There will be a high-level overview on network specific attacks such as replay, reflection and MitM and how modern authentication and communication protocols like SSH and TLS prevent them. For topics in application security, this course will overview major threats affection application such as Buffer Overflows, Race Conditions, XSS, Injection attacks, etc. and techniques to prevent them.

COMP.2350 Cyber Crime Investigation (Formerly COMP.4611) - Credits: 3
This class introduces students to computer forensics and network forensics, which are two major components of digital forensics. The class covers topics including legal compliance, applicable laws, affidavits, root cause analysis, case law, chain of custody, digital Investigations, authentication of evidence, metadata, using virtual machines for analysis, how to testify, E-Discovery, HIPAA/FERPA, computer security act, Sarbanes - Oxley Act, Gramm - Leach - Billey Act, Children’s Online Privacy Protection Act (COPPA), payment card industry data security standard (PCI DSS), state, US and international standards/Jurisdictions, laws and authorities, US Patriot Act, problem solving, log-file analysis, interlacing of device and network forensics, etc.

COMP.3010 Organization of Programming Languages (Formerly 91.301) - Credits: 3
Analytical approach to the study of programming languages. Description of the salient features of the imperative, functional, logical, and object-oriented programming paradigms in a suitable metalanguage such as Scheme. Topics include iteration, recursion, higher-order functions, types, inheritance, unification, message passing, orders of evaluation, and scope rules. Elementary syntactic and semantic descriptions. Implementation of simple interpreters.

COMP.3040 Foundations of Computer Science (Formerly 91.304) - Credits: 3

COMP.3050 Computer Architecture (Formerly 91.305) - Credits: 3
Examines the basic functional components of a computer system including the CPU, memory systems, and I/O systems. Each of these three areas will be developed in detail with a focus on the system design and component integration. Topics will include CPU control and ALU operation, computer timing, data address and I/O bus activity, addressing model, programmed and DMA I/O, and instruction sets and micro code.

COMP.3080 Operating Systems (Formerly 91.308) - Credits: 3
Presents an introduction to major operating systems and their components. Topics include processes, concurrency and synchronization, deadlock, processor allocation, memory management, I/O devices and file management, and distributed processing. Techniques in operating system design, implementation, and evaluation will be examined.

COMP.3090 Database I (Formerly 91.309) - Credits: 3
The Database I and II course pair provides students with a comprehensive introduction to data modeling, design of databases, use of database management systems for applications, and exploration into the building of databases. Database I covers relational data models, relational algebra and SQL -- The standard language for creating, querying, and modifying relational databases.

COMP.3100 Database II (Formerly 91.310) - Credits: 3
Advanced topics in database systems. The database I and II course pair provides students with a comprehensive introduction to data modeling, design of databases, use of database management systems for applications, and exploration into the building of databases. Database II focuses on database design with Entity-Relationship (E-R) models. Students design and implement a web-based database using MySQL and PHP.

COMP.3500 Special Topics (Formerly 91.350) - Credits: 3
Topics of mutual interest to the instructor and student(s). (Formerly 91.350).
COMP.4010 Software Project I (Formerly 91.401) -
Credits: 3

Specification, design, and implementation of a one- or two-semester software project proposed to a directing faculty member. Projects may be proposed as a one- or two-semester effort based on faculty approval. A two-semester effort requires subsequent registration for COMP.4020 Prerequisite: Students must submit a proposal to the directing faculty member, obtain his/her signed approval, and forward a copy of the signed proposal to department chairperson.

COMP.4020 Software Project II (Formerly 91.402) -
Credits: 3

A continuation of COMP.4010. Students must submit a proposal to the directing faculty member, obtain his/her signed approval, and forward a copy of the signed proposal to the department chairperson.

COMP.4040 Analysis of Algorithms (Formerly 91.404) - Credits: 3

Development of more sophisticated ideas in data type and structure, with an introduction to the connection between data structures and the algorithms they support. Data abstraction. Controlled access structures. Trees, lists, stacks, queues, graphs, arrays, hash tables. Algorithm design strategies such as divide and conquer. Elementary techniques for analysis; asymptotic analysis, recursion equations, estimation methods, elementary combinatorial arguments. Examination of problem areas such as searching and sorting, and the indicated representations and algorithms. The student will use the techniques learned in this course and in previous courses to solve a number of logically complex programming problems using pseudocode, with an emphasis on establishing algorithmic correctness and estimating time and space complexity.

COMP.4060 Compiler Construction I (Formerly 91.406) - Credits: 3

Includes both theory and practice. A study of grammars; specification and classes; the translation pipeline: lexical analysis, parsing, semantic analysis, code generation and optimization; and syntax-directed translation. Use of automatic generation tools in the actual production of a complete compiler for some language.

COMP.4110 Software Engineering I (Formerly 91.411) -
Credits: 3

Software Engineering is an essential discipline for any computer science major. In this class you will learn skills that will help you design and build software projects for advanced computer science classes. This course provides an introduction to systematic techniques for development of software, i.e., "the Engineering of Software". Topics to be discussed include software life-cycle, group coordination, requirements specification, software design, software testing and software maintenance. Emphasis is given to the development of one complex software system and the system documentation necessary for such a complete software product. The students will mock the software cycle via a medium-to-large semester-long project.

COMP.4120 Software Engineering II (Formerly 91.412) - Credits: 3

Software development methodologies for large-scale systems. Project organization, life cycle concept, data modeling, structured analysis and design, information hiding, and the use of computer-aided software engineering (CASE) tools. Team projects are required; these emphasize the design, documentation, and maintenance of complex software systems. Not open to students who have taken 91.523 Software Engineering I.

COMP.4130 Data Communications I (Formerly 91.413) - Credits: 3

This course provides an introduction to fundamental concepts in the design and implementation of computer communication networks, their protocols, and applications. Topics include: TCP/IP and OSI layered network architectures and associated protocols, application layer, network programming API (sockets), transport, congestion, flow control, routing, addressing, autonomous systems, multicast and link layer. Examples will be drawn primarily from the Internet.

COMP.4140 Data Communications II (Formerly 91.414) - Credits: 3

A continuation of 91.413. Topics include Multimedia Networks, network Management, Network Security, Wireless and Mobile Networks. Students will track discussion in IETF committees and work in a dedicated network laboratory. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Information Literacy (IL).

COMP.4200 Artificial Intelligence (Formerly 91.420) - Credits: 3

Topics include: search techniques and their properties, including A*; game-playing, including adversarial and stochastic search; probabilistic reasoning, including Markov Decision Processes and Hidden Markov Models; and
reinforcement learning, including value iteration and q-learning. Topics are developed theoretically and with programming assignments. The course includes a student-directed final project and paper.

COMP.4210 Data Mining (Formerly 91.421) - Credits: 3

This introductory data mining course will give an overview of the models and algorithms used in data mining, including association rules, classification, and clustering. The course will teach the theory of these algorithms and students will learn how and why the algorithms work through computer labs.

COMP.4220 Machine Learning (Formerly 91.422) - Credits: 3

This introductory course gives an overview of machine learning techniques used in data mining and pattern recognition applications. Topics include: foundations of machine learning, including statistical and structural methods; feature discovery and selection; parametric and non-parametric classification; supervised and unsupervised learning; use of contextual evidence; clustering, recognition with strings; small sample-size problems and applications to large datasets.

COMP.4230 Computer Vision I (Formerly 91.423 & 91.523) - Credits: 3

Computer vision has seen remarkable progress in the last decade, fueled by the ready availability of large online image collections, rapid growth of computational power, and advances in representations and algorithms. Applications range from 3-D scene reconstruction, to visual Simultaneous Localization and Mapping (SLAM) for robotics, to real-time human body pose estimation. This introductory computer vision course explores various fundamental topics in the area, including the principles of image formation, local feature analysis, segmentation, multi-view geometry, image warping and stitching, structure from motion, and object recognition.

COMP.4270 Computer Graphics I (Formerly 91.427) - Credits: 3

Introduction to graphics systems and concepts. History of graphics. Introduction to hardware, software, and mathematical tools. Graphics languages and APIs (OpenGL and other traditional and web-based libraries). Graphics data structures and algorithms for 2D and 3D modeling and viewing. Input, archiving, and display architectures.

COMP.4280 Computer Graphics II (Formerly 91.428) - Credits: 3

An advanced course in computer graphics for students familiar with basic issues in computer graphics. Details on hidden line and surface removal. 2D and 3D curve and surface generation, rendering, illumination, and color models, realism through precision (ray tracing) and imprecision (fractals), modern hardware architectures, and animation and simulation systems.

COMP.4290 Bioinformatics for CS - Credits: 3

Complete genomic sequences of human, other mammals, and numerous other organisms are known for some time. From early on, comparisons or analyses of genomic sequences require aids of computer programming. After brief introductions to molecular biology for Computer Science students, the course will examine computer algorithms used in bioinformatics problems including sequence alignment, phylogeny, DNA sequencing, and data analyses.

COMP.4420 Natural Language Processing (Formerly 91.442 & 91.542) - Credits: 3

This course introduces principles and techniques behind natural language processing (NLP), and covers a large selection of important automatic text processing tasks. Selected topics include n-gram language models, part-of-speech tagging, statistical parsing, word sense disambiguation, discourse segmentation, information extraction, sentiment analysis, machine translation. Quantitative techniques are emphasized, with a focus on applying statistical models to large collections of text. The course provides students with a hands-on experience in building a substantial NLP application of their choice.

COMP.4500 Mobile Robotics I (Formerly 91.450) - Credits: 3

An introduction to robotics, including laboratory. In the lab, students build and program robots. Topics include sensors, locomotion, deliberative, reactive, and hybrid control architectures, computer vision, application domains, and current research.

COMP.4510 Mobile Robotics II (Formerly 91.451) - Credits: 3

Advanced topics in robotics, including laboratory. Topics to be covered include probabilistic methods, including sensor modeling, hidden Markov models, particle filters, localization, and map making. Research-level robots are used in the laboratories.

COMP.4600 Selected Topics (Formerly 91.460) - Credits: 3
Depends on faculty interest, student demand, and developments in the field.

COMP.4610 Graphical User Interface Programming I (Formerly 91.461) - Credits: 3
This is a first course in the design and implementation of graphical user interfaces (GUIs) for web-based environments. The course requires the completion of several client-side programming projects that are evaluated on design and layout of the user interface, coding style, and comprehensiveness of documentation. Students learn to create web pages using HTML, CSS, JavaScript, jQuery, and a variety of jQuery plugins. Server-side techniques using PHP and MySQL are explored if time permits. The course may be taken on its own, but is intended to be followed by 91.462 to complete a two-course CS project sequence.

COMP.4620 Graphical User Interface Programming II (Formerly 91.462) - Credits: 3
A second course in the design and implementation of graphical user interfaces for web-based environments. The course requires the completion of a semester-long project done with others as a team. It explores the writing of a project proposal, the development and presentation of alpha and beta versions, usability testing, and a final presentation to an external audience.

COMP.4630 Mobile App Programming I - Credits: 3
This is a first course in the design and implementation of mobile applications. The course requires the completion of several Android programming projects that are evaluated on the functional correctness, coding style, and documentation. Students learn the fundamental principles of Android components, application architectures, and common Android libraries to create non-trivial mobile applications. The course may be taken on its own, but is intended to be followed by Mobile App Programming II to complete a two-course CS project sequence.

COMP.4631 Mobile App Programming II - Credits: 3
A second course in the design and implementation of mobile applications on Android platform. The course requires the completion of a semester-long project done with others as a team. It explores the writing of a project proposal, the development and presentation of alpha and beta versions, usability testing, and a final presentation to an external audience.

COMP.4800 Honors Project I (Formerly 91.480) - Credits: 3
This course provides an undergraduate research experience for Computer Science majors enrolled in the Honors Program. Each student develops a project idea in consultation with the instructor. The student writes a proposal for the project, reads the relevant literature, performs the project, writes a project report or thesis, and makes an oral presentation about the project.

COMP.4810 Honors Project II (Formerly 91.481) - Credits: 3
In this course, students continue and complete the project started in 91.480 Honors Project I.

COMP.4900 Directed Studies in Computer Science (Formerly 91.490) - Credits: 1-4
Individual study for a student desiring more advanced or more specialized work. This course may not be taken more than twice and may not be substituted for scheduled offerings. Prerequisite: Students must submit a proposal to the directing faculty member, obtain his/her signed approval, and forward a copy of the signed proposal to the department chairperson.

COMP.4930 Cooperative Education in Computer Science (Formerly 91.493) - Credits: 1
Supervision of cooperative educational experiences in Computer Science.

COMP.5020 Foundations of Computer Science (Formerly 91.502) - Credits: 3
An advanced introduction to theoretical computer science. This course will cover the fundamentals of automata, formal languages, and computability theory.

COMP.5030 Algorithms (Formerly 91.503) - Credits: 3
Advanced algorithms and complexity analysis. Dynamic programming; greedy algorithms; amortized analysis; shortest path and network flow graph algorithms; NP-completeness; approximation algorithms; number-theoretic algorithms; string matching; computational geometry. Additional topics may include linear programming, parallel algorithms, fast Fourier transforms, polynomial, integer, and matrix algorithms. Readings may include conference and journal papers from the algorithms literature. Abstract types, lists, trees, graphs, sets; relevant algorithms and their worst and average case analyses; fast transforms; polynomial, integer, and matrix algorithms; NP-completeness.
COMP.5040 Advanced Algorithms: Computational Geometry (Formerly 91.504) - Credits: 3
Advanced algorithms topics, such as design and analysis of geometric and combinatorial algorithms, computability and complexity.

COMP.5100 Computational Complexity Theory (Formerly 91.510) - Credits: 3
This course covers polynomial-time hierarchy and polynomial space, circuit complexity, structure of NP, probabilistic machines and complexity classes, complexity of counting, interactive proof systems, probabilistically checkable proofs, complexity of approximation problems, and average-case NP-completeness.

COMP.5130 Internet And Web Systems I (Formerly 91.513) - Credits: 3
This course is a survey of Web programming technologies. It begins with a discussion of what Web servers and clients are, how they interact, and how one sets them up. We then explore a wide variety of Web technologies including HTML, JavaScript, JavaServer Pages, Java Servlets, and XML and its many related technologies. Our goal in this course is to provide the basic understanding and knowledge of how the Internet and World Wide Web operate and the technical knowledge required to establish and maintain an Internet/Web site and to develop and introduce new capabilities and features on such sites.

COMP.5140 Internet & Web Systems II (Formerly 91.514) - Credits: 3
A continuation of 91.513 with a focus on current topics and topics of special interest. Examples of recent topics include: The semantic Web and ontologies, Web services, Peer-to-peer networks, Information Search and Retrieval, Autonomous intelligent agents and Multi-modal presentations.

COMP.5150 Operating Systems I (Formerly 91.515) - Credits: 3
This course provides insight into multiprocessing operating systems including processor memory, peripheral, and file systems management in batch, timesharing, real time, and distributed systems targeted for various hardware. Particular emphasis will be placed on techniques of virtual memory as well as the problems of concurrency in both centralized and distributed systems. An OS simulation is a required programming project. Some topics to be covered are process synchronization; high-Level mechanisms for concurrency; processor scheduling and system analysis; deadlock; virtual memory; distributed systems; computer security.

COMP.5160 Operating Systems II (Formerly 91.516) - Credits: 3
The design and implementation of an interactive multiprocessing operating system to run on a bare hardware system. Separate teams manage the major subsystems with in-class design reviews to coordinate system integration. A functioning system is a class requirement.

COMP.5230 Computer Vision I (Formerly 91.423 & 91.523) - Credits: 3
Computer vision has seen remarkable progress in the last decade, fueled by the ready availability of large online image collections, rapid growth of computational power, and advances in representations and algorithms. Applications range from 3-D scene reconstruction, to visual Simultaneous Localization and Mapping (SLAM) for robotics, to real-time human body pose estimation. This introductory computer vision course explores various fundamental topics in the area, including the principles of image formation, local feature analysis, segmentation, multi-view geometry, image warping and stitching, structure from motion, and object recognition.

COMP.5270 Human Computer Interaction (Formerly 91.527) - Credits: 3
The purpose of this class is to ground students in the basics of how humans interact with technology, and make students aware of the breadth of topic areas related to human-computer interaction (HCI). This course emphasizes theoretical constructs such as the Model-Human Processor, and includes seminal readings by the original researchers. Further, the course emphasizes techniques for understanding users’ tasks, formulating users’ requirements, and assessing proposed designs using heuristic evaluation. As part of understanding users’ needs, students will consider social, organizational, and ethical perspectives on information technology. Students are also exposed to specialty topics in human-computer interaction such as multi-user computing, universal access to computer applications, and internationalizing interfaces. This course includes a project to design, develop, document, and orally present a prototype interface. At the end of the course students will be able to cite basic principles of human interaction and devise and carry out a usability engineering plan to aid in developing new human interfaces.

COMP.5280 Evaluation of Human-Computer Interaction (Formerly 91.528) - Credits: 3
This course is an introduction to methods used to evaluate the design of human-computer interaction (HCI). Students will
apply examples of all three of the major types of HCI evaluation techniques: inspection, analytical, and empirical techniques. The course also covers HCI experiment design and data analysis, including threats to experimental validity. The course project consists of a formal usability test. This project requires students to learn principles of ethical treatment of human subjects, complete the University’s Institutional Review Board applications and training for human-subject testing, conduct testing sessions, analyze data, recommend design changes, and document results in a professional manner. At course completion, students will have demonstrated skills for assessing the effectiveness of interface designs and will understand how evaluation fits into computer products' lifecycles.

COMP.5300 Special Topics (Formerly 91.530) - Credits: 0-3
Topics of mutual interest to the instructor and student(s). "Variable credit course, student chooses appropriate amount of credits when registering."

COMP.5310 Design of Program Languages (Formerly 91.531) - Credits: 3
A one-semester course designed to provide students with hands-on understanding of the underlying concepts of programming languages, the principles of their design, and the fundamental methods for their implementation. An executable metalanguage such as Scheme or SML is used throughout the course, facilitating the design of high-level, concise interpreters that are easy to comprehend. The approach is analytical because the salient features of the imperative, functional, object-oriented, and logic programming paradigms are described in the executable meta-language.

COMP.5340 Compiler Construction I (Formerly 91.534) - Credits: 3
This course implements a compiler for a complete language. Topics include grammars, syntax, elements of parsing and recursive descent, semantics, basic code generation, fast compilation runtime support. Programming project required.

COMP.5400 Visual Analytics (Formerly 91.540) - Credits: 3
This course covers the basic topics for the interdisciplinary field of visual analytics. This course is not just for computer science students but also for analysts and scientists in different disciplines. The topics include visual analytics science and technology, perception, cognitive processes and human tasks and reasoning, data and knowledge representation, visualization and interaction, statistical and analytic methods, data mining and knowledge discovery, and evaluation and usability. Numerous examples of systems, tools and applications will be presented.

COMP.5411 Data Visualization (Formerly 91.541) - Credits: 3
This course looks at classical and novel methodologies for the visualization of large and complex data sets. The course covers both scientific and information visualization starting with data modeling, human perception and cognition, basic and advanced techniques, interaction, formal models, real time systems, and frameworks for integrated analysis and visualization. Examples used come from numerous areas including the biomedical literature and security.

COMP.5420 Natural Language Processing (Formerly 91.442 & 91.542) - Credits: 3
This course introduces principles and techniques behind natural language processing (NLP), and covers a large selection of important automatic text processing tasks. Selected topics include n-gram language models, part-of-speech tagging, statistical parsing, word sense disambiguation, discourse segmentation, information extraction, sentiment analysis, machine translation. Quantitative techniques are emphasized, with a focus on applying statistical models to large collections of text. The course provides students with a hands-on experience in building a substantial NLP application of their choice.

COMP.5430 Artificial Intelligence (Formerly 91.543) - Credits: 3
Search and games, knowledge representation paradigms, natural language understanding, planning, perception. Use of the LISP language for one or more programming projects.

COMP.5440 Data Mining (Formerly 91.544) - Credits: 3
This introductory data mining course will give an overview of the models and algorithms used in data mining, including association rules, classification, clustering, etc. The course will teach the theory of these algorithms and students will learn how and why the algorithms work through computer labs.

COMP.5450 Machine Learning (91.545) - Credits: 3
This introductory course gives an overview of machine learning techniques used in data mining and pattern recognition applications. Topics include: foundations of machine learning, including statistical and structural methods; feature discovery and selection; parametric and non-parametric classification;
supervised and unsupervised learning; use of contextual evidence; clustering, recognition with strings; small sample-size problems and applications to large datasets.

COMP.5460 Computer Graphics I (Formerly 91.546) - Credits: 3
Introduction to the hardware, software and mathematics of 2- and 3-dimensional interactive computer graphics systems, including standards, modeling, transformations, hidden-surface removal, shading, and realism.

COMP.5470 Computer Graphics II (Formerly 91.547) - Credits: 3
Lighting models, photo-realism, animation, constructive solid geometry, and distributed graphics.

COMP.5480 Robot Design (Formerly 91.548) - Credits: 3
A broad interpretation of robotics to mean systems that interact with people, each other, and the world around them, using sensors, actuators, communications, and a control program. Project- and lab-based course that involves electronics, embedded coding, mechanical design, and research.

COMP.5490 Mobile Robots (Formerly 91.549) - Credits: 3
This course will focus on the artificial intelligence side of robotics in a project- and lab-based course. Topics to be covered include robot architectures, mapping and localization, learning, vision, multi-agent systems and current research areas.

COMP.5500 Topics (Formerly 91.550) - Credits: 3
Topics of mutual interest to the instructor and student(s).

COMP.5510 Bioinformatics for CS - Credits: 3
Complete genomic sequences of human, other mammals, and numerous other organisms are known for some time. From early on, comparisons or analyses of genomic sequences require aids on computer programming. After brief introductions to molecular biology for Computer Science students, the course will examine computer algorithms used in bioinformatics problems including sequence alignment, phylogeny, DNA sequencing, and data analyses.

COMP.5530 Deep Learning - Credits: 3
This course focuses on the deep learning theory, algorithms, systems, and applications. Topics to be covered in this course include math and machine learning basics for Deep Learning, foundations of Deep Learning, Convolutional neural networks, Recurrent neural networks, Deep reinforcement learning, and practical methodology.

COMP.5610 Computer & Network Security I (Formerly 91.561) - Credits: 3
Basic concepts and techniques of computer network security; data encryption algorithms; public-key cryptography and key management; data authentication; network security protocols in practice; wireless network security; network perimeter security; the art of anti malicious software; the art of intrusion detection. Students will implement encryption and authentication algorithms as network applications.

COMP.5620 Computer Security II (Formerly 91.562) - Credits: 3
Applied computer security topics such as a computer and network forensics, virtual private networks, denial of service, viruses and worms, intrusion detection systems, smart cards, biometrics, programming language security, web security and privacy, e-commerce; case studies of deployed systems; policy and legal considerations.

COMP.5630 Data Communications I (Formerly 91.563) - Credits: 3
Resource sharing; computer traffic characterizations; multiplexing; network structure; packet switching and other switching techniques; design and optimization; protocols; routing and flow control; simulation and measurement; communications processors.

COMP.5640 Data Communications II (Formerly 91.564) - Credits: 3
Continuation of 91.563

COMP.5700 Topics (Formerly 91.570) - Credits: 3
Topics of mutual interest to the instructor and student(s).

COMP.5730 Data Base I (Formerly 91.573) - Credits: 3
Study of various database models including hierarchical, network, relational, entity-relationship, and object-oriented models. This course also covers data design, integrity, security, concurrency, recovery, query processing, and distribution.
COMP.5740 Data Base II (Formerly 91.574) - Credits: 3
Continuation of Data Base I. Various issues in the implementation of database systems will be covered.

COMP.5800 Topics in Computer Science (Formerly 91.580) - Credits: 3
Topics of mutual interest to the instructor and student(s).

COMP.5870 Computer Science Education in Secondary School (Formerly 91.587) - Credits: 3

COMP.5920 Special Topics: Computer Science (Formerly 91.592) - Credits: 3

COMP.5930 Cooperative Education (Formerly 91.593) - Credits: 0-1
"Variable credit course, student chooses appropriate amount of credits when registering."

COMP.6040 Network Optimization (Formerly 91.604) - Credits: 3
This course covers advanced topics in network optimization on continuous and discrete models, including the max-flow problem, the min-cost flow problem, simplex methods for min-cost flow, dual ascent methods for min-cost flow, auction algorithms for min-cost flow, nonlinear network optimization, convex separable network problems, and network problems with integer constraints.

COMP.6130 Advanced Topics in Information Retrieval and Mining (Formerly 91.613) - Credits: 3
This is a proposed new 600-level course. The topics are advanced topics in Information Retrieval and Mining, including (but not limited to) Search and Information Retrieval, Visual Text Mining, Document Retrieval and Analysis, Non-textual Retrieval (including Image-, Sound, Video-Retrieval). The course's format is a seminar: (advanced, doctoral) students will be reading and presenting the current state-of-the-art literature. Course requirements include weekly bibliography reports (at least 2 new entries each week) class presentations, two term papers, and a term project.

COMP.6410 Advanced Topics in Visualization (Formerly 91.641) - Credits: 3
This course covers advanced topics in data visualization. Coverage will be topical and may include advanced graph text visualization, modern coordinated visualizations, collaborative visualization knowledge visualizations, security visualization, web-based visualization, and high-performance visualization. Theory will also be covered.

COMP.6440 Topics in Data Mining (Formerly 91.644) - Credits: 3
This course continues with 91.421/91.544 Data Mining and explores the state of the art research advances in mining large amount of data especially algorithms in association classification, clustering, and applications such as web mining and spatio-temporal data mining.

COMP.6610 Advanced Topics in Network Security (Formerly 91.661) - Credits: 3
This is a topic course, with a subtitle to be determined by the instructor. It covers advanced topics in network security of mutual interests to the faculty and students.

COMP.6730 Advanced Database Systems (Formerly 91.673) - Credits: 3
This course covers advanced topics in database management systems, including query processing and optimization, indexing, transaction management, data warehousing, data mining, etc. It also covers spatio-temporal databases, search engines, stream and sensor databases, and open problems for research.

COMP.7010 Computer Science Research (Formerly 91.701) - Credits: 1
COMP.7020 Computer Science Research (Formerly 91.702) - Credits: 6
COMP.7030 Computer Science Research (Formerly 91.703) - Credits: 3
COMP.7060 Directed Research (Formerly 91.706) - Credits: 6
COMP.7100 Approximation Algorithms (Formerly 91.710) - Credits: 3
This course covers advanced topics in approximation algorithms for NP-hard problems, including combinatorial algorithms and LP-based algorithms for set cover, k-cut, k-center, feedback vertex set, shortest superstring, knapsack, bin packing, maximum satisfiability, scheduling, Steiner tree, Steiner Forest, Steiner network, facility location, k-median, semidefinite programming. It also covers counting problems, shortest vector, hardness of approximation, and open problems.
for research.

COMP.7410 Thesis Review (Formerly 91.741) - Credits: 1
COMP.7430 Master's Thesis - Computer Science (Formerly 91.743) - Credits: 3
COMP.7460 Master's Thesis - Computer Science (Formerly 91.746) - Credits: 6
COMP.7490 Master's Thesis - Computer Science (Formerly 91.749) - Credits: 9
COMP.7510 Doctoral Thesis Research (Formerly 91.751) - Credits: 1-3
COMP.7530 Doctoral Dissertation/Computer Science (Formerly 91.753) - Credits: 3
COMP.7560 Doctoral Dissertation/Computer Science (Formerly 91.756) - Credits: 6
COMP.7590 Doctoral Dissertation/Computer Science (Formerly 91.759) - Credits: 9
COMP.7690L Continued Graduate Research (Formerly 91.769) - Credits: 9
COMP.REVIEW Pending Departmental Review (Formerly 91.Review) - Credits: 0
EECE.1070 Introduction to Electrical and Computer Engineering (Formerly 25/16.107) - Credits: 2

This course is divided into two parts in which students focus on core skills to help them thrive in electrical and computer engineering. The first half of the course focuses on application programming in Matlab where students learn basics of Programming, Digital Signal Processing, and Data Analysis. In the second part of the course students program a microcontroller and learn about the function of basic electronic components. Students learn to use basic test equipment such as an Oscilloscope, Function Generator, Volt Meter. This course is project and lab based.

EECE.1CO-OP Curricula Practical Training - Credits: 0-1
Curricula Practical Training. "Variable credit course, student chooses appropriate amount of credits when registering."

EECE.2010 Circuit Theory I (Formerly 16.201) - Credits: 3

This course covers ideal elements, active and passive. It introduces and applies Ohm's Law and Kirchoff's Laws. Introduces concepts of network topology, independent and dependent variables, mesh and nodal analysis, the definition and consequences of linearity, source transformation, the superposition principle, Thevenin’s and Norton’s theorems, and maximum power transfer. Also covers ideal inductance and capacitance in simple circuits with the study of transient response and behavior under DC conditions.

EECE.2070 Basic Electrical Engineering Laboratory I (Formerly 25/16.207) - Credits: 2

Experimental work designed to verify theory and to acquaint students with electrical measurement techniques: experiments on meters, bridges, and oscilloscopes. Experiments are correlated with Circuit Theory I and concern: resistive measurements, Kirchhoff’s laws, network theorems, conservation of power and maximum power transfer, inductance and capacitance, and first and second-order transients, operational amplifiers. MATLAB will be utilized throughout the course.

EECE.2080 Basic Electrical Engineering Lab II (Formerly 16.208) - Credits: 2

Presents experimental work designed to emphasize electrical measurement techniques of linear systems with time-varying signals. Waveform measurements with DC and AC meters as well as advanced use of the oscilloscope are also discussed. Experiments are integrated with Circuit Theory II. Experiments cover: Kirchhoff’s laws for phasors, magnitude and phase measurements of impedance, network theorems, frequency response, resonance, inductance, maximum power transfer, and MATLAB techniques.

EECE.2110 Fundamentals of Electricity I (Formerly 16.211/213) - Credits: 3
This course serves as an introduction to direct current (DC) and alternating current (AC) analysis of electric circuits, with emphasis on energy and power. Covers the explanation of basic components (resistor, capacitor and inductor) and their use in electronics. Cover also the design and use of multi-range voltmeters, ammeters, and ohmmeters, series, parallel and series parallel circuits, the use of bridges, phasor analysis of AC circuits, transformers, relays, solenoids, etc. Different techniques like Superposition theorem, Thevenin equivalent circuit or Maximum Power will be presented. Students will also be introduced to DC and AC motors and generators, first and second order filters as well as basic sensors. Not for ECE students.

EECE.2140 Fundamentals of Sound Recording  
(Formerly 16.214) - Credits: 3

This course serves to instruct sound recording technology through the concepts of voltage, current, power, resistance and Ohm’s law; series, parallel and resonant circuits, Kirchhoff’s voltage and current laws; the Wheatstone bridge, Thevenin equivalent circuits and maximum power transfer theorem; magnetism, electromagnetism, electromagnetic devices, and transformers; a.c. current, RF signals, capacitors, and inductors; RC, RL, and RLC circuits; d.c. power sources; diodes, transistors, tubes (thermonic emission), and amplifiers. Use of voltmeters, ammeters, ohmmeters, and oscilloscopes are discussed and used in lab throughout the course. Not for ECE students.

EECE.2160 ECE Application Programming (Formerly 16.216) - Credits: 3

Introduces C programming for engineers. Covers fundamentals of procedural programming with applications in electrical and Computer engineering and embedded systems. Topics include variables, expressions and statements, console input/output, modularization and functions, arrays, pointers and strings algorithms, structures, and file input/output. Introduces working with C at the bit manipulation level. Laboratories include designing and programming engineering applications.

EECE.2330 History of Radio (Formerly 16.233) - Credits: 3

Intended primarily for students majoring in the liberal arts. The course develops the theory of electricity from an historical perspective. Sufficient background in circuit theory, resonance, field theory and radio waves is given to provide an understanding of the principles of radio from its antecedents in the nineteenth century through the invention of the transistor in the mid twentieth century. The fundamental contributions of, for example Volta, Oersted, Morse, Maxwell, Faraday, Hertz, Lodge, and Marconi are considered. In the present century the technical advances of such figures as de Forest, Fleming, Fessenden, Armstrong and Shockley are studied. The growth, regulation and culture of American broadcasting are also central to the course. Laboratory work is required and students may use this course toward fulfilling the General Education (science/experimental component) requirement of the University. Not open to students in the College of Engineering.

EECE.2460 Introduction to Data Communication Networks - Credits: 3

This course is designed to convey the essentials of data communication and networking. This includes an understanding of the Open Systems Interconnection (OSI), TCP/IP and Internet models. It covers various protocols and architectures of interconnection technologies. Several concepts will be discussed that will enable students to apply the basic concepts of data communication and networking technology in many practical situations.

EECE.2650 Logic Design (Formerly 16.265) - Credits: 3


EECE.3110 Electronics I Lab (Formerly 16.311) - Credits: 2

Laboratory experiments coordinated with the subject matter of Electronics I. This lab explores the characteristics and use of electronic instrumentation for making measurements on electronic circuits. Labs will utilize the methods of designing and characterizing diode and transistor circuits. They will analyze the performance characteristics of digital and linear semiconductor circuits, including logic elements and amplifiers. The design and construction of circuits using monolithic op amps will also be explored.

EECE.3120 Electronics II Laboratory (Formerly 16.312) - Credits: 2

This course covers laboratory experiments coordinated with the subject matter of Electronics II, Study of high-frequency characteristics of transistors and transistor amplifiers. Covers feedback in electronic circuits, electronic oscillators and
differential amplifier. Covers also the properties of linear IC operational amplifiers and their application in amplifier circuits and waveform generation circuits. Design and analysis of linear circuits.

EECE.3170 Microprocessors Systems Design I (Formerly 16.317) - Credits: 3

Introduction to microprocessors, Uses assembly language to develop a foundation on the hardware which executes a program. Memory and I/O interface design and programming. Design and operation of computer systems. Study of microprocessor and its basic support components, including detailed schematics, timing and functional analysis of their interactions. Laboratories directly related to microprocessor functions and its interfaces (e.g. memory subsystem, I/O devices and coprocessors).

EECE.3220 Data Structures (Formerly 16.322) - Credits: 3

Covers algorithms and their performance analysis, data structures, abstraction, and encapsulation. Introduces stacks, queues, linked lists, trees, heaps, priority queues, and hash tables, and their physical representation. Discusses efficient sorting (quicksort and heapsort) and experimental algorithm analysis. Examines several design issues, including selection of data structures based on operations to be optimized, algorithm encapsulation using classes and templates, and how and when to use recursion. Assignments include programming of data structures in an object-oriented language.

EECE.3550 Electromechanics (Formerly 16.355) - Credits: 3

Alternating current circuits, three phase circuits, basics of electromagnetic field theory, magnetic circuits, inductance, electromechanical energy conversion. Ideal transformer, iron-core transformer, voltage regulation, efficiency equivalent circuits, and three phase transformers. Induction machine construction, equivalent circuit, torque speed characteristics, and single phase motors. Synchronous machine construction, equivalent circuits, power relationships phasor diagrams, and synchronous motors. Direct current machines construction, types, efficiency, power flow diagram, and external characteristics.

EECE.3600 Engineering Electromagnetics I (Formerly 16.360) - Credits: 3

Electromagnetics I is the study of fundamental electrostatic and magnetostatic equations building up to the foundation of electrodynamics, Maxwell’s Equations. This course is put into an engineering perspective by describing transmission line properties using circuit models and deriving these model parameters directly from Maxwell’s Equations. To accomplish these tasks, Engineering Electromagnetics I implements: Transmission lines as Distributed Circuits, Smith Charts, impedance Matching, Electrostatics and Capacitance, steady current flow and Resistance, and Magnetostatics and Inductance.

EECE.3620 Signals and Systems I (Formerly 16.362) - Credits: 3

This course covers various continuous voltage/current time functions and their applications to linear time-invariant (LTI) electrical systems. It reviews pertinent topics from previous courses on circuit theory, such as system functions, S-plane concepts and complete responses. It introduces step and impulse functions and their responses in LTI circuits. It covers the solving of convolution integrals and differential equations, the transformation of signals to Fourier series, the Fourier and Laplace transforms, with their application, in continuous and discrete time, and Parseval’s theorem. It also describes analog filter responses and design. A computing project is proposed in this course.

EECE.3630 Introduction to Probability and Random Processes (Formerly 16.363) - Credits: 3

Introduction to probability, random processes and basic statistical methods to address the random nature of signals and systems that engineers analyze, characterize and apply in their designs. It includes discrete and continuous random variables, their probability distributions and analytical and statistical methods for determining the mean, variance and higher order moments that characterize the random variable. Descriptive and inferential statistics, as well as time-varying random processes and their spectral analysis are introduced. The course provides the skills required to address modeling uncertainty in manufacturing and reliability analysis, noise characterization, and data analysis.

EECE.3640 Engineering Mathematics (Formerly 16.364) - Credits: 3

Complex number, Argand plane, derivatives of complex numbers, limits and continuity, derivative and Cauchy Riemann conditions, analytic functions, integration in the complex plane, Cauchy's integral formula, infinite series for complex variables. Taylor series, Laurent series, residue theory, evaluation of integrals around indented contours. Linear vector spaces, matrices and determinants, eigenvalues and eigenvectors.

EECE.3650 Electronics I (Formerly 16.365) - Credits: 3

A brief introduction to solid-state physics, leading to discussion
of physical characteristics of p-n junction diodes, bipolar junction transistors, and field-effect transistors: active, saturated, and cutoff models of bipolar transistors and triode, constant current, and cutoff models of MOSFETs. Circuit models for diodes, and diode applications. Circuit models for transistors, and transistor applications in bipolar and MOS digital circuits and low-frequency amplifier circuits. Analysis of digital circuits and linear circuits based on application of circuit models of devices and circuit theory.

EECE.3660 Electronics II (Formerly 16.366) - Credits: 3

A continuation of 16.365 with discussion of differential amplifiers, operation amplifiers and op amp applications, transistor amplifiers at very high frequencies; direct-coupled and band pass amplifiers; small and large signal amplifiers; feedback amplifiers and oscillators. Active filters, wave form generation circuits including Schmitt trigger, multiplexers, and A/D and D/A converters. Circuit design employing integrated circuit operational amplifiers and discrete devices. Circuit analysis using SPICE. An electronic design project constitutes a major part of the course.

EECE.3991 Capstone Proposal (Formerly 16.399) - Credits: 3

This course is the first in a two semester capstone sequence. In a group, students will work with a client to define their project, by identifying the problem, objective and requirements, and engage in design, analysis, test and fabrication tasks as appropriate to meet the project goals. Project management tools are discussed and applied in this process.

EECE.4030 Microwave Engineering (Formerly 16.403) - Credits: 3

An introductory course in the analysis and design of passive microwave circuits beginning with a review of time-varying electromagnetic field concepts and transmission lines. Smith Chart problems; single and double stub matching; impedance transformer design; maximally flat and Chebyshev transformers; microstrip transmission lines, slot lines, coplanar lines; rectangular and circular waveguides; waveguide windows and their use in impedance matching; design of directional couplers; features of weak and strong couplings; microwave filter design; characteristics of low-pass, high-pass, band-pass, band-stop filter designs; two-port network representation of junctions; Z and Y parameters, ABCD parameters, scattering matrix; microwave measurements; measurement of VSWR, complex impedance, dielectric constant, attenuation, and power. A design project constitutes a major part of the course.

EECE.4040 VLSI Fabrication (Formerly 16.470/EECE.4700) - Credits: 3

Fabrication of resistors, capacitors, p-n junction and Schottky barrier diodes, BJTs and MOS devices and integrated circuits. Topics include: silicon structure, wafer preparation, sequential techniques in microelectronic processing, testing and packaging, yield and clean room environments. MOS structures, crystal defects, Fick's laws of diffusion; oxidation of silicon, photolithography including photoresist, development and stripping. Metallization for conductors, Ion implantation for depletion mode and CMOS transistors for better yield speed, low power dissipation and reliability. Students will fabricate circuits using the DSPL Laboratory.

EECE.4060 Antenna Theory and Design (Formerly 16.462/EECE.4620) - Credits: 3


EECE.4090 Directed Studies (Formerly 16.409) - Credits: 3

Provides an opportunity for qualified Electrical Engineering students to investigate specific areas of interest. The actual project undertaken may be software or hardware oriented. The most important characteristics of the projects are that the end results represent independent study, that they are research and development oriented, and that they are accomplished in an engineering environment. Design reviews and progress reports are expected for each project. A final formal report to be permanently filed in the EE Department is required for each project. Engineering Design (100%).

EECE.4100 Directed Studies (Formerly 16.410) - Credits: 1-3

The purpose of this course is to provide an opportunity for qualified Electrical Engineering students to investigate specific areas of interest. The actual project undertaken may be software or hardware oriented. The most important characteristics of the projects are that the end results represent independent study and that they are research and development oriented, and that they are accomplished in an engineering environment. Design reviews and progress reports are expected for each project. A final formal report to be permanently filed in the EE Department is required for each project.
EECE.4120 Directed Studies (Formerly 16.412) - Credits: 3
The purpose of this course is to provide an opportunity for qualified Electrical Engineering students to investigate specific areas of interest. The actual project undertaken may be software or hardware oriented. The most important characteristics of the projects are that the end results represent independent study and that they are research and development oriented, and that they are accomplished in an engineering environment. Design reviews and progress reports are expected for each project. A final formal report to be permanently filed in the EE Department is required for each project.

EECE.4130 Linear Feedback System (Formerly 16.413) - Credits: 3

EECE.4140 Integrated Power Systems (Formerly 16.414/514) - Credits: 3
Power System Operations and Electricity Markets provide a comprehensive overview to understand and meet the challenges of the new competitive highly deregulated power industry. The course presents new methods for power systems operations in a unified integrated framework combining the business and technical aspects of the restructured power industry. An outlook on power policy models, regulation, reliability, and economics is attentively reviewed. The course lays the groundwork for the coming era of unbundling, open access, power marketing, self-generation, and regional transmission operations.

EECE.4150 Power Electronics (Formerly 16.473/515 & EECE.4730/5150) - Credits: 3
A one-semester course with emphasis on the engineering design and performance analysis of power electronics converters. Topics include: power electronics devices (power MOSFETs, power transistors, diodes, silicon controlled rectifiers SCRs, TRIACs, DIACs and Power Darlington Transistors), rectifiers, inverters, ac voltage controllers, dc choppers, cycloconverters, and power supplies. The course includes a project, which requires that the student design and build one of the power electronics converters. A demonstrative laboratory to expose the students to all kinds of projects is part of the course.

EECE.4180 Wireless Communication (Formerly 16.418) - Credits: 3
Cellular systems and design principles, co-channel and adjacent channel interference, mobile radio propagation and determination of large scale path loss, propagation mechanisms like reflection, diffraction and scattering, outdoor propagation models, Okumura and Hata models, small scale fading and multipath, Doppler shift and effects, statistical models for multipath, digital modulation techniques QPSK, DPSK, GMSK, multiple access techniques, TDMA, FDMA, CDMA, spread spectrum techniques, frequency hopped systems, wireless systems and worldwide standards.

EECE.4210 Real Time Digital Signal Processing (Formerly 16.421) - Credits: 3
This course provides an introduction to real-time digital signal processing techniques using floating point and fixed point processors. The architecture, instruction set and software development tools for these processors will be studied via a series of C and assembly language computer projects where real-time adaptive filters, modems, digital control systems and speech recognition systems are implemented.

EECE.4230 Semiconductor Physics for Solid-State Electronics (Formerly 16.423) - Credits: 3
The course covers fundamental solid-state and semiconductor physics relevant for understanding electronic devices. Topics include quantum mechanics of electrons in solids, crystalline structures, band theory of semiconductors, electron statistics and dynamics in energy bands, lattice dynamics and phonons, carrier transport, and optical processes in semiconductors.

EECE.4240 Computational Methods for Power System Analysis (Formerly 16.424/524) - Credits: 3
The course explores some of the mathematical and simulation tools used for the design, analysis and operation of electric power systems. Computational methods based on linear and nonlinear optimization algorithms are used to solve load flow problems, to analyze and characterize system faults and contingencies, and to complete economic dispatch of electric power systems. Real case studies and theoretical projects are assigned to implement the techniques learned and to propose recommendations. Different software applications will be used concurrently including ATP, PowerWorld Simulator, Aspen, MatLab with Simulink and Power System Toolbox, PSCAD,
EECE.4250 Power Distribution System (Formerly 16.4440/EECE.4440) - Credits: 3

An intermediate course in analysis and operation of electrical power distribution systems using applied calculus and matrix algebra. Topics include electrical loads characteristics, modeling, metering, customer billing, voltage regulation, voltage levels, and power factor correction. The design and operation of the power distribution system components will be introduced: distribution transformers, distribution substation, distribution networks, and distribution equipment.

EECE.4260 Power Systems Stability and Control (Formerly 16.426/526) - Credits: 3


EECE.4270 Advanced VLSI Design Techniques (Formerly 16.427/527) - Credits: 3

This course builds on the previous experience with Cadence design tools and covers advanced VLSI design techniques for low power circuits. Topics covered include aspects of the design of low voltage and low power circuits including process technology, device modeling, CMOS circuit design, memory circuits and subsystem design. This will be a research-oriented course based on team projects.

EECE.4280 Alternative Energy Sources (Formerly 16.428) - Credits: 3

PV conversion, cell efficiency, cell response, systems and applications. Wind Energy conversion systems: Wind and its characteristics; aerodynamic theory of windmills; wind turbines and generators; wind farms; siting of windmills. Other alternative energy sources: Tidal energy, wave energy, ocean thermal energy conversion, geothermal energy, solar thermal power, satellite power, biofuels. Energy storage: Batteries, fuel cells, hydro pump storage, flywheels, compressed air.

EECE.4290 Electric Vehicle Technology (Formerly 16.429) - Credits: 3

Electric vehicle vs internal combustion engine vehicle. Electric vehicle (EV) saves the environment. EV design, EV motors, EV batteries, EV battery chargers and charging algorithms, EV instrumentation and EV wiring diagram. Hybrid electric vehicles. Fuel cells. Fuel cell electric vehicles. The course includes independent work.

EECE.4310 RF Design (Formerly 16.431) - Credits: 3

Two-port network parameters, Smith chart applications for impedance matching, transmission line structures like stripline, microstrip line and coaxial line, filter designs for low-pass, high-pass and band-pass characteristics, amplifier design based on s-parameters, bias network designs, one port and two port oscillator circuits, noise in RF systems.

EECE.4330 Electronic Materials (Formerly 16.333/EECE.3330) - Credits: 3

The production and processing of materials into finished products constitute a large part of the present economy. To prepare students for the use of a variety of traditional and new materials, this course will cover: atomic structure and chemical bonding, crystal geometry and defects, mechanical properties and phase diagrams of metals and alloys, electrical and optical properties of semiconductors, ceramics, and polymers; brief description of electronic, quantum electronic and photonic devices; benefits and difficulties of materials design with decreasing dimensions from millimeters to micrometers and to nanometers.

EECE.4410 Introduction to Biosensors (Formerly 16.441/541) - Credits: 3

This course introduces the theory and design of biosensors and their applications for pathology, pharmacogenetics, public health, food safety civil defense, and environmental monitoring. Optical, electrochemical and mechanical sensing techniques will be discussed.

EECE.4450 Analog Devices and Techniques (Formerly 16.445/565 & EECE.4450/5650) - Credits: 3

A survey of analog devices and techniques, concentrating on operational amplifier design and applications. Operational amplifier design is studied to reveal the limitations of real opamps, and to develop a basis for interpreting their specifications. Representative applications are covered, including: simple amplifiers, differential and instrumentation amplifiers, summers, integrators, active filters, nonlinear circuits, and waveform generation circuits. A design project is required.
Design of logic machines. Finite state machines, gate array designs, ALU and 4 bit CPU unit designs, micro-programmed systems. Hardware design of advanced digital circuits using XILINX. Application of probability and statistics for hardware performance, and upgrading hardware systems. Laboratories incorporate specification, top-down design, modeling, implementation and testing of actual advanced digital design systems hardware. Laboratories also include simulation of circuits using VHDL before actual hardware implementation and PLDs programming.

EECE.4520 Microprocessor Systems II & Embedded Systems (Formerly 16.480/EECE.4800) - Credits: 3

CPU architecture, memory interfaces and management, coprocessor interfaces, bus concepts, bus arbitration techniques, serial I/O devices, DMA, interrupt control devices. Including Design, construction, and testing of dedicated microprocessor systems (static and real-time). Hardware limitations of the single-chip system. Includes micro-controllers, programming for small systems, interfacing, communications, validating hardware and software, microprogramming of controller chips, design methods and testing of embedded systems.

EECE.4530 Software Engineering (Formerly 16.453) - Credits: 3

Introduces software life cycle models, and engineering methods for software design and development. Design and implementation, testing, and maintenance of large software packages in a dynamic environment, and systematic approach to software design with emphasis on portability and ease of modification. Laboratories include a project where some of the software engineering methods (from modeling to testing) are applied in an engineering example.

EECE.4590 Introduction to Nanoelectronics (Formerly 16.459/559) - Credits: 3

This course introduces the use of nanomaterials for electronic devices such as sensors and transistors. Synthesis methods for nanoparticles, nanotubes, nanowires, and 2-D materials such as graphene will be covered. The challenges in incorporating nanomaterials into devices will also be discussed. These methods will be compared to techniques used in the semiconductor industry and what challenges, technically and financially, exist for their widespread adoption will be addressed. Finally, examples of devices that use nanomaterials will be reviewed. The course will have some hands on demonstrations.

EECE.4600 Biomedical Instrumentation (Formerly 16.460/560) - Credits: 3

A survey of biomedical instrumentation that leads to the analysis of various medical system designs and the related factors involved in medical device innovation. In addition to the technical aspects of system integration of biosensors and physiological transducers there will be coverage of a biodesign innovation process that can translate clinical needs into designs. A significant course component will be project-based prototyping of mobile health applications. The overall goals of the course are to provide the theoretical background as well as specific requirements for medical device development along with some practical project experience that would thereby enable students to design electrical and computer based medical systems.

EECE.4610 Engineering Electromagnetics II (Formerly 16.461) - Credits: 3

Continuation of Magnetostatics, Maxwell’s Equations for Time-varying Fields, plane waves: time-harmonic fields, polarization, current flow in good conductors and skin effect, power density and Poynting vector, wave reflection and transmission; Snell’s Law, fiber optics, Brewster angle, radiation and simple antennas, electromagnetic concepts involved in a topical technology in development.

EECE.4670 Special Topics (Formerly 16.467) - Credits: 3

Topics of current interest in Electrical and Computer Engineering. Subject matter to be announced in advance.

EECE.4680 Electro-optics & Integrated Optics (Formerly 16.468) - Credits: 3

An introduction to physical optics, electro-optics and integrated optics. Topics include: Waves and polarization, optical resonators, optical waveguides, coupling between waveguides, electro-optical properties of crystals, electro-optic modulators, Micro-Optical-Electro-Mechanical (MEMS) Devices and photonic and microwave wireless systems.

EECE.4690 VLSI Design (Formerly 16.469/502 & EECE.4690/5020) - Credits: 3

Introduction to CMOS circuits including transmission gate, inverter, NAND, NOR gates, MUXes, latches and registers. MOS transistor theory including threshold voltage and design equations. CMOS inverter’s DC and AC characteristics along with noise margins. Circuit characterization and performance estimation including resistance, capacitance, routing capacitance, multiple conductor capacitance, distributed RC capacitance, multiple conductor capacitance, distributed RC capacitance, switching characteristics incorporating analytic delay models, transistor sizing and power dissipation. CMOS
circuit and logic design including fan-in, fan-out, gate delays, logic gate layout incorporating standard cell design, gate array layout, and single as well as two-phase clocking. CMOS test methodologies including stuck-at-0, stuck-at-1, fault models, fault coverage, ATPG, fault grading and simulation including scan-based and self test techniques with signature analysis. A project of modest complexity would be designed to be fabricated at MOSIS.

EECE.4720 Embedded Real Time Systems (Formerly 16.472) - Credits: 3

Designing embedded real-time computer systems. Types of real-time systems, including foreground/background, non-preemptive multitasking, and priority-based pre-emptive multitasking systems. Soft vs. hard real time systems. Task scheduling algorithms and deterministic behavior. Ask synchronization: semaphores, mailboxes and message queues. Robust memory management schemes. Application and design of a real-time kernel. A project is required.

EECE.4760 Principles Of Solid State Devices (Formerly 16.474/EECE.4740) - Credits: 3

This course introduces the operating principles of Solid State Devices. Basic semiconductor science is covered including crystalline properties, quantum mechanics principles, energy bands and the behavior of atoms and electrons in solids. The transport of electrons and holes (drift and diffusion) and the concepts of carrier lifetime and mobility are covered. The course describes the physics of operation of several semiconductor devices including p-n junction diodes (forward/reverse bias, avalanche breakdown), MOSFETs (including the calculation of MOSFET threshold voltages), Bipolar transistor operation, and optoelectronic devices (LEDs, lasers, photodiodes).

EECE.4811 Operating Systems (Formerly 16.481/EECE.4810) - Credits: 3

Covers the components, design, implementation, and internal operations of computer operating systems. Topics include basic structure of operating systems, Kernel, user interface, I/O device management, device drivers, process environment, concurrent processes and synchronization, inter-process communication, process scheduling, memory management, deadlock management and resolution, and file system structures. Laboratories include examples of components design of a real operating systems.

EECE.4821 Computer Architecture and Design (Formerly 16.482/EECE.4820) - Credits: 3


EECE.4830 Network Design: Principles, Protocols & Applications (Formerly 16.483) - Credits: 3

Covers design and implementation of network software that transforms raw hardware into a richly functional communication system. Real networks (such as the Internet, ATM, Ethernet, Token Ring) will be used as examples. Presents the different harmonizing functions needed for the interconnection of many heterogeneous computer networks. Internet protocols, such as UDP, TCP, IP, ARP, BGP and IGMP, are used as examples to demonstrate how internetworking is realized. Applications such as electronic mail and the WWW are studied.

EECE.4841 Computer Vision and Digital Image Processing (Formerly 16.484/EECE.4840) - Credits: 3

Introduces the principles and the fundamental techniques for Image Processing and Computer Vision. Topics include programming aspects of vision, image formation and representation, multi-scale analysis, boundary detection, texture analysis, shape from shading, object modeling, stereo-vision, motion and optical flow, shape description and objects recognition (classification), and hardware design of video cards. AI techniques for Computer Vision are also covered. Laboratories include real applications from industry and the latest research areas.

EECE.4850 Fundamentals of Network and Cyber Security - Credits: 3

This course will cover two categories of topics: One part is the fundamental principles of cryptography and its applications to cyber &network security in general. This part focuses on cryptography algorithms and the fundamental cyber &network security enabling mechanisms. Topics include cyber-attack analysis and classifications, public key cryptography (RSA, Diffie-Hellman), secret key cryptography (DES, IDEA), Hash (MD2, MD5, SHA-1) algorithms, key distribution and management, security handshake pitfalls and authentications, and well-known cyber &network security protocols such as Kerberos, IPsec, SSL/SET, PKG &PKI, WEP, etc. The second part surveys unique challenges and the general security &Privacy solutions for the emerging data/communication/information/computing networks (e.g., Ad Hoc &sensor network, IoTs, cloud and edge computing, big data, social networks, cyber-physical systems, critical infrastructures such as smart grids and smart transportation
systems, etc.).

EECE.4900 Fiber Optic Communication (Formerly 16.490) - Credits: 3

Optical fiber; waveguide modes, multimode vs single mode; bandwidth and data rates; fiber losses; splices, couplers, connectors, taps and gratings; optical transmitters; optical receivers; high speed optoelectronic devices; optical link design; broadband switching; single wavelength systems (FDDI, SONET, ATM); coherent transmission; wavelength division multiplexing and CDMA; fiber amplifiers.

EECE.4991 Capstone Project (Formerly 16.499) - Credits: 3

The objective of this course is to execute the project defined in Capstone Proposal. The design of the project will be completed, prototyped, tested, refined, constructed and delivered to the client. Practical experience will be gained in solving engineering problems, designing a system to meet technical requirements, using modern design elements and following accepted engineering practices. Students will work in a team environment and deliver the completed system to the project client. Proper documentation of activities is required.

EECE.5040 VLSI Fabrication (Formerly 16.504) - Credits: 3

Fabrication of resistors, capacitors, p-n junction and Schottky Barrier diodes, BJT's and MOS devices and Integrated circuits. Topics include: silicon structure, wafer preparation, sequential techniques in micro-electronic processing, testing and packaging, yield and clean room environments. MOS structures, crystal defects, Fick's laws of diffusion; oxidation of silicon, photolithography including photoresist, development and stripping. Metallization for conductors, Ion implantation for depletion mode and CMOS transistors for better yield speed, low power dissipation and reliability. Students will fabricate circuits using the DSIP Laboratory.

EECE.5050 Microwave Electronics (Formerly 16.505) - Credits: 3

Review of p-n junction theory, depletion layer width and junction capacitance, Schottky barrier diodes, pin diodes and applications in switches and phase shifters, varactors and step recovery diodes, tunnel diodes and circuits, Gunn devices and circuits, avalanche diodes, IMPATT, TRAPATT and BARRITT diodes, microwave bipolar junction transistors (BJT) and field effect transistors (FET), small signal amplifier design, new devices like HEMT and Si-Ge devices, traveling wave tubes and klystrons.

EECE.5060 Antenna Theory and Design (Formerly 16.506) - Credits: 3


EECE.5070 Electromagnetic Materials and Waves (Formerly 16.507) - Credits: 3

This is a graduate core course, which serves the needs of students who study electromagnetics as a basis for a number of electromagnetic technologies including photonic technologies. Study of Electromagnetic Wave Interactions with Bounded Simple Media: transmission lines, Green's function, fibers, conducting waveguides and cavity resonators, Plane waves in Complex Electromagnetic Materials: plasmas, dispersive dielectrics, mixing formulas, optical waves in metals, super conductors, chiral media, crystals, magnetized plasma and time-varying media, layered and periodic media.

EECE.5080 Quantum Electronics for Engineers (Formerly 16.508) - Credits: 3

Introduction to the fundamental postulates of quantum theory: Planck's quantization hypothesis; wave-particle duality; time-dependent & time-independent Schrodinger's Equation; simple quantum mechanical systems. Radiation and quanta; quantization of the radiation field and cavity modes; absorption and emission of radiation; coherence functions; coherent states; importance of quantum fluctuations and quantum nature of light; laser amplifiers and amplifier nonlinearity; electromagnetics and quantum theory of laser oscillators; photons in semiconductors; semiconductor photon sources and detectors.

EECE.5090 Linear Systems Analysis (Formerly 16.509) - Credits: 3


EECE.5100 Digital Signal Processing (Formerly 16.510) - Credits: 3

EECE.5110 Medical Diagnostic Imaging (Formerly 16.511 & IB.511) - Credits: 3
This course covers the physics and electrical engineering aspects of how signals are acquired from which images will be formed, and the principal methods by which the signals are processed to form useful medical diagnostic images. Modalities studied include: x-rays, ultra-sound, computed tomography, and magnetic resonance imaging. The principles of signal processing via Fourier transform will be reviewed. Noise and other artifacts that degrade the medical diagnostic of images are considered. MATLAB is heavily used in simulation and verification.

EECE.5120 Mixed-Signal VLSI Design (Formerly 16.512) - Credits: 3
The course covers a wide spectrum of topics related to challenges in modern VLSI design. Students will learn the skills of overcoming these problems when two opposing signal domains are integrated onto a single chip. Understanding physical layout representation and the effects of alternative layout solutions on circuit and system specifications is critical in modern designs. Students will learn to use the CAD tools widely used by the semiconductor industry for layout, schematic capture, advanced simulation, parasitic extraction, floorplanning and place and route. Specifically, the course provides a review of fundamentals of semiconductor components. In the next step, basic building blocks of digital and analog design are described. The course concludes with challenges of large scale integration under varying operation conditions. An individual project involving a layout design from specification to implementation is included.

EECE.5130 Control Systems (Formerly 16.513) - Credits: 3
System representations, state variables, transfer functions, controllability and observability, phase variables, canonical variables, representation of nonlinear systems, Lagrange's equations, generalized co-ordinates, time response of linear systems, state transition matrix, Sylvester's expansion theorem, stability and state function of Liapunov, transient behavior estimation, optimal control, state function of Pontryagin, variational calculus, Hamilton Jacobi method, matrix Riccati equation, linear system synthesis.

EECE.5140 Integrated Power Systems (Formerly 16.414/514) - Credits: 3
Power System Operations and Electricity Markets provide a comprehensive overview to understand and meet the challenges of the new competitive highly deregulated power industry. The course presents new methods for power systems operations in a unified integrated framework combining the business and technical aspects of the restructured power industry. An outlook on power policy models, regulation, reliability, and economics is attentively reviewed. The course lay the groundwork for the coming era of unbundling, open access, power marketing, self-generation, and regional transmission operations.

EECE.5150 Power Electronics (Formerly 16.473/515 & EECE.4730/5150) - Credits: 3
A one-semester course with emphasis on the engineering design and performance analysis of power electronics converters. Topics include: power electronics devices (power MOSFETs, power transistors, diodes, silicon controlled rectifiers SCRs, TRIACs, DIACs and Power Darlington Transistors), rectifiers, inverters, ac voltage controllers, dc choppers, cycloconverters, and power supplies. The course includes a project, which requires that the student design and build one of the power electronics converters. A demonstrative laboratory to expose the students to all kinds of projects is part of the course.

EECE.5170 MMIC Design and Fabrication (Formerly 16.517) - Credits: 3
The domain of microwave monolithic integrated circuits (MMIC) design and fabrication engineer stretches from realms of device physics and microwave circuit theory in the frequency range from 300MHz to 300 GHz. The main goal of the course is to embody most of the application of the spectrum that have been deployed during the past five decades due to advances of many microwave solid state devices. The principles of semiconductors emphasizing 1) the properties which predominate at microwave frequencies, 2) the theories for circuit design techniques required to utilize them at microwave frequencies, and 3) practical engineering applications for controlling microwave signals in amplitude and phase using semiconductors, will be treated in great details. Special emphasis will be laid on correlation of S’parameters with microwave device parameters and their usage in designing
Low-noise amplifiers, High-power amplifiers and oscillators and their integration in MMIC design.

EECE.5180 Wireless Communications (Formerly 16.582/EECE.5820) - Credits: 3

Cellular systems and design principles, co-channel and adjacent channel interference, mobile radio propagation and determination of large scale path loss, propagation mechanisms like reflection, diffraction and scattering, outdoor propagation models, Okumura and Hata models, small scale fading and multipath, Doppler shift and effects, statistical models for multipath, digital modulation techniques QPSK, DPSK, GMSK, multiple access techniques, TDMA, FDMA, CDMA, spread spectrum techniques, frequency hopped systems, wireless systems and worldwide standards.

EECE.5190 Engineering of Submicron Machines (Formerly 16.519) - Credits: 3

Recently fabrication of Very Large Scale Integrated circuits has spun-off a new technology of micro-machines (MEMS) and sensors on a semiconductor wafer. These new devices are ideally located next to a microprocessor on the same wafer or a separate chip. The data transfer to and from a miniature machine, sensor or transducer is processed and controlled on site. Topics include design of mechanical, electrical and biological transducers; properties of electronic materials; pattern generation on a semiconductor wafer; interface of a micromachine and processor; applications and markets for submicron machines.

EECE.5200 Computer Aided Engineering Analysis (Formerly 16.520) - Credits: 3

An advanced programming course, which considers the digital computer as a tool for solving significant engineering problems. The course is based on a specific area in engineering which will be selected from such topics as digital and image processing, spectral estimation, optimization techniques, etc. Typical algorithms related to the specific topic will be studied. User oriented programs or subroutine packages will be developed in a project.

EECE.5210 Real Time Digital Signal Processing (Formerly 16.521 & IB.511) - Credits: 3

This course provides an introduction to real-time digital signal processing techniques using the TMS320C3x floating point and TMS320C5x fixed point processors. The architecture, instruction set and software development tools for these processors are studied via a series of C and assembly language computer projects where real time adaptive filters, modems, digital control systems and speech recognition systems are implemented.

EECE.5230 Semiconductor Physics for Solid-State Electronics (Formerly 16.523) - Credits: 3

The course covers fundamental solid-state and semiconductor physics relevant for understanding electronic devices. Topics include quantum mechanics of electrons in solids, crystalline structures, band theory of semiconductors, electron statistics and dynamics in energy bands, lattice dynamics and phonons, carrier transport, and optical processes in semiconductors.

EECE.5240 Computational Methods for Power System Analysis (Formerly 16.424/524) - Credits: 3

The course explores some of the mathematical and simulation tools used for the design, analysis and operation of electric power systems. Computational methods based on linear and nonlinear optimization algorithms are used to solve load flow problems, to analyze and characterize system faults and contingencies, and to complete economic dispatch of electric power systems. Real case studies and theoretical projects are assigned to implement the techniques learned and to propose recommendations. Different software applications will be used concurrently including ATP, PowerWorld Simulator, Aspen, MatLab with Simulink and Power System Toolbox, PSCAD, etc.

EECE.5250 Power Distribution Systems (Formerly 16.525) - Credits: 3

An intermediate course in analysis and operation of electrical power distribution systems using applied calculus and matrix algebra. Topics include electrical loads characteristics, modeling, metering, customer billing, voltage regulation, voltage levels, and power factor correction. The design and operation of the power distribution system components will be introduced: distribution transformers, distribution substation, distribution networks, and distribution equipment.

EECE.5260 Power Systems Stability and Control (Formerly 16.426/526) - Credits: 3


EECE.5270 Advanced VLSI Design Techniques (Formerly 16.427/527) - Credits: 3
This course builds on the previous experience with Cadence design tools and covers advanced VLSI design techniques for low power circuits. Topics covered include aspects of the design of low voltage and low power circuits including process technology, device modeling, CMOS circuit design, memory circuits and subsystem design. This will be a research-oriented course based on team projects.

EECE.5280 Alternative Energy Sources (Formerly 16.528) - Credits: 3

PV conversion, cell efficiency, cell response, systems and applications. Wind Energy conversion systems: Wind and its characteristics; aerodynamic theory of windmills; wind turbines and generators; wind farms; siting of windmills. Other alternative energy sources: Tidal energy, wave energy, ocean thermal energy conversion, geothermal energy, solar thermal power, satellite power, biofuels. Energy storage: Batteries, fuel cells, hydro pump storage, flywheels, compressed air.

EECE.5290 Electric Vehicle Technology (Formerly 16.529) - Credits: 3

Electric vehicle VS internal combustion engine vehicle. Electric vehicle (EV) saves the environment. EV design, EV motors, EV batteries, EV battery chargers and charging algorithms, EV instrumentation and EV wiring diagram. Hybrid electric vehicles. Fuel cells. Fuel cell electric vehicles. The course includes independent work.

EECE.5310 RF Design (Formerly 16.531) - Credits: 3

Two-port network parameters, Smith chart applications for impedance matching, transmission line structures like stripline, microstrip line and coaxial line, filter designs for low-pass, high-pass and band-pass characteristics, amplifier design based on s-parameters, bias network designs, one port and two port oscillator circuits, noise in RF systems.

EECE.5320 Computational Electromagnetics (Formerly 16.532) - Credits: 3


EECE.5330 Microwave Engineering (Formerly 16.533) - Credits: 3

An introductory course in the analysis and design of passive microwave circuits beginning with review of time-varying electromagnetic field concepts and transmission lines. Smith Chart problems; single and double stub matching; impedance transformer design; maximally flat and Chebyshev transformers; microstrip transmission lines, slot lines, coplanar lines; rectangular and circular waveguides; waveguide windows and their use in impedance matching; design of directional couplers; features of weak and strong couplings; microwave filter design; characteristics of low-pass, high-pass, band-pass, band-stop filter designs; two-port network representation of junctions; Z and Y parameters, ABCD parameters, scattering matrix; microwave measurements; measurement of VSWR, complex impedance, dielectric constant, attenuation, and power. A design project constitutes a major part of the course.

EECE.5410 Introduction to Biosensors (Formerly 16.441/541) - Credits: 3

This course introduces the theory and design of biosensors and their applications for pathology, pharmacogenetics, public health, food safety civil defense, and environmental monitoring. Optical, electrochemical and mechanical sensing techniques will be discussed.

EECE.5430 Theory of Communication (Formerly 16.543) - Credits: 3

Information transmission and deterministic signals in time and frequency domains. Relationship between correlation and power or energy spectra. Statistical properties of noise. Spectral analysis and design of AM, FM and pulse modulation systems, continuous and discrete. AM, FM, and various pulse modulation methods, in the presence of noise. Digital modulation & demodulation technique.

EECE.5450 Analog Devices and Techniques (Formerly 16.445/565 & EECE.4450/5650) - Credits: 3

A survey of analog devices and techniques, concentrating on operational amplifier design and applications. Operational amplifier design is studied to reveal the limitations of real opamps, and to develop a basis for interpreting their specifications. Representative applications are covered, including: simple amplifiers, differential and instrumentation amplifiers, summers, integrators, active filters, nonlinear circuits, and waveform generation circuits. A design project is required.

EECE.5460 Communication Networks (Formerly 16.546) - Credits: 3

An in depth survey of the elements of the modern computer based telecommunications system. Discussion of media used to transport voice and data traffic including twisted pair, baseband and broadband coaxial cable, fiber optic systems and wireless systems. Techniques for sending data over the media
are presented including modems, baseband encoding, modulation and specific cases such as DSL, cable modems, telephone modems. Architecture and functionality of telephone system that serves as backbone for moving data, including multiplexing, switching, ATM, ISDN, SONET. Layered software architectures are discussed including TCP/IP protocol stack and the ISO/OSI seven layer stacks are examined in depth from data link protocols to transport protocols. LAN and WAN architectures including media access control (MAC) techniques are discussed for Ethernet, token ring and wireless LAN applications. Internetworking protocols and the role of repeaters, routers, and bridges. Voice over IP and state of the art applications.

EECE.5480 Coding and Information Theory (Formerly 16.548) - Credits: 3

Probabilistic measure of information. Introduction to compression algorithms including L-Z, MPEG, JPEG, and Huffman encoding. Determination of the information handling capacity of communication channels and fundamental coding theorems including Shannon’s first and second channel coding theorems. Introduction to error correcting codes including block codes and convolutional coding and decoding using the Viterbi algorithm. Applications of information theory and coding to advanced coding modulation such as Trellis code modulation (TCM) and turbo modulation.

EECE.5510 Heterogeneous Computing (Formerly EECE.6540) - Credits: 3

This course introduces heterogeneous computing architecture and the design and optimization of applications that best utilize the resources on such platforms. The course topics include heterogeneous computer architecture, offloading architecture/API, platform memory and execution models, GPU/FPGA acceleration, OpenCL programming framework, Data Parallel C++ programming framework, performance analysis and optimization. Labs are included to practice design methodology and development tools.

EECE.5520 Microprocessor Systems II & Embedded Systems (Formerly 16.552) - Credits: 3

CPU architecture, memory interfaces and management, coprocessor interfaces, bus concepts, bus arbitration techniques, serial I/O devices, DMA, interrupt control devices. Including Design, construction, and testing of dedicated microprocessor systems (static and real-time). Hardware limitations of the single-chip system. Includes microcontrollers, programming for small systems, interfacing, communications, validating hardware and software, microprogramming of controller chips, design methods and testing of embedded systems.

EECE.5530 Software Engineering (Formerly 16.553) - Credits: 3

Introduces software life cycle models, and engineering methods for software design and development. Design and implementation, testing, and maintenance of large software packages in a dynamic environment, and systematic approach to software design with emphasis on portability and ease of modification. Laboratories include a project where some of the software engineering methods (from modeling to testing) are applied in an engineering example.

EECE.5560 Fundamentals of Robotics (Formerly 16.556) - Credits: 3

The material in this course is a combination of essential topics, techniques, algorithms, and tools that will be used in future robotics courses. Fundamental topics relevant to robots (linear algebra, numerical methods, programming) will be reinforced throughout the course using introductions to other robotics topics that are each worthy of a full semester of study (dynamics, Kinematics, controls, planning, sensing). Students will program real robots to further refine their skills and experience the material fully.

EECE.5590 Introduction to Nanoelectronics (Formerly 16.459/559) - Credits: 3

This course introduces the use of nanomaterials for electronic devices such as sensors and transistors. Synthesis methods for nanoparticles, nanotubes, nanowires, and 2-D materials such as graphene will be covered. The challenges in incorporating nanomaterials into devices will also be discussed. These methods will be compared to techniques used in the semiconductor industry and what challenges, technically and financially, exist for their widespread adoption will be addressed. Finally, examples of devices that use nanomaterials will be reviewed. The course will have some hands on demonstrations.

EECE.5600 Biomedical Instrumentation (Formerly 16.460/560) - Credits: 3

A survey of biomedical instrumentation that leads to the analysis of various medical system designs and the related factors involved in medical device innovation. In addition to the technical aspects of system integration of biosensors and physiological transducers there will be coverage of a biodesign innovation process that can translate clinical needs into designs. A significant course component will be project-based prototyping of mobile health applications. The overall goals of the course are to provide the theoretical background as well as specific requirements for medical device development along with some practical project experience that would thereby
enable students to design electrical and computer based medical systems.

**EECE.5620 VHDL/Verilog Synthesis & Design (Formerly 16.562)** - Credits: 3

This course covers digital chip design, synthesis, verification, and test using Hardware Description Languages (HDLs). This class will thoroughly cover important features of the following Hardware Description Languages (HDLs): Verilog, VHDL (VHSIC Hardware Description Language) and System Verilog. These HDLs will be presented with primary emphasis on the synthesizable design aspects of the languages. Therefore, these HDLs will be used for chip design. In addition to using HDLs for digital design, these HDLs will also be used for design verification. Hardware Description Languages (HDLs) will be utilized to design, synthesize and verify digital chip designs. The design and structure of HDL code for effective FPGA and ASIC synthesis will be explored. The design process and verification process for FPGAs and ASICs will be thoroughly reviewed. The Synthesis process for FPGAs and ASICs will thoroughly reviewed, including the following: step by step synthesis process flows, the impact of synthesis constraints, and synthesis scripts for FPGA and ASIC design. Key concepts in functional design verification for ASICs &FPGAs will be explored. Other topics may include the following: High speed digital design, interface to SDRAM devices, embedded processors (hardware, software, test implications), HDL design techniques for effective logic synthesis, chip partitioning, ASIC and FPGA top-down design structure, pipelining, resource/speed trade offs, high speed DSP structures, high speed cache design, resources sharing and design of arbiters. Additional topics to be covered include the following: Design for Test (DFT), Memory Built in Self Test, Logic Built in Self Test, scan chain design, shadow scan design, JTAG, observability bus design, test vector generation & fault coverage.

**EECE.5680 Electro Optic Systems (Formerly 16.568)** - Credits: 3

Introduction to optoelectronics and laser safety; geometrical optics; waves and polarization; Fourier optics; coherence of light and holography; properties of optical fibers; acousto-optic and electro-optic modulation; elementary quantum concepts and photon emission processes; optical resonators; Fabry Perot etalon; laser theory and types; review of semiconductor lasers and detectors; nonlinear optics.

**EECE.5690 VLSI Design (Formerly 16.469/502 & EECE.4690/5020)** - Credits: 3

Introduction to CMOS circuits including transmission gate, inverter, NAND, NOR gates, MUXEs, latches and registers, MOS transistor theory including threshold voltage and design equations. CMOS inverter’s DC and AC characteristics along with noise margins. Circuit characterization and performance estimation including resistance, capacitance, routing capacitance, multiple conductor capacitance, distributed RC capacitance, multiple conductor capacitance, distributed RC capacitance, switching characteristics incorporating analytic delay models, transistor sizing and power dissipation. CMOS circuit and logic design including fan-in, fan-out, gate delays, logic gate layout incorporating standard cell design, gate array layout, and single as well as two-phase clocking. CMOS test methodologies including stuck-at-0, stuck-at-1, fault models, fault coverage, ATPG, fault grading and simulation including scan-based and self test techniques with signature analysis. A project of modest complexity would be designed to be fabricated at MOSIS.

**EECE.5710 Radar Systems (Formerly 16.571)** - Credits: 3


**EECE.5720 Embedded Real Time Systems (Formerly 16.572)** - Credits: 3

Designing embedded real-time computer systems. Types of real-time systems, including foreground/background, non-preemptive multitasking, and priority-based preemptive multitasking systems. Soft vs. hard real time systems. Task scheduling algorithms and deterministic behavior. Ask synchronization: semaphores, mailboxes and message queues. Robust memory management schemes. Application and design of a real-time kernel. A project is required.

**EECE.5740 Advanced Logic Design (Formerly 16.574)** - Credits: 3


**EECE.5750 Field Programmable Gate Arrays Logic Design Techniques (Formerly 16.575)** - Credits: 3

Advanced logic design techniques using field programmable
gate arrays (FPGAs), programmable logic devices, programmable array logic devices, and other forms of reconfigurable logic. Architectural descriptions and design flow will be covered as well as rapid prototyping techniques, ASIC conversions, in-system programmability, high level language design techniques, and case studies highlighting the tradeoffs involved in designing digital systems with programmable devices. This course is generally offered summers only.

EECE.5760 Principles of Solid State Devices (Formerly 16.576) - Credits: 3

This course introduces the operating principles of Solid State Devices. Basic semiconductor science is covered including crystalline properties, quantum mechanics principles, energy bands and the behavior of atoms and electrons in solids. The transport of electrons and holes (drift and diffusion) and the concepts of carrier lifetime and mobility are covered. The course describes the physics of operation of several semiconductor devices including p-n junction diodes (forward/reverse bias, avalanche breakdown), MOSFETs (including the calculation of MOSFET threshold voltages), bipolar transistor operation, and optoelectronic devices (LEDs, lasers, photodiodes).

EECE.5770 Verification of Digital Systems (Formerly 16.577) - Credits: 3

The increasing complexity of digital designs coupled with the requirement for first pass success creates a need for an engineered approach to verification. This course defines the goals for verification, presents techniques and applications, and develops a framework for managing the verification process from concept to reality.

EECE.5780 Modeling and Implementation of Digital Systems using MATLAB - Credits: 3

The course covers the methodology and tools to design digital systems with MATLAB. Topics include algorithm design and analysis with MATLAB, MATLAB Simulink development, conversion from algorithm to VHDL implementation, synthesis to FPGA and performance evaluation. Labs are included to practice design methodology and tools with FPGA or other platforms.

EECE.5800 Robotics, Automation and Machine Intelligence (Formerly 16.580) - Credits: 3

Covers advanced foundations and principles of robotic manipulation; includes the study of advanced robot motion planning, task level programming and architectures for building perception and systems for intelligent robots. Autonomous robot navigation and obstacle avoidance are addressed. Topics include computational models of objects and motion, the mechanics of robotic manipulators, the structure of manipulator control systems, planning and programming of robot actions. Components of mobile robots, perception, mechanism, planning and architecture; detailed case studies of existing systems.

EECE.5811 Operating Systems (Formerly 16.573/EECE.5730) - Credits: 3

Covers the components, design, implementation, and internal operations of computer operating systems. Topics include basic structure of operating systems, Kernel, user interface, I/O device management, device drivers, process environment, concurrent processes and synchronization, inter-process communication, process scheduling, memory management, deadlock management and resolution, and file system structures. Laboratories include examples of components design of a real operating system.

EECE.5821 Computer Architecture and Design (Formerly 16.561/EECE.5610) - Credits: 3


EECE.5830 Network Design: Principles, Protocols and Applications (Formerly 16.583) - Credits: 3

Covers design and implementation of network software that transforms raw hardware into a richly functional communication system. Real networks (such as the Internet, ATM, Ethernet, Token Ring) will be used as examples. Presents the different harmonizing functions needed for the interconnection of many heterogeneous computer networks. Internet protocols, such as UDP, TCP, IP, ARP, BGP and IGMP, are used as examples to demonstrate how internetworking is realized. Applications such as electronic mail and the WWW are studied.

EECE.5840 Probability and Random Processes (Formerly 16.584) - Credits: 3


**EECE.5841 Computer Vision and Digital Image Processing (Formerly 16.581/EECE.5810) - Credits: 3**

Introduces the principles and the fundamental techniques for Image Processing and Computer Vision. Topics include programming aspects of vision, image formation and representation, multi-scale analysis, boundary detection, texture analysis, shape from shading, object modeling, stereovision, motion and optical flow, shape description and objects recognition (classification), and hardware design of video cards. AI techniques for Computer Vision are also covered. Laboratories include real applications from industry and the latest research areas.

**EECE.5850 Network and Cyber Security (Formerly 16.658 and EECE.6580) - Credits: 3**

This course will cover two categories of topics: One part is the fundamental principles of cryptography and its applications to network and communication security in general. This part focuses on cryptography algorithms and the fundamental network security enabling mechanisms. Topics include attack analysis and classifications, public key cryptography (RSA, Diffie-Hellman), secret key cryptography (DES, IDEA), Hash (MD5; SHA-1) algorithms, key distribution and management, security handshake pitfalls and authentications, and well known network security protocols such as Kerberos, IPSec, SSL/SET, PGP &PKI, WEP. The second part reviews unique challenges and the security &privacy solutions for the emerging data/communication/information/computing networks (e.g., Ad Hoc &sensor network, IoT, cloud and edge computing, big data, social networks, cyber-physical systems, critical infrastructures such as smart grids and smart transportation systems, etc.).

**EECE.5890 Fiber Optic Communication (Formerly 16.590) - Credits: 3**

Optical fiber; waveguide modes, multimode vs single mode; bandwidth and data rates; fiber losses; splices, couplers, connectors, taps and gratings; optical transmitters; optical receivers; high speed optoelectronic devices; optical link design; broadband switching; single wavelength systems (FDDI, SONET, ATM); coherent transmission; wavelength division multiplexing and CDMA; fiber amplifiers.

**EECE.5930 Industrial Experience (Formerly 16.593) - Credits: 1**

**EECE.5950 Solid State RF Electronics (Formerly 16.595) - Credits: 3**

This course provides a physical understanding of advanced solid-state devices with an emphasis on high-speed designs for RF applications. Topics include semiconductor heterostructures, heterojunction bipolar transistors, field-effect transistors, high-electron-mobility transistors, hot-electron devices, charge transport, quantum confinement effects, and small-signal analysis. Technologies to be discussed draw from group IV elemental semiconductors (silicon, germanium), group III-V compound semiconductor families (arsonides, phosphides, nitrides), and emerging oxide materials. Case studies of state-of-the-art examples taken from the literature will be used to motivate more in-depth discussions.

**EECE.5980 Seminar for Teaching Assistants (Formerly 16.598) - Credits: 0**

This course will meet once per week and attendance is mandatory for all TAs. The course will cover an overview of laboratories for the following week.

**EECE.6010 Graduate Seminar (Formerly 16.601) - Credits: 0**

There will be a series of seminars by distinguished researchers from academia and industry in addition to UML faculty. Moreover, there will be seminars dedicated to instructional sessions in library services, introduction to Department and Faculty research, and information on thesis requirements and professional ethics. Attendance is mandatory for doctoral and MS students with thesis option. The students are required to write short reports summarizing the talk after each seminar. This course is offered in the fall semester.

**EECE.6120 Converged Voice and Data Network (Formerly 16.612) - Credits: 3**

Covers the technologies and protocols used to transport voice and data traffic over a common communication network, with emphasis on voice over IP (VoIP). The specific topics covered include voice communication network fundamentals, data networking fundamentals, voice packet processing, voice over packet networking, ITU-T VoIP archichecture, IETF VoIP architecture, VoIP over WLAN,m access networks for converged services: xDSL and HFC networks, and IP TV service.

**EECE.6150 Medical Image Reconstruction - Credits: 3**
This course will deliver the students both traditional and state-of-the-art algorithms in a unified way, which can make the students qualify for a medical image reconstruction engineer. The topics includes central slice theorem, 2D parallel-beam, 2D fan-beam and 3D cone-beam reconstruction algorithms in terms of analytic and iterative methods. It will cover the state-of-the-art Katsevich algorithm, interior tomography, compressive sensing, and spectral CT.

EECE.6160 Computational Power Systems Analysis (Formerly 16.616) - Credits: 3

Power system matrices, power flow studies, fault studies, state estimation, optimal power dispatch, and stability studies.

EECE.6170 Modelling Of Communication Networks (Formerly 16.617) - Credits: 3

Overview of general architectures for B-ISDN and Internet, network layering, signaling, performance requirements, traffic management strategies, usage parameter control, connection admission control, congestion control, stochastic processes, Markov chains and processes, stochastic models for voice, video and data traffic, Poisson processes, Markov-modulated processes, traffic analysis, queuing systems, M/M/1, M/M/m, M/G/1 queues, fluid buffer models, effective band-width approaches, simulation modeling, discrete event simulation of transport and multiplexing protocols using OPNET software, statistical techniques for validation and sensitivity analysis.

EECE.6500 Advanced Computing Systems Hardware Architecture (Formerly 16.650) - Credits: 3

Covers the latest advanced techniques in CPU design, floating point unit design, vector processors, branch prediction, shared memory versus networks, scalable shared memory systems, Asynchronous shared memory algorithms, systems performance issues, advanced prototype hardware structures, and future trends including TeraDash systems.

EECE.6510 Advanced Embedded System Design with FPGA - Credits: 3

This course covers the topics related to FPGA based embedded systems, including microprocessor architectures, embedded system architecture, firmware, bootloader, JTAG etc., bare metal processor vs embedded OS, and core and soft core IP’s, interconnects between processor and FPGA, buses and interfaces, and external devices such as sensors and cameras. Labs are included for practice the design of FPGA based embedded systems.

EECE.6520 Parallel & Mp Architect (Formerly 16.652) - Credits: 3

EECE.6530 AI and Machine Learning (Formerly 16.653) - Credits: 3

EECE.6600 Mobile Communication Networks (Formerly 16.660) - Credits: 3

The goal of this course is to enable students to understand communication systems that permit a user to be either continuously or intermittently connected to a communication network as he/she moves from one place to another. The key issue in these communications systems, which are referred to as mobile communication systems, is that there is provision for handling a device, service or user, over from on network to another. That is, mobility management is an essential aspect of mobile communication networks. The learning objectives of the course include enabling the student to understand mobile radio propagation, antenna and communications systems; the so-called 2G, 2.5G, 3G and 4G networks; mobile IP and mobile TCP; mobile ad hoc networks; WiMAX networks; and cognitive radio networks.

EECE.6660 Storage Area Networks (Formerly 16.666) - Credits: 3

EECE.6690 Opto Electronic Devices (Formerly 16.669) - Credits: 3

EECE.6870 Applied Stochastic Estimation (Formerly 16.687) - Credits: 3


EECE.6880 Theoretical Acoustics (Formerly 16.688) - Credits: 3

EECE.6920 Directed Studies/Electrical Engineering (Formerly 16.692) - Credits: 3

Provides opportunity for students to get a specialized or customized course in consultation with a faculty member.

EECE.7100 Selected Topics (Formerly 16.710) - Credits: 3

Topics of current interest in electrical Engineering. Subject matter to be announced in advance.
EECE.7110 Special Topics (Formerly 16.711) - Credits: 3
Topics of current interest in Electrical Engineering. Subject matter to be announced in advance.

EECE.7120 Special Topics in Electrical Engineering (Formerly 16.712) - Credits: 3
Topics of current interest in Electrical Engineering. Subject matter to be announced in advance.

EECE.7150 Special Topics (Formerly 16.715) - Credits: 3
EECE.7290 Selected Topics in Electrical Engineering (Formerly 16.729) - Credits: 3
Advanced topics in various areas of Electrical Engineering and related fields. Prerequisite: specified a the time of offering.

EECE.7300 Thesis - Electrical Engineering (Formerly 16.730) - Credits: 6
EECE.7310 Thesis - Computing Engineering (Formerly 16.731) - Credits: 3
EECE.7320 Systems Engineering Thesis (Formerly 16.732) - Credits: 3
EECE.7330 Advance Graduate Project (Formerly 16.733) - Credits: 3
The Advanced Project is a substantial investigation of a research topic under the supervision of a faculty member. A written proposal must be on file in the Electrical & Engineering Graduate Office before enrollment. A written report is required upon completion of the project. This course can be taken only once, and may evolve into a master's thesis. However, credit for this course will not be given if thesis credit is received.

EECE.7360 Graduate Project - Electrical Engineering (Formerly 16.736) - Credits: 6
EECE.7390 Graduate Project - Electrical Engineering (Formerly 16.739) - Credits: 9
EECE.7400 Advanced Project In Electrical Engineering (Formerly 16.740) - Credits: 3
EECE.7430 Master's Thesis in Electrical Engineering (Formerly 16.743) - Credits: 1-3

Master's Thesis Research

EECE.7460 Master's Thesis in Electrical Engineering (Formerly 16.746) - Credits: 6
Co-requisites: Minimum of 6 credit-hours of graduate courses at an acceptable level when registering for first three credits and 12 credit hours when registering for subsequent credits; matriculated status in the M.S. Eng. Program in Electrical, Computer or Systems Engineering; approval of a written proposal outlining the extent and nature of proposed research work. The report on the research work, performed under the supervision of a faculty member, must be published in appropriate form and presented to a committee of three faculty members appointed at the time of acceptance of the thesis proposal. The student is required to give an oral defense of the thesis before the committee and other faculty members.

EECE.7490 Master's Thesis - Electrical Engineering (Formerly 16.749) - Credits: 9
EECE.7510 Doctoral Thesis (Formerly 16.751) - Credits: 1
EECE.7520 PhD Thesis (Formerly 16.752) - Credits: 2
EECE.7530 Doctoral Dissertation/EE (Formerly 16.753) - Credits: 3
Doctoral Dissertation Research

EECE.7540 Doctoral Thesis - Electrical Engineering (Formerly 16.754) - Credits: 4
EECE.7550 Doctoral Dissertation (Formerly 16.755) - Credits: 5
EECE.7560 Doctoral Dissertation/Electrical Engineering (Formerly 16.756) - Credits: 6
Doctoral Dissertation Research

EECE.7570 Doctoral Dissertation (Formerly 16.757) - Credits: 7
EECE.7590 Doctoral Dissertation/Electrical Engineering (Formerly 16.759) - Credits: 9
No more than 9 credits of doctoral dissertation research may be taken before passing the doctoral qualifying examination. No more than 15 credits of doctoral dissertation research may be taken before passing the defense of the thesis proposal examination.
EECE.7660 Continued Grad Research (Formerly 16.766) - Credits: 1-6

EECE.7710 Eng Sys Analysis I (Formerly 16.771) - Credits: 3

Study of the key areas in multiple engineering disciplines including Mechanical, Electrical, Software, Systems and Optical. Students are introduced to weekly topics and then work in multidiscipline teams to solve technical assignments. Topics covered include: Concept of Operations and Requirements development, integration, test and verification, vibration/shock analysis, thermal analysis, power supply design, digital electronics & FPGA, intro to optical engineering, SCRUM planning, continuous integration and UML/SW design. Content may vary year to year. This course is part of the Engineering Leadership Development Program (ELDP) and team taught by industry experts at BAE Systems.

EECE.7720 Eng Sys Analysis II (Formerly 16.772) - Credits: 3

Introduction and analysis of complex systems aligned with the key product lines of BAE Systems. Students are introduced to multiple types of systems and then work in multidiscipline teams to solve technical assignments. The systems covered include but are limited to: Electronic Warfare (EW), Communications Electronic Attack (Comms EA), Wide Area Airborne Surveillance (WAAS), Signal Intelligence (SIGINT), RADAR Navigation, Radio Communications, and Infrared Countermeasures (IRCM). Content may vary year to year. This course is part of the Engineering Leadership Development Program (ELDP) and team taught by industry experts at BAE Systems.

EECE.7730 Eng Sys Analysis III (Formerly 16.773) - Credits: 3

Study of project management concepts, product development methods, transition to operations and new business capture. Topics covered include but are not limited to risks and opportunities management, earned value management, lean product development, business strategy, design for manufacturability/maintainability (DFM^2), and request for information (RFI) response. Content may vary year to year. This course is part of the Engineering Leadership Development Program (ELDP) and team taught by industry experts at BAE Systems.

ENGN.0010 Undeclared Engineering Seminar (Formerly 25.001) - Credits: 0

The seminar course is designed to introduce undeclared engineering students to the various engineering disciplines so that undeclared engineering students can make a more informed decision when declaring their engineering major.

ENGN.1030 Environmental Biotechnology (Formerly 25.103) - Credits: 3

This UML TEAMS Academy course will investigate the chemical and biological impact of human activity on aquatic environments. A specific focus of this course will be to observe the behavior of microorganisms impacted by pollutants introduced into the environment by humans. Students will explore possible engineering solutions to alleviate the problems caused by pollutants. This course can be described as “inquiry based discovery” and will rely heavily on laboratory investigations and laboratory based projects analyzing environmental samples collected in the field. This course is open only to high school students accepted to the UML-TEAMS Academy. Instructor permission required.

ENGN.1070 Introduction To Engineering I (Formerly 25.107) - Credits: 2

This course provides a hands-on introduction to engineering and the engineering design process. Through assignments and projects, students learn how to: identify a problem, develop alternative solutions, select the best alternative, make critical decisions, and work as a team. The course is intended for freshmen in all engineering majors and provides an overview of the different engineering disciplines. Lecture and lab component.

ENGN.1080 Introduction To Engineering II (Formerly 25.108) - Credits: 2

This course is intended for first-year engineering students and provides an introduction to technical communications, teamwork and other skills. Topics vary depending on the department and include data analysis, computer-aided drafting/design/modeling program usage, report-writing and/or oral presentation. Depending on the department, software introduced may include Excel, PowerPoint, AutoCad, Matlab and/or MathCad. Team-based labs and projects may be employed. Students should enroll in the sections corresponding to their major or intended department to develop relevant skills.

ENGN.1300 Introduction to Nano-Engineering (Formerly 25.130) - Credits: 3

The multi-billion dollar investment in nanoscience and nanotechnology is beginning to yield new products, including better sunscreens and wear-resistance materials. "Introduction to Nano-Engineering" is an overview of engineering at the nanoscale, including measurement techniques, nanoelectronics,
nanomaterials, design of nanodevices, nanomanufacturing, and the societal impact of nanotechnology. "Lecture" material is accompanied by open-ended questions for chat-room discussion and five virtual laboratories. Targeted for the general public. This is an interdisciplinary course.

ENGN.1510 Assistive Technology & Electronics  
(Formerly 25.151) - Credits: 3

UML-TEAMS Academy students will explore basic electronics physics in a hands-on laboratory environment. Students will apply their knowledge as they learn how to breadboard, test, and troubleshoot a series of lab projects. Students will use CAD tools as they learn how to fabricate printed circuit boards. The course culminates with groups projects that apply the engineering design process and electronics to design and build a product for disabled clients in our community. This course is open only to high school students accepted to the UML-TEAMS Academy. Instructor permission required.

ENGN.2000 Community-based Engineering Project I  
(Formerly 25.200) - Credits: 1

Students work on multi-disciplinary teams and apply their engineering problem-solving skills on community-based design projects.

ENGN.2050 Statics (Formerly 14.203/22.211/26.211/25.205) - Credits: 3

The application of Newton’s Laws to engineering problems in statics. The free-body diagram method is emphasized. Topics include vector algebra, force, moment of force, couples, static equilibrium of rigid bodies, trusses, friction, properties of areas, shear and moment diagrams, flexible cables, screws, bearings, and belts.

ENGN.2060 Strength of Materials (Formerly 14.204/22.212/25.206) - Credits: 3

Stress and deformation analysis of bodies subjected to uniaxial loading, thermal strain, torsion of circular cross-sections, shear flow in thin-walled sections, bending of beams, and combined loading. Application of equilibrium, compatibility and load-deformation relations to solve statically determinate and indeterminate systems.

ENGN.2070 Dynamics (Formerly 14.205/22.213/25.207) - Credits: 3

Calculus based vector development of the dynamics of points, particles, systems of particles, and rigid bodies in planar motion; kinematics of points in rotating and non-rotating frames of reference in one, two, and three dimensions; conservation of momentum, and angular momentum; principle of work and energy.

ENGN.2100 Professional Development Seminar  
(Formerly 25.210) - Credits: 1

The Professional Development Seminar is designed to provide students with the necessary structure, resources, and support to successfully secure and engage in their first cooperative education experience. Through a variety of teaching methodologies and assignments, students will prepare to engage in the job search process through resume writing, strategic interviewing, professional networking and through learning professional behavior and presentation skills. Course open to undergraduates who have previously applied and been accepted to participate in the Professional Co-op Program. Enrollment is by Instructor permission only. For more information on applying to the Professional Co-op Program, see https://www.uml.edu/student-services/Career-Services/Cooperative-Education/Forms-Handbooks.aspx. Pre-Req: Permission of Instructor.

ENGN.2180 Introduction to Aerospace (Formerly MECH.2080) - Credits: 2

This survey course introduces and discusses: basic lightweight structures, aerospace materials, aerodynamics, air-breathing/rocket propulsion, space environment, energy systems, thermal analysis, aerospace systems design, and the aerospace industry (economics, jobs, opportunities, etc.). The hands-on laboratory component of this course requires students perform an aerospace system design in one of the following disciplinary areas (1) Aircraft design, manufacture and testing (2) Space system design, modeling and testing. The course has 2 hours of lecture and 2 hours of laboratory per week.

ENGN.2180L Introduction to Aerospace Lab  
(Formerly MECH.2080L) - Credits: 1

The introduction to Aerospace Laboratory is a hands-on exploration of the topics covered in the Introduction to Aerospace course. This laboratory course examines topics in: basic lightweight structures, aerospace materials, aerodynamics, air-breathing/rocket propulsion, space environment, energy systems, thermal analysis, aircraft design and space mission analysis and design. The laboratory course culminates in a required aerospace system design in one of the following disciplinary areas (1) Aircraft design, manufacture and testing (2) Space system design, modeling and testing.

ENGN.3000 Community-based Engineering Project II  
(Formerly 25.300) - Credits: 1

Students work on multi-disciplinary teams and apply their
engineering problem-solving skills on community-based design projects.

**ENGN.3100 Co-op assessment 1 (Formerly 25.310) - Credits: 1**

The primary goal of this seminar is to assist students in the overall assessment of their overall cooperative education experience. Through facilitated small group discussion, individual consultation and hands on practice, students will have an opportunity to identify and articulate their technical and professional skills, and explore how these skills and their co-op employment might be translated and leveraged into future work environments and their academic program at UML.

**ENGN.3200 Co-op Assessment I (6 months) - Credits: 2**

This seminar is designed to support and assist students in the assessment of their 6 month cooperative education experience. Students will reflect on their extended time in a work environment, the impact of their experience on their planning, and how organizational culture, personal interests and values can inform their subsequent decisions for career development. Through facilitated small group discussions, individual consultation and hands on practice, students will have the opportunity to identify and articulate their technical and professional skills.

**ENGN.4000 Community-based Engineering Project III (Formerly 25.400) - Credits: 1**

Students work on multi-disciplinary teams and apply their engineering problem-solving skills on community-based design projects. Completion of 25.400, 25.300, and 25.200 can count as a mechanical engineering technical elective (academic petition required).

**ENGN.4017 Entrepreneurship Engineering Capstone Proposal - Credits: 3**

Students will develop a new engineering product concept from both integrative design and new venture creation standpoints. Projects may include members from other departments and colleges. This course has an emphasis on entrepreneurship, team work, communication, report writing, oral presentations, project definition and project planning. This course may be used as a technical elective for all engineering departments. Alternatively, this course may be used as a substitute for the first capstone course in Electrical and Computer Engineering (EECE.3991) and Plastics Engineering (PLAS.4150). Students will then take their department's culminating capstone course to complete their capstone course requirements.

**ENGN.4019 Engineering Capstone Design Proposal - Credits: 3**

This is the first of a two course capstone sequence. It provides an integrative design experience in engineering. Students work on multi-disciplinary teams and apply their engineering problem solving skills on open-ended, real-world projects. Projects may include members from other departments and colleges. This course has an emphasis on team work, communication, report writing, oral presentations, project definition and project planning. This course may be used as a technical elective for all engineering departments. Alternatively, this course may be used as a substitute for the first capstone course in Electrical and Computer Engineering (EECE.3991) and Plastics Engineering (PLAS.4150).

**ENGN.4020 Engineering Capstone Design Project - Credits: 3**

This is the second of a two course capstone sequence. This course provides an integrative design experience in engineering. Students work on multi-disciplinary teams and apply their engineering problem solving skills on open-ended, real-world projects. Projects may include members from other departments and colleges. This course has an emphasis on team work, Communication, report writing, oral presentations, design, analysis, test and fabrication. This course may be used as a substitute for the culminating capstone course in Electrical and Computer Engineering (EECE.4491), Plastics Engineering (PLAS.4160) and Mechanical Engineering (MECH.4230).

**ENGN.4100 Co-op Assessment 2 (Formerly 25.410) - Credits: 1**

This seminar is designed to support and assist students in the continued assessment of their cooperative education experience. Through a deepening of their work in Co-op Assessment 1, students will review their overall performance in
the cooperative education program, while continuing to
demonstrate their technical and professional skills through
written work and public presentations to multiple audiences. It
is expected that students will clearly define their future
academic and career goals, enhance their professional
networks, and develop a future plan to support aspirations
related to their major.

ENGN.4200 Co-op Assessment 2 (6 months) -
Credits: 2
This seminar is designed to support and assist students int he
assessment of their second cooperative education work
experience that was for a 6 month cycle. Students will reflect
on their extended time in this second work environment, and
how their two different co-op work experiences impacts their
subsequent decisions for career development. Students will
review their overall performance in the cooperative education
program, and demonstrate their technical and professional
skills through written work and public presentations to
multiple audiences.

ENGN.4900 Industrial Experience (Formerly 25.490)
- Credits: 0
ENGN.4910 Industrial Experience I (Formerly 25.491)
- Credits: 0-12
"Variable credit course, student chooses appropriate amount of
credits when registering."

ENGN.5010 Engineering for Teachers (Formerly
25.501) - Credits: 3
The course will focus on increasing teachers’ understanding of
the Engineering Design Process. The linkage between science,
engineering and technology will be discovered as teachers
engage in a variety of home-based projects requiring them to
apply design principles to the building, testing and evaluating
of prototypes. Teachers will also gain knowledge of the various
fields of engineering. Through their participation in the course,
teachers will discuss how they might integrate engineering-
technology concepts with other areas of their curriculum.

ENGN.5400 Designing Sustainable Products -
Credits: 3
The course introduces students to the sustainability aspects of
product design. Sustainable products are designed to conserve
materials and energy, select low-impact materials, eliminate
toxic substances, extend product life, re-use materials, and
reduce the generation of wastes. The entire product life cycle
will be considered including: material extraction, material
processing, manufacturing, transportation, product use, and
disposal. Students will learn the impact of design solutions in a
global, economic, environmental, and societal context. The
students will learn strategies to identify the sustainability
impacts throughout the product life cycle, as well as the
application of sustainable product design principles and
strategies to address these impacts.

ENGN.5500 Introduction to Nanotechnology
(Formerly 25.550) - Credits: 3
This course is designed to provide you with a broad overview
to the multi-disciplinary field of nanotechnology. The course is
team-taught by researchers from science, engineering, health
and environment, management, and humanities disciplines.
The topics include an introduction to nanoscale phenomena;
fundamental theoretical concepts and experimental techniques
in nanotechnology; nanoscale manufacturing and processing;
innovative nanomaterials for various applications; applications
of the technology; and environmental and health impacts of
nanotechnology.

ENGN.5700 Selected Issues in Nanomanufacturing
(Formerly 25.570) - Credits: 0
A seminar course that examines the issues associated with high
rate template-based nanomanufacturing, including:
technologies for nanoscale templates, high rate assembly of
nanoelements and polymer systems, registration at the
nanoscale, interfacing with biological systems, measurement of
nanoelements, and molecular modeling. Environmental,
regulatory, and ethical issues associated with new technologies
are also addressed. The course is co-taught by faculty from
Northeastern University, the University of Massachusetts
Lowell, and the University of New Hampshire. Meeting dates:
January 27, February 10, February 24, March 10, March 24,
and April 7. Time: 12:00 to 3:30, including lunch.

ENGN.5800 Thesis Review (Formerly 25.580) -
Credits: 1
ENGN.5810 Project Review (Formerly 25.581) -
Credits: 1
ENGN.5900 Graduate Industrial Cooperative
Educational Experience I (Formerly 25.590) - Credits: 1
Industrial experience credit for co-op and internships with
industry. Students must register with department co-op
coordinator.

ENGN.5910 Graduate Industrial Cooperative
Educational Experience II (Formerly 25.591) - Credits:
1

Industrial experience credit for co-op and internships with industry. Students must register with department co-op coordinator.

ENGN.5920 Graduate Industrial Cooperative Educational Experience III (Formerly 25.592) - Credits: 1

Industrial experience credit for co-op and internships with industry. Students must register with department co-op coordinator.

ENGN.5930 Graduate Industrial Cooperative Educational Experience (Formerly 25.593) - Credits: 3

Industrial experience credit for co-op and internships with industry. Students must register with department co-op coordinator.

ENGN.5980 Seminar for Teaching Assistants in Engineering - Credits: 0

Prepare graduate students for their role as teaching assistants in labs and lectures. Topics include: (1) classroom management, (2) grading strategies, (3) how to prepare for lecture and lab, (4) understanding the cultural differences that come with the diverse campus population, (5) balancing teaching and research responsibilities, (6) how to do graduate-level research. This course is mandatory for all new teaching assistants in the College of Engineering.

ENGN.6010 Academic and Technical Writing for Research in Engineering - Credits: 0

This course addresses the complex nature of academic language and academic writing by focusing on sentence, paragraph and text structures, purposeful and appropriate word choices, and the writing process. Through attention to details and critical reading of various materials, students will enhance their writing skills by applying effective planning, drafting, rewriting and editing strategies. Students will further become adept at critically and creatively evaluating, analyzing, constructing and presenting their ideas and arguments. As a workshop class, the final product of the class will be one or more of (1) a journal paper that is ready for submission, (2) a conference paper, and (3) one or more chapters of a dissertation or thesis. Please Note: Advanced English language proficiency required.

ENGY.3310 Fundamentals of Nuclear Science and Engineering (Formerly 24/10.331) - Credits: 3

Overviews a variety of fundamental nuclear science and engineering concepts that form the basis for most contemporary nuclear technology applications. Course topics include concepts from basic atomic and nuclear physics, modern physics, nuclear models and nuclear stability considerations, basic nuclear reactions and the conservation laws that govern these interactions, various radioactive decay processes, and the interaction of neutrons and gamma rays with matter. The energy dependence of neutron and gamma cross sections, the slowing down process, the computation of microscopic and macroscopic reactions rates, and the characterization of different materials used in a variety of nuclear applications are also addressed. A variety of practical applications are highlighted.

ENGY.4190 Nuclear Reactor Operator Training (Formerly 24.419) - Credits: 3

This course provides an introductory overview of nuclear physics and related theory and the various systems associated with the operation of the UMASS Lowell Nuclear Research Reactor (UMLRR). The course is intended for students who want to learn about the operation of the UMLRR and who are interested in a career in nuclear engineering and science. The course provides a multidisciplinary systems approach to education and training, which emphasizes “learning by doing”. In a practical setting, students study and learn basic nuclear theory and design aspects of real-world systems associated with nuclear reactor operations. Knowledge is gained by working closely with experienced reactor operators and staff, and through independent study.

ENGY.4200 Nuclear Reactor Operator Training II (Formerly 24.420) - Credits: 3

Continuation of 24.419. Upon completion of this course, the student will be given a simulated Reactor Operator examination, including a written test, an oral test about reactor systems, and a controls manipulation test.

ENGY.4340 Nuclear Reactor Theory (Formerly 10/24/434) - Credits: 3

Emphasis is placed on neutron interactions in various nuclear core and shield configurations along with the development, solution, and analysis of the neutron balance equation for various situations. Several aspects of nuclear reactor core physics including neutron diffusion, criticality, power production, reactor kinetics, reactivity feedback and control, fuel depletion, fission product poisoning, and some energy removal considerations are treated. General reactor core design and safety considerations are also discussed.

ENGY.4350 Nuclear Reactor Engineering - Credits: 3
This course provides an overview of pertinent topics in basic nuclear heat generation and removal in a nuclear reactor, power conversion, and overall system integration and safety.

**ENGY.4390 Nuclear Systems Design & Analysis**  
(Formerly 24.432 & ENGY.4320) - Credits: 3

A design course that focuses on the use of modern computer analysis tools for the design and analysis of nuclear systems. Reactor physics and shielding codes and thermal and transient analysis of nuclear systems are completed by small design teams with individual responsibility for a particular aspect of the design. Oral and written communication skills are emphasized. (10.432 and 24.432 are the same)

**ENGY.4910 Industrial Experience** (Formerly 24.491) - Credits: 0-12

"Variable credit course, student chooses appropriate amount of credits when registering."

**ENGY.4950 Directed Studies** (Formerly 24.495) - Credits: 3

Special problems in nuclear science and engineering assigned to the individual student, with emphasis on modern research methods and preparation of results for publication.

**ENGY.5040 Energy Engineering Workshop** (Formerly 24.504) - Credits: 3

A group/individual design project. The design effort will integrate many aspects of the student's engineering background, including design concepts, technical analyses, economic and safety considerations, etc. A formal report and oral presentation are required.

**ENGY.5050 Reactor Physics** (Formerly 24.505) - Credits: 3

Advanced treatment of several topics in reactor physics, including cross sections and processing methods, development of transport theory, reduction to diffusion theory, and analyses of analytical and numerical solutions of the resultant balance equations.

**ENGY.5070 Reactor Engineering and Safety**  
(Formerly 24.507) - Credits: 3

Modeling and analysis of reactor thermal-hydraulics and safety systems. Topics include nuclear heat generation and transport, single and two-phase flow, boiling crisis, and safety analysis.

**ENGY.5090 Dynamic Systems Analysis** (Formerly 24.509) - Credits: 3

Mathematical foundation using the state-variable approach. Topics include matrix methods, Laplace and Fourier transforms, transfer functions, frequency response and stability analyses, and distributed/lumped parameter systems. Applications to mechanical and thermo-fluid systems. Modeling and simulation of systems using Matlab are emphasized. A comprehensive project, including formal written and oral reports, is required.

**ENGY.5100 Nuclear Fuel Cycle** (Formerly 24.510) - Credits: 3

This course will explore the various stages of the nuclear fuel cycle. The nuclear fuel cycle is broadly classified into three stages; front end, service stage, and back end. The course will introduce students to the various sub stages within the three broad stages of the nuclear fuel cycle. The course will explore the technology that is currently being used in these stages, then compare difference in approaches. Further modifications to the fuel cycle management will be discussed to make nuclear energy more sustainable. The course will provide an overview of front end fuel cycle including: mining, milling, enriching, fabrication; back end of the fuel cycle including: waste and recycling (or not); and in core fuel management, burnup calculations; and approaches to balance the cost of electricity production using nuclear reactors. The students will be introduced to nuclear burnup code such as ORIGEN. At the conclusion of the course students will be tasked to design and evaluate an aspect of the nuclear cycle that has been discussed in the class including but not limited to: enrichment plant, in-core fuel management, spent fuel management.

**ENGY.5140 Chemical and Nuclear Waste**  
(formerly 24.514) - Credits: 3

History of nuclear waste disposal; engineering design of disposal systems. Present status of waste and the character and quantities of future wastes. Review of disposal concepts on a generic basis. The national plan for waste disposal.

**ENGY.5160 Radiation Shielding and Protection**  
(formerly 24.516) - Credits: 3

This course will explore the fundamental principles of the interaction of nuclear and atomic radiation with matter and the transport of radiation through materials. The students will learn characterization of radiation fields and sources, and transport radiation through material. The course will discuss radiation exposure, dose, dose equivalent in context of radiation shielding and protection. Consequently, the students will compile each of these topics to learn how to design and
analyze radiation shielding and protection. The students will learn how to use both the SOURCES and ORIGEN (or equivalent) code systems for calculating radiation sources and the MCNP (or equivalent) code system for the transport of radiation. At the conclusion of the course the students are expected to develop a shielding design for a given constraints typically encountered in the nuclear field.

ENGY.5180 Energy Technology, Economics and Policy - Credits: 3
Survey course where students integrate the knowledge form previous undergraduate courses to explore and interpret energy technologies, economics and policies. This course is an elective course for engineering students and requires a good basic understanding of technical concepts related to the measurement and calculation of energy conversion and engineering economics.

ENGY.5190 Reactor Operator Training (Formerly 24.519) - Credits: 3
Training, including in-reactor experience and topical lectures, as given to Reactor Operator Trainees who will undergo Federal testing for a Reactor Operator License.

ENGY.5200 Reactor Operator Training (Formerly 24.520) - Credits: 3
Continuation of 24.519. Upon completion of this course, the student will be given a simulated Reactor Operator examination, including a written test, an oral test about reactor systems, and a controls manipulation test.

ENGY.5310 Selected Topics in Engineering (Formerly 24.531) - Credits: 3
Special problems in nuclear science and engineering assigned to the individual student, with emphasis on modern research methods and preparation of results for publication.

ENGY.5320 Selected Topics: Energy Science (Formerly 24.532) - Credits: 3
Special problems in nuclear science and engineering assigned to the individual student, with emphasis on modern research methods and preparation of results for publication.

ENGY.5340 Fundamentals of Nuclear Security and Safeguards (Formerly 24.534) - Credits: 3
This course will include technical and policy matters related to nuclear security and safeguards. The students will explore in interplay between technical and social science disciplines. Students will be introduced to fundamental nuclear physics and engineering, material science, risk assessment, computational techniques, modeling and simulation, information technology, measurement techniques, and detector development. Those technical disciplines will be combined with social science fields such as political science, international relations, international law, energy policies, and regional studies.

ENGY.5360 Reactor Experiments (Formerly 24.536) - Credits: 3
A laboratory-based course using the U Mass Lowell Research Reactor (UMLRR) to illustrate, validate, and expand upon a mix of topics from reactor core physics, reactor operations, and balance-of-plant/energy removal considerations in nuclear systems. Typical experiments may include an approach to critical demo, reactivity measurements, generation of blade worth curves, analysis of various reactor kinetics and dynamic scenarios (including temperature and xenon effects), measurement of axial flux profiles and temperature/void coefficients, analysis of loss of flow and other pump transients, etc. Matlab will be used for data analysis and for reactor simulation. Other analysis tools such as VENTURE, MCNP, or PARET using existing models of the UMLRR may also be used. Comprehensive analysis reports that compare/contrast experimental and simulation data will be required. Oral presentations summarizing the results from the experiments will also be required.

ENGY.6010 Graduate Research Seminar (Formerly 24.601) - Credits: 0

ENGY.6510 Selected Topics in Energy Engineering (Formerly 24.651) - Credits: 3

ENGY.7050 Supervised Tchg - Nuclear Engineering (Formerly 24.705) - Credits: 0

ENGY.7330 Graduate Project - Energy Engineering (Formerly 24.733) - Credits: 3

ENGY.7390 Graduate Project - Energy Engineering (Formerly 24.739) - Credits: 9

ENGY.7410 Thesis Review (Formerly 24.741) - Credits: 1

ENGY.7430 Master's Thesis - Nuclear Engineering (Formerly 24.743) - Credits: 3

ENGY.7460 Master's Thesis - Energy Engineering (Formerly 24.746) - Credits: 6

ENGY.7490 Master's Thesis - Energy Engineering
ENGY.7530 Doctoral Dissertation/Energy Engineering (Formerly 24.753) - Credits: 1-3
Advanced research work required of students performed under the supervision of a senior faculty member in the Nuclear Engineering Program. The dissertation topic must be approved by the doctoral committee.

ENGY.7560 Doctoral Dissertation/Energy Engineering (Formerly 24.756) - Credits: 6
ENGY.7590 Doctoral Dissertation/Energy Engineering (Formerly 24.759) - Credits: 9
Advanced research work required of students performed under the supervision of a senior faculty member in the Energy Engineering Program. The dissertation topic must be approved by the doctoral committee.

ENGY.7660 Continued Graduate Research (Formerly 24.766) - Credits: 6
ENGY.7690 Continued Graduate Research (Formerly 24.769) - Credits: 9
ENVE.2010 Environmental Engineering Chemistry - Credits: 3
Overview of fundamental chemistry related to the source, fate and reactivity of compounds in the atmosphere, hydrosphere, and lithosphere. Topics include reaction kinetics, chemical equilibrium, redox reactions, chemical thermodynamics, carbonate systems, environmental fate of chemicals in natural and polluted environments, anthropogenic and natural pollution.

ENVE.3020 Fluid Mechanics Laboratory - Credits: 1
Laboratory and field experiments on fluid mechanics including measurement of fluid properties, analysis of fluid flow patterns and fluid flow in closed conduits, and flow measurements. Course emphasizes data acquisition and analysis, and report writing.

ENVE.3105 Material Science for Environmental Engineering - Credits: 2
A treatment of the properties of engineering materials that influence the design, construction and maintenance of Civil Engineering works. Included are such materials as ferrous and non-ferrous metals.

ENVE.3630 Environmental Engineering II - Credits: 3
This course emphasizes the ecology and physical-chemical processes used in water and wastewater treatment. Topics covered include Streeter-Phelps model, coagulation, flocculation, water softening, precipitation, filtration, activated carbon adsorption, and disinfection.

ENVE.3640 Energy and the Sustainable Environment - Credits: 3
Thermodynamic laws, energy balance, conservation of energy, heat transfer, energy conversion and efficiency, ideal and non-ideal gas and gas mixtures, design and evaluation of renewable energy systems.

ENVE.3650 Groundwater Hydrogeology and Remediation - Credits: 3
Groundwater flow and aquifer behavior in response to pumping will be addressed. Analysis of contaminant transport and the formation of multi-dimensional contaminant plume formation will be conducted. Physical, chemical and biological based technologies for contaminated aquifer remediation are covered.

ENVE.3660 Biological Processes in Environmental Engineering - Credits: 3
This course focuses on the fundamental aspects of biological processes that are commonly used in water and wastewater treatment. Topics covered include: the mechanisms and kinetics of biological reactions, mass balances of biological reactors, biological reactor design and diagnosis, and aeration and gas transfer.

ENVE.4610 Chemical Fate and Transport in the Environment - Credits: 3
The properties of organic chemicals and equilibrium chemistry controlling the distribution of these chemicals between air, water and soil will be studied. Transport processes and the lifetime of chemicals in the environment will be investigated. Risk assessment for the exposure to chemical contaminants will be addressed.

ENVE.4620 Air Quality - Credits: 3
Review of gaseous pollutants, their chemistry and properties. Emissions of air pollutants (mass balances) and atmospheric sciences related to air pollution. Gas and particulate handling and treatment technologies are addressed.

ENVE.4630 Environmental Eng. Ethics and
ENVE.4640 Solid Waste Engineering and Management - Credits: 3
Generation, storage, collection, transfer and transport, processing and disposal of municipal solid wastes; treatment and disposal of water and wastewater treatment sludge; landfill design; alternative waste management and disposal strategies.

ENVE.4855 Capstone Design - Credits: 3
Introduction to the essentials of engineering design and a forum for practicing the design process. Integrates many elements of the curriculum through a comprehensive design project to professional standards. Project includes the use of open-ended design problems, feasibility and impact analysis, complete design process, consideration of alternative solutions, and cost estimation and scheduling. Students practice team effort, development of a system perspective, communication skills, reporting, and presentations. The course is fast paced and covers new design elements in each module.

ETEC.1300 Electrical Basics and Laboratory (Formerly 17.130) - Credits: 3
This course introduces the basic principles of electrical engineering, including the concepts of voltage, current, resistance, inductance and capacitance. Ohm's Law, Kirchhoff's Laws, superposition, Thevenin's theorem, and Norton's theorem will be covered. Alternating current concepts, frequency response and filters are discussed. The use of laboratory power supplies and measuring instruments such as oscilloscopes, voltmeters, ammeters and ohmmeters are demonstrated. Written reports are required.

ETEC.1310 Electronic Basics and Laboratory (Formerly 17.131) - Credits: 3
The Electronic Basics and Laboratory serves as a continuation and elaboration of 17.130. The course covers diodes, transistors and electronic amplifiers, power supplies, Magnetics and electromechanics. Further use of laboratory equipment, function generators, power supplies, DMM and oscilloscope will be demonstrated.

ETEC.1320 Digital Basics and Laboratory (Formerly 17.132) - Credits: 3
This course presents an introduction to number systems and digital logic, including both combinational and sequential digital logic networks. Other topics include: binary, decimal, octal, and hexadecimal number systems; base conversion; Boolean algebra; Karnaugh maps; and sequential counters. Computer terminals are available in the laboratory and their use is expected. Written reports are required.

ETEC.2130 Electric Circuits I (Formerly 17.213) - Credits: 3
Discusses: electrical circuits; voltage, current and resistance; energy, power and charge; Ohm's Law, Kirchhoff's Current Law and Kirchhoff's Voltage Law; simplification and conversion techniques for networks containing sources and/or resistance; Thevenin's and Norton's theorems; fundamentals of magnetism and magnetic circuits; properties of capacitance and inductance and associated transient behavior of circuits.

ETEC.2140 Circuits II and Laboratory (Formerly 17.214) - Credits: 3
This course provides a continuation of ETEC.2130. Topics include sinusoidal waveforms, phasors, impedance and network elements. Mesh and nodal analysis of AC circuits; series and parallel circuits, superposition and Wye/Delta conversions are also covered. The use of power supplies and various electrical measuring instruments will be studied. DC circuit analysis concepts studied in 17.213 will be verified by laboratory experiments. Written reports are required. Alternate lecture and laboratory sessions.

ETEC.2160 Circuits IV (Formerly 17.216) - Credits: 3
Advanced Circuits is a continuation of passive circuit analysis, where the student is introduced into the frequency domain. LaPlace techniques are used to analyze electric circuits using sources and elements similar to those in earlier circuit analysis courses. The concept of boundary conditions is introduced along with initial value and final value theorems. There is a brief review of mathematical concepts such as logarithm, exponential functions and partial fraction expansion to aid the student for newer analysis techniques. The S plane is introduced as a graphical technique to plot the poles and zeros of a function and acquire an insight into the time domain. The dualities of electrical elements in other engineering fields (mechanical, fluids and thermal) are introduced and analyzed using LaPlace techniques. Bode plots are used as another tool to gain insight into the time domain. The cascade interconnect is introduced along with the concept of transfer functions and the impulse response. Filter circuits are again analyzed but this time in the frequency domain using the concepts of LaPlace.
ETEC.3220 Signals and Systems I (Formerly 17.322) - Credits: 3

Introduction to signals and systems. Signal classification, normalized energy and power. Signal families, time-domain representation by differential equations, linear time invariance, classical solution to various signal families, frequency domain representation, total solution of system with initial conditions. Impulse and pulse response of LTI systems. Convolution methods, Fourier series analysis, Fourier transforms, properties and use, inversion by partial fractions, residues with s-plane vectors, application to LTI systems with initial conditions and sources. Introductions to digital elements and equations.

ETEC.3410 Logic Design I and Laboratory (Formerly 17.341) - Credits: 3


ETEC.3420 Logic Design II and Laboratory (Formerly 17.342) - Credits: 3


ETEC.3450 Programmable Logic Controllers and Lab I (Formerly 17.345) - Credits: 3

This course introduces Programmable Logic Controllers from a fundamental perspective and analyses of programming and operation from a practical point of view. We will look inside the PLC and cover general programming procedures, basic functions along with intermediate, data handling, and advanced functions. There will be laboratory sessions with "Koyo" DLOS modules and using Koto PL Software, PLC simulating software will also be used in homework problems.

ETEC.3500 Control Systems I (Formerly 17.350) - Credits: 3

This course covers the concepts of feedback; open loop and closed loop systems, feedback in electrical and mechanical systems, mathematical models of systems and linear approximations, transfer functions of linear systems, block diagrams and signal flow graphs, sensitivity, control of transient response, disturbance signals, time domain performance: steady state errors, performance indices, stability related to s-plane location of the roots of the characteristic equation, Routh-Hurwitz criterion, graphical analysis techniques: root locus, frequency response as polar plot and Bode diagrams, closed loop frequency response. A control system design project is included in the course.

ETEC.3530 Digital Electronics (Formerly 17.353) - Credits: 3

This course presents the building blocks and concepts associated with digital electronic networks. The material presented will cover the design requirements necessary to develop successfully functioning digital logic circuits. The lectures will cover combinatorial networks, the Eber-Moll Transistor model, state devices, RTL, TTL, ECL, and CMOS logic families, read-only memories (ROMs), static and dynamic MOS random access memories (RAMs), programmable logic arrays (PLAs) and macrocell logic. Homework, based on actual applications, is designed to provide practice in the use of the fundamental circuit design. Real life examples are given to show the application of design theory. Pre-Requisites: 27.356, 17.341.

ETEC.3540 PSPICE Simulation (Formerly 17.354) - Credits: 3

OrCAD's Capture is used as the schematic entry tool to generate circuits that will be simulated using PSPICE. AC and DC independent and dependent sources and device models will be used in these circuits that will then be evaluated by various simulation methods using voltage, current and frequency sweeping as well as temperature and time sweeps. The graphical analysis tool, Probe, will be used to display the results of the simulations and Probes mathematical functions will be used to further analyze the simulation results. All of these functions will be presented in a combination of lecture, homework, and hands-on PC lab environment. Applications learned in class will be reinforced by homework problems which will then be applied in the PC lab. Pre-Requisite: 17.355

ETEC.3550 Electronics I and Laboratory (Formerly 17.355) - Credits: 3

This course introduces Electronics from a fundamental perspective and analyses of circuits from a practical point of view. Semiconductor devices and their application are stressed.
This course surveys the operating characteristics of pn junction diodes, transistors and operational amplifiers, and analyzes their application in actual circuits. The use of diodes in power switching circuits and the use of transistors in logic circuits and amplifiers will be covered extensively. Examples and homework, based on present-day applications, are designed to provide practice in the use of fundamental concepts and applications. It is expected that following the four-course electronic sequence, students will be able to use the textbook used in this course or other professional level electronic texts for further study of specific electronic topics. The course includes computer applications in solving problems involving models of electronic devices and circuits. Coverage of some topics is based on notes handed out that augments coverage in Sedra and Smith.

ETEC.3560 Electronics II and Laboratory (Formerly 17.356) - Credits: 3

This is the second course in a series of four courses with Labs. It introduces Electronics from a fundamental perspective and analyzes circuits from a practical point of view. Semiconductor devices and their application are stressed. P- and N-channel MOSFETs and junction field effect transistors (FET) will be introduced and discussed. These include linear small-signal AC models, and amplifier. This course surveys the operating characteristics of MOSFET and bipolar junction transistors (BJT) its circuit symbols; nonlinear large signal behavior and operational amplifiers, and analyses; their application in actual circuits. Large signal piecewise linear DC circuits, and small signal AC circuits will be studied. This course will include MOSFET and BJT as used in amplifiers, switches cut-off and saturation will be discussed. Examples and homework, based on present day applications, are designed to provide practice in the use of fundamental concepts, and applications. It is expected that following the four course electronic sequence, students will be able to use the textbook used in this course or other professional level electronic texts for further study of specific electronic topics. The course includes computer applications in solving problems involving models of electronic devices and circuits. Coverage of some topics is based on notes handed out that augments coverage in Sedra and Smith. Pre-Requisites: 17.215, 17.358, 17.365

ETEC.3570 Electronics III and Laboratory (Formerly 17.357) - Credits: 3

This course introduces Electronics from a fundamental perspective and analyzes of circuits from a practical point of view. It is expected that following the four course electronic sequence, students will be able to use the textbook used in this course or other professional level electronic texts for further study of specific electronic topics. The following topics will be covered: review BJT and MOSFET, differential amplifiers, and frequency response of different types of amplifiers will be discussed, diff. pair, small signal analysis, biasing, current source, active load CMOS, Frequency response, Bode Plots cascode configuration.

ETEC.3580 Electronics IV and Laboratory (Formerly 17.358) - Credits: 3

This course provides the student with the understanding of feedback. The course covers the feedback equations, the four topologies of feedback, two port theory, Bode Plots, active filters, Weinbridge Oscillators, and power amplifiers. There are two experiments the first covers finite gain, finite band width, output resistance, input resistance, and nonlinear distortion. The second covers multiple poles and loop stability, stabilization with three coincident poles, and loop gain for oscillation.

ETEC.3600 Mathematics and Statistics/E.E.T. (Formerly 17.360) - Credits: 3

Uses the computer to apply mathematics, probability and statistics to technological problems. Topics include: probability, statistics, regression, correlation, goodness of fit, variance, probability distributions and the computer solution of algebraic equations associated with multivariable statistical problems. Pre-Requisites: 17.353, 17.358, 17.365

ETEC.3610 Project Laboratory A (Formerly 17.361) - Credits: 2

The project lab runs for 14 weeks with design, fabrication, and testing of the project during the weeks one through twelve, and the last two weeks for presentation of the projects to the class. It is expected that all projects be presented operational and meeting the design performance requirements. There are exceptions to this. In the case of non-working projects the progress and final report will be heavily relied on for grading.

ETEC.3650 Applied Linear Devices (Formerly 17.365) - Credits: 3

Discusses the linear and nonlinear applications and characteristics of linear-integrated devices. Optimal use of industry-published specifications, application notes and handbook data will be stressed. Topics to be covered include operational amplifiers, regulators, comparators, analog switches, time-function generators, instrument circuits, logarithmic circuits, computing circuits, and signal processing circuits.

ETEC.3680 Data Conversion and Laboratory (Formerly 17.368) - Credits: 3

This course teaches the fundamentals of data conversion including digital to analog converters (DACs) using R/2R
ladder networks, analog to digital converters (ADCs), sampling
theory, coding schemes, sources of errors in DAC's and ADC's,
voltage to frequency converters, frequency to voltage
converters, sample and hold circuits, transfer functions of
converters, wave shaping devices, and applications by
designing and constructing a data conversion system. Pre-
Requisite: 17.341

ETEC.3690 Electromagnetic Theory (Formerly 17.376) - Credits: 3

This course examines waves and phasors, transmission lines as
distributed circuits, Smith chart calculations, impedance
matching, transients on transmission lines, vector analysis,
electrostatics and capacitance, steady current flow in
conductors and resistance, magnetostatics and inductance.

ETEC.3830 Microprocessors A (Formerly 17.383) -
Credits: 3

Introduces the microprocessor and microprocessor
programming through an integrated set of experiments and
related lectures. Topics include: binary, decimal, and
hexadecimal numbers; the microprocessor; memory devices;
structure of microprocessor-based systems; programming and
instruction sets; addressing modes; arithmetic, logical, and shift
instructions; branch conditions and instructions; indexed
addressing; the stack; subroutines; assembly language; floating-
point routines; and software development techniques.
Approximately one-half of the course time will be an
associated laboratory, culminating with a programming
project. Pre-Requisite: 17.341

ETEC.3840 Microprocessors B (Formerly 17.384) -
Credits: 3

Extends the skills developed in 17.393 to interfacing the
microprocessor to the outside world through an integrated set
of experiments and related lectures. Topics include:
architecture of microprocessor-based systems; microcontrollers;
parallel I/O ports; interrupts; A/D and D/A converters;
programmable timers; handshaking; and serial
communications. The course will contain a three-week project
applying the functions learned to a real world design.
Approximately one-half of the course time will be an
associated laboratory.

ETEC.3910 Capstone Design (Formerly 17.391) -
Credits: 3

The project lab runs for 14 weeks with design, fabrication, and
testing of the project during the weeks one through twelve, and
the last two weeks for presentation of the projects to the class.
It is expected that all projects be presented operational and
meeting the design performance requirements. There are
exceptions to this. In the case of non-working projects the
progress and final report will be heavily relied on for grading.
May do project at work (all requirements of reports,
presentation, etc. still required). Pre-Requisites: 17.361, or
17.353 and 17.358 and 17.365

ETEC.3920 Capstone Execution (Formerly 17.392) -
Credits: 3

The project lab runs for 14 weeks with design, fabrication, and
testing of the project during the weeks one through twelve, and
the last two weeks for presentation of the projects to the class.
It is expected that all projects be presented operational and
meeting the design performance requirements. There are
exceptions to this. In the case of non-working projects the
progress and final report will be heavily relied on for grading.
May do project at work (all requirements of reports,
presentation, etc. still required).

ETEC.4030 Foundations of Microwave Design
(Formerly 17.403) - Credits: 3

An introductory course in the analysis and design of
microwave circuits beginning with a review of time-varying
electromagnetic field concepts and transmission lines. Smith
Chart problems; single and double stub matching; impedance
transformer design; microstrip transmission lines, slot lines,
coplanar lines; rectangular and circular waveguides;
characteristics of low-pass, high-pass, band-pass, band-stop
filters; two-port network representation of junctions; Z and Y
parameters, ABCD parameters, scattering matrix; microwave
measurements; measurement of VSWR, complex impedance,
attenuation, and power; noise basic concepts and
representation; gain definitions, amplifier design; low-noise
amplifiers, power amplifiers, distributed amplifiers, other
circuits for microwave applications.

ETEC.4100 System Engineering and Analysis
(Formerly 17.410) - Credits: 3

This course describes the entire development of complex
systems form needs and requirements analysis through the life
cycle design process. Phases of system design form conceptual
to detailed design are described. Program management and
control techniques, including risk management and
configuration management, are discussed. Analysis of
alternatives and decision making under risk and uncertainty are
covered. Mathematical tools for quantitative analysis are
described. Costing issues are discussed and the "ilities" (i.e.,
reliability, maintainability, supportability, etc.) are introduced.

ETEC.4220 GPS: Principles and Applications
(Formerly 17.422) - Credits: 3
This course provides an introduction into how GPS works and the variety of applications for GPS. The general methodology of satellite navigation is described. Then there is an overview of the GPS system including the space segment and the control segment in addition to the GPS receivers themselves. The signal characteristics are presented. Satellite orbital mechanics and various earth coordinate systems are described. GPS receiver operations are then discussed focusing on signal acquisition and tracking. The impact of interference is considered. The performance of stand-alone GPS is described. Next, the techniques of differential GPS are presented. Finally, the integration of GPS with other navigation systems such as inertial systems in considered. Applications are discussed throughout the course.

ETEC.4270 Digital Signal Processing (Formerly 17.427) - Credits: 3

This course covers the basic theory of digital signal processing. Sampling theory, discrete time signals and systems, and transform methods - Z transform and Fourier series and transforms - are discussed in detail. Computational techniques, such as the Fast Fourier Transform are discussed. The basic concepts of digital filter design are described.

ETEC.4590 Power Conversion Design I (Formerly 17.459) - Credits: 3

Power supply design is introduced starting with a simple half wave and full wave rectifier capacitor filter power supply. The student will develop a design process that details performance requirements that will translate into topology selection and component requirements. To improve line and load regulation as well as output voltage tolerance, feedback control is introduced using linear regulator. Circuit elements which effect regulation are explored and the improvements in regulation through regulator gain is demonstrated. Protection circuits, regulator efficiency and thermal design are also introduced. The high frequency switching forward conversion topologies are explored, detailing the output filter design and its effect on control and loop stability. Bode plots are used to determine loop stability and selection of the amplifier’s break frequencies. PSPICE is used as a tool to plot over all regulator frequency response. The output filter inductor design is studied with respect to core selection, wire size and thermal analysis. The switching regulator efficiency is also studied. Along with the forward converter, the flyback regulators are also introduced both in continuous and discontinuous mode of operation. Pre-Requisites: 17.350 and 17.365

ETEC.4600 Power Conversion Design II (Formerly 17.460) - Credits: 3

Forward converter topologies are reviewed and core selection equations are developed from magnetic fundamentals, power and winding requirements. Transformer design and winding layups are studied for their effects on eddy currents, proximity effect and AC resistance. Drive requirements and circuits are investigated for both BJTs and MOSFETs along with snubber circuits.

ETEC.4690 Control Systems II (Formerly 17.469) - Credits: 3

Serves as a complement to 17.350 in that modern approaches to control system design are described. State space modeling techniques are presented. State feedback using pole placement is introduced. State estimation using observers is presented in the context of closed loop state feedback design. Techniques for digital control are discussed along with concepts from optimal and nonlinear control.

ETEC.4850 Fundamentals of Communication Systems (Formerly 17.485) - Credits: 3

The course will provide an overview of various techniques and technologies used in communication systems. Signal analysis and linear system analysis will be discussed along with various nonlinear techniques. Various modulation techniques to be discussed will include linear modulation (AM), angle modulation (FM), and several types of digital modulation. Issues related to wireless systems as well as computer communication will be addressed.

ETEC.4870 Analog Filter Design (Formerly 17.487) - Credits: 3

Presents a review of network analysis. This course also provides an introduction to synthesis, driving point impedance, approximation theory and transfer function realization.

ETEC.4960 Radar Systems (Formerly 17.496) - Credits: 3

Offers an introduction to radar system analysis. An overview of basic radar operation is followed by a discussion of the factors influencing the radar operations of target detection and parameter estimation. Transmitters, antennas, receivers and system losses will be discussed. Propagation effects and clutter interference will be presented. Signal processing techniques will be described. Synthetic aperture radar and pulse compression techniques will also be discussed. Time permitting, various applications will be described.

HONR.3500 Seminar: Special Topic in Honors (STEM Perspective) - Credits: 3

Seminar: Special Topics in Honors offers students the opportunity to engage in depth with a subject that is of special
interest in an Honors-level seminar. The course will address an inquiry-based topic that spans or falls outside the boundaries of any individual major on campus, but integrates methodology, content, and/or approaches from two or more.

**HSCI.1010 Human Anatomy and Physiology I**  
(Formerly 35.101) - Credits: 3

This course provides a basic knowledge of the structure and function of the human body. An overview of the general organization of the body introduces the course. Following a discussion of basic human chemistry, the anatomy and physiology of cells, tissues, organs, and organ systems are studied with special emphasis placed on homeostasis and interaction among the various systems. The topics treated are body plan, chemistry, cytology, histology, the integumentary system, the skeletal system, the muscular system, and the nervous system. Clinical applications will be presented.

**HSCI.1020 Human Anatomy and Physiology II**  
(Formerly 35.102) - Credits: 3

A continuation of the basic knowledge of human structure and function. The topics treated are cardiovascular system, lymphatic system, respiratory system, endocrine system, digestive system, metabolism, urinary system, and reproductive system.

**HSCI.1030 Human Anatomy and Physiology Laboratory I**  
(Formerly 35.103) - Credits: 1

Laboratory exercises are designed to reinforce didactic material by providing hands-on experience with the subject matter. Students actively participate in simple chemical analysis, microscopic observations, and studies of anatomical models and preserved specimens. Students perform simple physiological tests on themselves and work in small groups to discuss conclusions.

**HSCI.1040 Human Anatomy and Physiology Laboratory II**  
(Formerly 35.104) - Credits: 1

Laboratory exercises are designed to reinforce didactic material by providing hands-on experience with the subject matter. Students actively participate in simple chemical analysis, microscopic observations, and studies of anatomical models and preserved specimens. Students perform simple physiological tests on themselves and work in small groups to analyze results and discuss conclusions.

**HSCI.1991 Intercollegiate Health 100 level elective**  
(Formerly 30.199) - Credits: 3

Intercollegiate Health 100 level elective

**HSCI.2040 Introduction to Exercise Physiology**  
(Formerly 30.204) - Credits: 3

This course serves as an introductory course to the field of Exercise Physiology. It is designed as a program foundation to the profession and to professional behavior. Students will be exposed to what happens in both the fitness centers and in the cardiac or pulmonary rehabilitative facilities. The course will serve as a precursor to the remaining upper division major courses.

**HSCI.2060 Pandemics: How Do They Occur?**  
Credits: 3

This course focuses on the global challenge posed by infectious diseases. In the past 50 years, many previously unknown infectious diseases have emerged, while others have reemerged at an unprecedented rate. Despite tremendous strides in science, technology, and medical advances, and primary prevention strategies, infectious disease continue to plague humanity. This course will feature the global challenges posed by select pathogens. To do this, we will explore pandemics through a few different lenses. We will review the sources of and risk factors that lead to pandemics, and methods to prevent and control infectious disease outbreaks from becoming pandemics. Infectious diseases discussed in this course include: Cholera, Ebola, HIV, Influenza, SARS, MERS, COVID-19, among others.

**HSCI.2100 Clinical Calculations**  
(Formerly 30.210) - Credits: 1

This elective course is designed for students beginning the nursing program. It reviews the mathematics necessary to compute drug calculations using dimensional analysis. This course covers the metric system of weights and measures. The focus of the course is on the computation of drug dosages for oral and parenteral medications with emphasis on the application of skills necessary to calculate intravenous infusions and medications.

**HSCI.2110 Basic Clinical Microbiology & Pathology**  
(Formerly 35.211) - Credits: 3

Studies the fundamentals of microbiology with major emphasis on structure, function, growth, metabolism, and classification of clinically important microorganisms. The human body's response to invading microbes and an introduction to the ecological aspects of microorganisms in the environment with particular stress on their significance, activities (beneficial and detrimental) and control measures will also be studied.
Laboratory (Formerly 35.213) - Credits: 1

Laboratory investigations of basic properties and characteristics of microorganisms are conducted. Students will perform commonly used techniques for collecting, handling, and studying clinically important microorganisms.

HSCI.2220 Health and Disease Across the Lifespan (Formerly 30.222) - Credits: 3

This course will introduce the basic principles that promote health of individuals throughout the lifespan. Physiological, socioeconomic, economic, and behavioral factors that impact health, disease, and quality of life across the lifespan will be examined. Health assessment tools will be reviewed. The course emphasizes the role of nutrition and physical activity for health promotion and disease prevention across different life stages and the impact of aging on health and disease. Major causes of morbidity and mortality in the United States will be discussed.

HSCI.2510 Physiological Chemistry I (Formerly 35.251) - Credits: 3

This course provides a foundation in basic chemistry for students majoring in the Health Sciences. Basic concepts covered include: properties of matter, energy, atomic and molecular structure, isotopes and radioactivity, chemical bonding, chemical formulae and reactions. Quantitative aspects of chemical processes, chemical equilibrium and the behavior of gases, including blood gases and their transport are discussed. Properties of water and solutions are studied and include units of concentration, osmosis, osmolality, and physiological fluid and electrolyte balance. The chemistry of acids, bases and buffers is reviewed with emphasis on physiological buffer systems. Quantitative aspects, acid/base balance, compensatory mechanisms and elementary diagnosis are discussed. The chemistry of inorganic trace elements and their physiological roles are investigated. Concepts of organic chemistry are introduced, including the structure and function of carbon, isomerism and the properties and selected reactions of the major functional groups important in human biochemistry.

HSCI.2520 Physiological Chemistry II (Formerly 35.252) - Credits: 3

This course is designed to provide a foundation in basic biochemistry for students majoring in the Health Professions. Selected concepts in organic chemistry are integrated into this framework. Aspects of amino acid and protein structure are studied. The structure and function of enzymes, their effects on reaction energetics and dynamics and the diagnostic uses of enzyme assays in clinical medicine are covered. The plasma proteins, hemoglobin, and the structure and function of miscellaneous cellular proteins are reviewed. The chemistry of the nucleic acids, protein anabolism and catabolism are studied along with selected metabolic disturbances and genetic disease. The structure and chemical properties of the simple and complex carbohydrates and lipids their metabolic pathways and cycles, and selected pathologies are studied in detail. Diagnostic tests relating to carbohydrate and lipid abnormalities are included. The course concludes with a study of chemical communication mechanisms, which includes neurotransmitters, hormonal secretions, and immunoglobulins.

HSCI.2530 Physiological Chemistry Laboratory I (Formerly 35.253) - Credits: 1

Laboratory experiments are conducted to complement the material covered in 35.251. Exercises dealing with properties of matter, chemical equations, qualitative analysis, energy, osmosis, chemical equilibrium and acids/bases/buffers will be performed. The qualitative properties of alcohols, aldehydes, ketones, acids and esters will be explored.

HSCI.2540 Physiological Chemistry Laboratory II (Formerly 35.254) - Credits: 1

Laboratory experiments are conducted to complement the material covered in 35.252. The chemistry of the basic biochemical molecules will be explored, including proteins, enzymes, carbohydrates, lipids, and nucleic acids. Selected aspects of metabolism and the assay of clinically significant materials will be studied.

HSCI.2991 Clinical Lab 2000 level elect (Formerly 35.299) - Credits: 3

Clinical Laboratory 2000 level elective

HSCI.3050 Exercise Physiology Lecture (Formerly 30.305) - Credits: 4

This course is designed to enable students to understand the acute and chronic physiologic effects of exercise on the human body. Topics will include bioenergetics, cardiopulmonary and cardiovascular physiology, neuromuscular physiology, special populations, and exercise prescription for apparently healthy athletic and clinical populations. Special topics in exercise physiology and environmental physiology will also be covered.

HSCI.3190 Pathophysiology (Formerly 30/33.319) - Credits: 3

This course provides an overview of the dynamic aspects of disease processes as they present in major body systems.
HSCI.3500 Human Biochemistry (Formerly 36.350) - Credits: 3
This course is an in-depth study of biochemical substances and their reactions in the body, with major emphasis placed on metabolism at the cellular level and examined in the tissues of the various organs where these reactions occur. Correlation of biochemical processes underlying pathologic conditions will be made whenever practical.

HSCI.5500 Human Development and Pathophysiology (Formerly 30.550) - Credits: 3
The physiological steady state of the human body and disruptions that result over the life span will be examined as well as the pathophysiological mechanism manifested in disease states. The course addresses defense, compensating, and adaptive responses to the pathophysiological processes as they apply to the various systems rather than being a survey course of diseases.

INFO.1600 Introduction to Information Systems (Formerly 90.160) - Credits: 3
This course presents the most up-to-date technology in an ever-changing discipline. It provides an in-depth understanding of the components of the computer systems and mobile devices, application software, mobile apps, system software (including operation systems), digital storage, and communications and networks. The course also teaches the fundamentals of the Internet, digital safety, security, and privacy, as well as Information and Data Management and Information Systems and Program Development.

LIFE.1100 Microbes and Society: Good, Bad and Ugly (Formerly 83.110) - Credits: 3
Examines historical aspects of microbial interactions with human society, including the use of microbes in food production, agriculture, biotechnology, industry and environmental preservation; explores bioterrorism, the problem of antibiotic resistance and surveys some historical and contemporary microbial diseases.

LIFE.1230 Nutrition and Disease (Formerly 83.123) - Credits: 3
Serves as an interdisciplinary survey course for students not majoring in biology, which deals with human nutrition as it relates to various chronic disease states. Methods of detection and treatment of the disorders are considered as well as general concepts of health promotion/disease prevention based on the Dietary Guidelines for Americans. Specific topics covered include the role of nutrition in: heart disease, diabetes, cancer, obesity, alcoholism, and eating disorders. Not suitable for credits toward any degree in the Division of Sciences.

LIFE.2140 Human Ecology (Formerly 83.214) - Credits: 3
Designed to reveal and discuss the increasing problems of overpopulation in regard to environmental deterioration, living space, limits of natural resources and the adverse effects of human alteration on destruction of the natural ecosystem. The implications of current literature and news items will be emphasized. Not suitable for credit towards any degree in the Division of Sciences.

MATH.1020 Freshman Seminar in Mathematics (Formerly 92.102) - Credits: 1
This course is designed to orient undergraduate math majors to the university and to their chosen field. Students will learn about the mathematics program, the mathematics faculty and their research interests, careers in math-related areas, internship opportunities, and university resources.

MATH.1070 Elementary Math for Teaching: Numbers and Operations (Formerly 92.107) - Credits: 3
The Number and Operations course for elementary and middle school teachers examines the three main categories in the Number and Operations strand of Principles and Standards of School Mathematics (NCTM) -- Understanding numbers, representations, relationships, and number systems; the meanings of operations and relationships among those operations; and reasonable estimation and fluent computation. No credit in Science or Engineering.

MATH.1080 Elementary Math for Teaching: Algebra and Data Analysis - Credits: 3
This course seeks to support students in furthering their understanding of elementary mathematics concepts. The goal is for students to not only pass the MTEL for elementary mathematics, but to lay the groundwork for graduate work in elementary mathematics education. Specifically, we use an integrated approach to algebra that draws on real-world data to the extent possible. To this end, learners will gain experience in selecting and developing a number of data representations, organizing data, looking for patterns in the data and, finally, using words, symbolic notation, graphs and tables to generalize those patterns. No credit in Science or Engineering.

MATH.1110 Quantitative Reasoning (Formerly 92.111) - Credits: 3
An introduction to the mathematics concepts and skills
important in modern society, even for non-technical pursuits. The course will emphasize conceptual understanding as well as a facility in performing elementary computations. Topics to be examined will include types of reasoning, problem-solving methods, techniques of estimation, algebraic essentials, and the nature of probability and statistics. No credit in Science or Engineering.

MATH.1110SI SI for Quantitative Reasoning & Introduction to Statistics (Formerly 92.111SI/92.2830SI) - Credits: 2

This course provides supplemental instruction in mathematics to students whose Elementary Algebra Accuplacer exam scores indicate the need for such instruction. The credits in this course can not be used to satisfy the credits required for graduation, but may be used to satisfy the credits required for full time student status.

MATH.1115 Fundamentals of Algebra (Formerly 90.111) - Credits: 3

Intended for students with little or no background in basic algebra or whose background is not current. Topics covered include: the real number system, factoring fractions, linear equations, functions, graphs, systems of equations, and the quadratic equation. Students will not receive credit for this course toward any degree program at the University of Massachusetts Lowell.

MATH.1200 Precalculus Mathematics I (Formerly 92.120) - Credits: 3

Intended for students whose background in basic algebra is current. Topics covered include: linear equations, slope of a line, quadratic equations, functions, transformations, inequalities, curve sketching, and systems of equations. Note: Students who score 45 or lower on the ALEKS math assessment should consider enrolling in MATH.1115 first. Credit is given for only one of the following courses; MATH.1200, or MATH.1210.

MATH.1210 Management Precalculus (Formerly 92.121) - Credits: 3

Review of algebra. The Real Numbers, inequalities and intervals on the number line, factoring, radical notation, properties of exponents, scientific notation, and operations on rational expressions. Function definition and graph of linear/nonlinear functions such as quadratic, cubic, absolute value, piecewise-defined, rational, and power function. Additional topics with functions included such as transformations of graphs and symmetry, composite functions, one-to-one and inverse functions. Solving linear and quadratic equations algebraically and graphically. Solving systems of equations in two variables algebraically and graphically. Modeling systems of equations in three variables and solving them analytically and with matrices using TI-84 implementation. Modeling with linear as well as quadratic and power functions with the aid of a graphing calculator and Excel spread sheets. Business applications are included.

MATH.1210SI Management Pre-Calculus Supplemental Instruction (Formerly 92.121SI) - Credits: 1

Taken simultaneously with MATH.1210, this 1-credit course offers students taking MATH.1210 supplemental instructions to foster a greater opportunity for successful completion of Management Precalculus. The course credit cannot be used to satisfy the credits required for graduation, but may be used to satisfy credits required for full time student status.

MATH.1220 Management Calculus (Formerly 92.122) - Credits: 3

Review of difference quotient, least squares modeling, limit of difference quotient, differential calculus: derivatives, differentials, higher-order derivatives, implicit differentiation, relative and absolute maxima and minima of functions, and applications of derivatives to business and economics. Integrals and applications to business. No credit in Science or Engineering.

MATH.1220SI Management Calculus Supplemental Instruction (Formerly 92.122SI) - Credits: 1

Taken simultaneously with MATH.1220, this 1-credit course offers students taking MATH.1220 supplemental instructions to foster a greater opportunity for successful completion of Management Calculus. The course credit cannot be used to satisfy the credits required for graduation, but may be used to satisfy credits required for full time student status.

MATH.1230 Precalculus Mathematics II (Formerly 92.123) - Credits: 3

A continuation of Math 1200. Covers exponential and logarithmic functions, trigonometric and inverse trigonometric functions, and trigonometric identities.

MATH.1250 Calculus A (Formerly 92.125) - Credits: 3

Serves as a first course in calculus and provides a brief review of analytic geometry and trigonometric functions. The course progresses to the study of inverse functions, limits, continuity, derivatives, rules for differentiation of algebraic and transcendental functions, chain rule, implicit differentiation,
linear approximation, differentials, and maximum and minimum values.

MATH.1260 Calculus B (Formerly 92.126) - Credits: 3
Serves as a continuation of MATH.1250. The course covers L'Hopital's Rule, optimization problems, Newton's method, sigma notation, integration, area between curves, volume, arc length, surface area, integration by parts, trigonometric substitution, partial fraction decomposition, and improper integrals.

MATH.1270 Preparation for Calculus (Formerly 92.127) - Credits: 4
A review of precalculus (algebra and trigonometry) together with development of problem solving skills. No credit in Science or Engineering.

MATH.1280 Calculus IA (Formerly 92.128) - Credits: 4
Provides a review of pre-calculus algebra and trigonometry integrated with the first half of Calculus I: limits, continuity, derivatives, basic derivative formulas, chain rule, implicit differentiation. Students are expected to have taken pre-calculus and trigonometry in order to be successful in this course.

MATH.1280SI Calculus IA Supplemental Instruction (Formerly 92.128SI) - Credits: 1
Taken simultaneously with MATH.1280, this 1-credit course offers students retaking MATH.1280 supplemental instructions to foster a greater opportunity for successful completion of Calculus IA. The course credit cannot be used to satisfy the credits required for graduation, but may be used to satisfy credits required for full time student status.

MATH.1290 Calculus IB (Formerly 92.129) - Credits: 4
Provides a review of pre-calculus, algebra and trigonometry integrated with the second half of Calculus I. Inverse trig functions and their derivative, logarithmic functions and their derivative, related rates, L’Hospital's Rule, optimization problems, curve sketching, linearization, Newton's Method, hyperbolic functions and their derivative, antiderivatives. Completion of this course is equivalent to MATH.1310 Calculus I.

MATH.1290SI Calculus IB Supplemental Instruction (Formerly 92.129SI) - Credits: 1
Taken simultaneously with MATH.1290, this 1-credit course offers students retaking MATH.1290 supplemental instructions to foster a greater opportunity for successful completion of Calculus IA. The course credit cannot be used to satisfy the credits required for graduation, but may be used to satisfy credits required for full time student status.

MATH.1310 Calculus I (Formerly 92.131) - Credits: 4
Serves as a first course in calculus. Functions, limits, continuity, derivatives, rules for differentiation of algebraic and transcendental function; chain rule, implicit differentiation, related rate problems, linearization, applied optimization, and curve sketching. Introduction to area and integration. Students are expected to have taken pre-calculus and trigonometry in order to be successful in this course.

MATH.1320 Calculus II (Formerly 92.132) - Credits: 4
Serves as a continuation of Calculus I. Integration and techniques of integration including the substitution method, integration by parts, trigonometric integrals, trigonometric substitution, integration of rational functions by partial fractions, numerical integration, and improper integrals. Volumes using cross-sections, the disk method, the washer method and the shell method. Arc length and surface area. Infinite series, power series, Maclaurin and Taylor series. Polar coordinates and areas and lengths in polar coordinates.

MATH.1380 Calculus for the Life Sciences I (Formerly 92.138) - Credits: 4
This is a single variable calculus course with applications to the life sciences. Review of basic algebra, trigonometry, functions and graphs. Limits and derivatives, including differentiation rules, curve sketching and optimization problems. Implicit differentiation. Study of exponential and logarithmic functions motivated by growth, decay and logistic modes. Introduction to integration, techniques, applications and the fundamental theorem.

MATH.1390 Calculus for the Life Sciences II (Formerly 92.139) - Credits: 4
MATH.1410 Honors Calculus I (Formerly 92.141) - Credits: 4
This course covers the same topics as MATH.1310 Calculus I, but in an enriched environment.

MATH.1420 Honors Calculus II (Formerly 92.142) - Credits: 4
This course covers the same topics as MATH.1320 Calculus II, but in an enriched environment.

MATH.1510 Explorations in Mathematics (Formerly 92.151) - Credits: 3
This course is not so much about the mathematics of formulas, equations, rules and errors, as about mathematics that can be experienced: counted, drawn, seen, created; quite simply: played with. Officially, we will encounter concepts of combinatorics, geometry, number theory and Boolean logic. Unofficially, we will experiment with puzzles and patterns and develop as much mathematics from them as we can.
Prerequisites: high school mathematics and willingness to explore. No credit in science or engineering. This course satisfies the Quantitative Reasoning requirement.

MATH.2100 Functions and Modeling (Formerly 92.210) - Credits: 3
Engage in lab-based activities designed to strengthen their problem-solving skills and expand knowledge of the topics in secondary mathematics, focusing especially on topics from precalculus and the transition to calculus. Explore a variety of contexts that can be modeled using families of functions.
Topics include conic sections, parametric equations and polar equations. Multiple representations, transformations, data analysis techniques and interconnections among geometry, probability and algebra. Quantitative approaches and building relationships between discrete and continuous reasoning will be recurrent themes.

MATH.2190 Discrete Structures I (Formerly 92.321 and MATH.3210) - Credits: 3
Presents propositional logic, combinatorics, methods of proof, mathematical systems, algebra of sets, matrix algebra, relations and functions, recursion and generating functions, applications to computer science, and graph theory.

MATH.2210 Linear Algebra I (Formerly 92.221) - Credits: 3
Elementary set theory and solution sets of systems of linear equations. An introduction to proofs and the axiomatic methods through a study of the vector space axioms. Linear analytic geometry. Linear dependence and independence, subspaces, basis. Inner products. Matrix algebra. Applications of the above will also be discussed.

MATH.2220 Linear Algebra II (Formerly 92.222) - Credits: 3
Linear transformations, Linear operators, change of basis, inner product and the diagonalization problem. Quadratic forms. Convex sets and geometric programming, input/output models for an economy, Markov chains, other applications of linear algebra.

MATH.2250 Calculus C (Formerly 92.225) - Credits: 3
Serves as a continuation of MATH.1260. This course covers integration by parts, integration of trigonometric integrals, trigonometric substitution, partial fraction, numeric integration, improper integrals, L'Hopital's Rule, indeterminate forms, sequences, infinite series, integral tests, comparison tests, alternating series tests, power series, Taylor series, polar coordinates, graphs and areas in polar coordinates, and parametric equations.

MATH.2260 Calculus D (Formerly 92.226) - Credits: 3
Serves as a continuation of MATH.2250. This course covers curvature, cylindrical surfaces, dot and cross products, curves and planes in three space, cylindrical and spherical coordinates, functions of two variables, chain rule, directional derivatives and gradient, tangent planes, and double and triple integrals in rectangular, polar, cylindrical and spherical coordinate systems.

MATH.2270 Elementary Math for Teaching: Geometry and Measurement (Formerly 92.227) - Credits: 3
This is a mathematics content course which covers the geometry/measurement strands of the Massachusetts Curriculum Frameworks in Mathematics at a collegiate level. The goal is not only to prepare students for the elementary mathematics MTEL, but to lay the groundwork for graduate work in elementary mathematics education. The course centers around “Big Ideas” such as Equivalence, Proportionality, Transformations; and Shapes &Solids. No credit in Science or Engineering.

MATH.2310 Calculus III (Formerly 92.231) - Credits:
Extends the concepts of Calculus I and II that deal with functions of a single variable to multi-variable functions, vector-valued functions and vector fields. Vectors and vector-valued functions, the dot and cross products, curves in space and the calculus of vector-valued functions. Multi-variable functions, limits, continuity, and differentiation. Partial derivatives, directional derivatives, the gradient, Lagrange multipliers and optimization. Double and triple integrals in Cartesian, polar and spherical coordinates. Vector fields and the fundamental theorems of vector calculus developed, line and surface integrals, Green’s theorem, Stokes’s theorem, and the divergence theorem.

MATH.2320L Math Lab I (Formerly 92.232) - Credits: 1
An introduction to mathematics related software. Topics from Calculus & Differential Equations will be explored using a symbolic package like Maple. The course will also introduce LaTeX, the standard for typesetting mathematics.

MATH.2340 Differential Equations (Formerly 92.234) - Credits: 3

MATH.2360 Engineering Differential Equations (Formerly 92.236) - Credits: 3
Introduction to differential equations with an emphasis on engineering applications. Topics include first-order equations, higher-order linear equations with constant coefficients, and systems of first-order equations. Applications of each topic are introduced and qualitative, analytical, and numerical solution techniques are studied. Laplace transform methods are discussed. The software package MATLAB is used throughout the course for both analytical and numerical calculations.

MATH.2410 Honors Calculus III (Formerly 92.241) - Credits: 4
Covers the same topics as MATH.2310 Calculus II, but in an enriched environment.

MATH.2440 Honors Differential Equations (Formerly 92.244) - Credits: 3
Introductory to differential equations. Topics include first-order equations, second-order and higher-order linear equations, systems of first-order linear equations with constant coefficients, and Laplace transforms.

MATH.2720 Introduction to Programming with MATLAB (Formerly 92.272) - Credits: 3
This course will introduce basic programming concepts using MATLAB as the programming environment. Topics include an introduction to MATLAB, array manipulation, graphics, script files, data input and output, relational and logical operators, conditional statements, loops, and iterative procedures. Additional topics will be discussed as time permits. Additional topics will be chosen from the following: finding roots of nonlinear equations, random number generation, Markov processes, simple statistics, interpolation, and the basics of Fourier analysis.

MATH.2830 Introduction to Statistics (Formerly 92.283) - Credits: 3
An introduction to descriptive statistics, graphing and data analysis, probability laws, discrete and continuous probability distributions, correlation and regression, inferential statistics. No credit in Sciences (except Biology and EEAS) or Engineering. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

MATH.2830SI SI for Quantitative Reasoning & Introduction to Statistics (Formerly 92.111SI/92.2830SI) - Credits: 2
This course provides supplemental instruction in mathematics to students whose Elementary Algebra Accuplacer exam scores indicate the need for such instruction. The credits in this course can not be used to satisfy the credits required for graduation, but may be used to satisfy the credits required for full time student status.

MATH.3010 Introduction to Applied Mathematics I (Formerly 92.301) - Credits: 3
Discusses vector analysis, Green’s Theorem, Divergence Theorem, Stokes’ Theorem, Fourier series, integrals, and partial differential equations of physics and engineering.

MATH.3020 Introduction to Applied Mathematics II (Formerly 92.302) - Credits: 3
Introduces students to matrix algebra, solution of systems of linear equations, eigenvalues and eigenvectors, solution of differential equations by matrix methods, series solution of
differential equations, Bessel and Legendre functions, and Sturm-Liouville problems.

MATH.3220 Discrete Structures II (Formerly 92.322) - Credits: 3
Examines graph theory, trees, algebraic systems, Boolean algebra, groups, monoids, automata, machines, rings and fields, applications to coding theory, logic design, and sorting.

MATH.3300 Symbolic Logic (Formerly 92.330) - Credits: 3
An introduction to symbolic logic. Symbolic logic provides a framework of formal reasoning with applications in mathematics, cognitive science, computer science and philosophy. Topics include propositional logic, boolean algebras and rings, first-order logic and systems of deduction. Time permitting, we will touch on Tarski’s notion of model, and the completeness and incompleteness theorems of Godel.

MATH.3600 Mathematic Structure for Computer Engineers (Formerly 92.360) - Credits: 3

MATH.3620 Numerical Analysis I (Formerly 92.362) - Credits: 3
Focuses on the theory and application of numerical techniques including error analysis. Also discusses solution of linear, nonlinear and differential equations, interpolation, numerical integration, and curve fitting. Computer solutions are emphasized.

MATH.3630 Intro to Data Analysis (Formerly 92.363) - Credits: 3
Computer analysis of data derived from research conducted in physical, social, and life sciences. Data preparation. Data modification, file manipulation, and descriptive statistics using SPSS. Programming ability is not required. No credit in Science or Engineering.

MATH.3750 Senior Seminar I (Formerly 92.375) - Credits: 1
Student works with an advisor to develop a proposal for a senior project that will be carried out as part of MATH.4750 Senior Seminar II. Generally taken during the spring of the junior year. Prerequisite: Permission of instructor.

MATH.3810 Mathematical Physics (Formerly 92.381) - Credits: 3
Intended for students having completed 2 full years of physics and math, this course is designed to develop competency in the applied mathematical skills required of junior and senior level physics majors. Covering topics involving infinite series, power series, complex numbers, and linear algebra along with vector and Fourier analysis, students will be trained with the rigor required to solve a wide range of applications in the physical sciences. Physics majors only.

MATH.3850 Applied Statistics (Formerly 92.385) - Credits: 3
Introduction to experimental design, data analysis and formal statistical procedures from an applied point of view.

MATH.3860 Probability and Statistics I (Formerly 92.386) - Credits: 3
Provides a one-semester course in probability and statistics with applications in the engineering sciences. Probability of events, discrete and continuous random variables cumulative distribution, moment generator functions, chi-square distribution, density functions, distributions. Introduction to estimation, hypothesis testing, regression and correlation. No credit for both MATH.3860 and MATH.4070, Math majors should take MATH.4070.

MATH.4030 Mathematical Analysis (Formerly 92.403) - Credits: 3
The real numbers, completeness, sequences of real numbers, functions, continuity, uniform continuity, differentiability, the Riemann integral, series or real numbers, sequences and series of functions, uniform convergence, power series.

MATH.4070 Probability and Mathematical Statistics I (Formerly 92.407) - Credits: 3
Addresses the topics of probability, random variables, discrete and continuous densities, expectation and variance, special distributions (binomial, Poisson, normal, etc.), moment generating functions, joint and conditional distributions, transformations of variables, sampling, and the central limit theorem.

MATH.4100 Computers and Calculators in the Classroom (Formerly 92.410) - Credits: 3
This course explores the roles of mainframes, PC’s and hand calculators in instruction, examine some of the available software and consider their use in a variety of areas of secondary mathematics, such as algebra, geometry (Euclidean and analytic), probability and statistics and introductory calculus. No credit in Science or Engineering.

MATH.4110 Complex Variables I (Formerly 92.411/511) - Credits: 3
A first course in theory of analytic functions of one complex variable: complex differentiability and the Cauchy-Riemann equations, Cauchy Integral Theorem and Cauchy Integral Formula, Taylor and Laurent series, zeroes of analytic functions and uniqueness, the maximum modulus principle, isolated singularities and residues. Applications.

MATH.4130 Number Theory (Formerly 92.413) - Credits: 3
Studies congruencies and the Chinese Remainder Theorem, Primitive roots, quadratic reciprocity, approximation properties of continued fractions, Pell’s equation. Recent application of number theory such as primality testing, cryptology, and random number generation will also be covered.

MATH.4190 Mathematica - Credits: 3
A project-based course starting with an introduction to the basic features of Mathematica. A project that allows the student to focus on certain features in more detail is required and occupies the second half of the course.

MATH.4200 Mathematical Problem Solving (Formerly 92.420/520) - Credits: 3
Focuses on: mathematical resources, ability to use heuristics, the student’s beliefs about the use of mathematics to solve problems, and the student’s self-confidence as a problem solver. Effective strategies for incorporating problem solving in the curriculum will also be discussed.

MATH.4210 Abstract Algebra I (Formerly 92.421/521) - Credits: 3
Elementary group theory, groups, cosets, normal subgroups, quotient groups, isomorphisms, homomorphisms, applications.

MATH.4260 Topology (Formerly 92.426/526) - Credits: 3
Metric spaces, topological spaces, connectedness, compactness, the fundamental group, classifications of surfaces, Brouwer’s fixed point theorem.

MATH.4270 Geometry (Formerly 92.427/527) - Credits: 3
This course is designed for current and prospective geometry teachers. In addition to the development of Euclidean geometry, students will become familiar with geometry applications in Geometer’s Sketchpad software, and to a lesser degree with other geometry software applications including Geogebra, and Cabri. There will be an introduction to spherical and hyperbolic geometry and triangle measurements will be computed for each. Calculus based derivations of area and volume for surfaces and solids will be generated and related to Euclidean geometry topics.

MATH.4350 History of Mathematics (Formerly 92.435/535) - Credits: 3
Examines ancient numeral systems, Babylonian and Egyptian mathematics, Pythagorean mathematics, duplication, trisection, and quadrature, Euclid's elements and Greek mathematics after Euclid, Hindu and Arabian mathematics, European mathematics from 500 to 1600, origins of modern mathematics, analytic geometry, the history of calculus. Also covers the transition to the twentieth century and contemporary perspectives.

MATH.4450 Partial Differential Equations (Formerly 92.445) - Credits: 3

MATH.4480 Mathematics of Signal Processing (Formerly 92.448) - Credits: 3

MATH.4500 Mathematical Modeling (Formerly 92.450) - Credits: 3
Applications of mathematics to real life problems. Topics include dimensional analysis, population dynamics wave and
heat propagation, traffic flow.

MATH.4660 Stat Program Using SAS (Formerly 92.466) - Credits: 3

An introduction to creation and manipulation of databases and statistical analysis using SAS software. SAS is widely used in the pharmaceutical industry, medical research and other areas. Cannot be used as a Math Elective.

MATH.4750 Senior Seminar II (Formerly 92.475) - Credits: 3

Undergraduate seminar on advanced mathematical topics. Students are required to develop an understanding of an advanced subject beyond the scope of an existing course or synthesize two or more different areas form their curriculum. Students are required to participate in the seminar, present their results to the Department and write a substantial thesis in their topic area. Essential course elements include library research, original research, and both verbal and written exposition. The first semester is a graduation requirement for majors in mathematics.

MATH.4760 Senior Seminar III (Formerly 92.476) - Credits: 3

An optional second semester seminar to allow for continuation of study initiated in Senior Seminar I.

MATH.4860 Probability and Math Statistics II (Formerly 92.486) - Credits: 3


MATH.4900 Selected Topics (Formerly 92.490) - Credits: 1-3

Individual study for the student desiring more advanced or more specialized work. Course may not be substituted for scheduled offerings. Prerequisite: Permission of Department Chair.

MATH.4910 Directed Study in Algebra (Formerly 92.491) - Credits: 3

Individual study for the student desiring more advanced or more specialized work in algebra. May be repeated for a total of six semester credits. Course may not be substituted for scheduled offerings.

MATH.4940 Directed Study in Statistics (Formerly 92.494) - Credits: 3

Individual study for the student desiring more advanced or more specialized work in Statistics. May be repeated for a total of six semester credits. Course may not be substituted for scheduled offerings. Prerequisite: Permission of Department Chair.

MATH.4960 Mathematics Practicum (Formerly 92.496) - Credits: 1-3

Unpaid internship in the Department of Mathematical Sciences. This allows students to receive up to 3 (free elective) credits while working on an approved project. Students who have a position and who wish to take advantage of this Practicum should see the department Internship Coordinator.

MATH.5000 Discrete Structures (Formerly 92.500) - Credits: 3

An introduction to discrete mathematics, including combinatorics and graph theory. The necessary background tools in set theory, logic, recursion, relations, and functions are also included. Masters degree credit for Teacher Option Only.

MATH.5010 Real Analysis (Formerly 92.501) - Credits: 3

The class is aimed to give rigorous foundations to the basic concepts of Calculus such as limits of sequences and functions, continuity, Riemann integration. The main focus is given to rigorous proofs rather than computations. Tentative topics are: Real numbers (algebraic, order and distance structures); Archimedean property; Sequences and their limits. Bolzano-Weierstrass theorem; Cauchy sequences and completeness; Limit of a function; Continuity of a function at a point and on a set; Uniform continuity; Open and closed sets, idea of compactness, compactness of a closed interval; Sequences of functions, uniform convergence; Riemann integration. Prerequisites: Calculus I-III or equivalent, Discrete Structures or equivalent.

MATH.5070 Applied Functional Analysis I (Formerly 92.507) - Credits: 3

Metric spaces, completeness, contractions, compactness, the Arzela-Ascoli theorem, Picard’s theorem, Weierstrass’s theorem. Banach spaces, dual spaces, weak v’s strong convergence. Hilbert spaces, orthogonal sequences, weak sequential compactness, compact self-adjoint operators and
their spectra, application to Sturm-Liouville theory.

MATH.5090 Probability and Mathematical Statistics
(Formerly 92.509) - Credits: 3
This course provides a solid basis for further study in statistics and data analysis or in pattern recognition and operations research. It is especially appropriate for students with an undergraduate science or engineering major who have not had a rigorous calculus-based probability and statistics course. The course covers the topics in probability models, random variables, expected values, important discrete and continuous distributions, limit theorems, and basic problems of statistical inference: estimation and testing.

MATH.5100 Computers and Calculators in Classroom
(Formerly 92.510) - Credits: 3
Explores the roles of computers and calculators in instruction, examines some of the available software, and considers their use in a variety of areas of school mathematics, such as algebra, geometry (Euclidean and analytic) probability and statistics, and introductory calculus. Mathematics Masters degree credit for Teacher Option Only.

MATH.5110 Complex Variables I (Formerly 92.411/511) - Credits: 3
A first course in theory of analytic functions of one complex variable: complex differentiability and the Cauchy-Riemann equations, Cauchy Integral Theorem and Cauchy Integral Formula, Taylor and Laurent series, zeroes of analytic functions and uniqueness, the maximum modulus principle, isolated singularities and residues. Applications.

MATH.5130 Number Theory (Formerly 92.513) - Credits: 3
Study of primes, congruences, number-theoretic functions, Diophantine approximation, quadratic forms and quadratic number fields. Additional topics as time permits.

MATH.5200 Mathematical Problem Solving
(Formerly 92.420/520) - Credits: 3
Focuses on: mathematical resources, ability to use heuristics, the student’s beliefs about the use of mathematics to solve problems, and the student’s self-confidence as a problem solver. Effective strategies for incorporating problem solving in the curriculum will also be discussed.

MATH.5210 Abstract Algebra I (Formerly 92.421/521) - Credits: 3
Elementary group theory, groups, cosets, normal subgroups, quotient groups, isomorphisms, homomorphisms, applications.

MATH.5230 Linear Algebra (Formerly 92.523) - Credits: 3
Sets and maps; vector spaces and linear maps, matrix of linear maps, solving systems of equations, scalar products and orthogonality, eigenvalues and applications. Masters degree credit for Teachers Option Only.

MATH.5260 Topology (Formerly 92.426/526) - Credits: 3
Metric spaces, topological spaces, connectedness, compactness, the fundamental group, classifications of surfaces, Brouwer’s fixed point theorem.

MATH.5270 Geometry (Formerly 92.427/527) - Credits: 3
This course is designed for current and prospective geometry teachers. In addition to the development of Euclidean geometry, students will become familiar with geometry applications in Geometer’s Sketchpad software, and to a lesser degree with other geometry software applications including Geogebra, and Cabri. There will be an introduction to spherical and hyperbolic geometry and triangle measurements will be computed for each. Calculus based derivations of area and volume for surfaces and solids will be generated and related to Euclidean geometry topics.

MATH.5300 Applied Mathematics I (Formerly 92.530) - Credits: 3
Infinite Series, Complex Algebra, Ordinary Differential Equations, Special Functions, Fourier Series, Vector Spaces, Operators and Matrices.

MATH.5310 Applied Mathematics II (Formerly 92.531) - Credits: 3

MATH.5350 History of Mathematics (Formerly 92.435/535) - Credits: 3
Examines ancient numeral systems, Babylonian and Egyptian mathematics, Pythagorean mathematics, duplication, trisection, and quadrature, Euclid’s elements and Greek mathematics after Euclid, Hindu and Arabian mathematics, European
mathematics from 500 to 1600, origins of modern mathematics, analytic geometry, the history of calculus. Also covers the transition to the twentieth century and contemporary perspectives.

MATH.5450 Partial Diff Equations (Formerly 92.545) - Credits: 3

MATH.5500 Mathematical Modeling (Formerly 92.550) - Credits: 3
Applications of mathematics to real life problems. Topics include dimensional analysis, population dynamics wave and heat propagation, traffic flow. Pre-requisite: 92.132 Calculus II.

MATH.5510 Calculus of Variations (Formerly 92.551) - Credits: 3
The first variational problem, necessary conditions. Euler’s equation. Generalization to dependent and independent variables. Constraints and Lagrange multipliers. Application to dynamics and elasticity. Direct methods.

MATH.5550 Applied Math for Life Scientists (Formerly 92.555) - Credits: 3
The objective of this course is to give students an opportunity to learn how to use a computer algebra system in the context of reviewing some of the key mathematical topics that are used in the life sciences. The first half of the course includes a review of mathematical topics ranging from trigonometry through differential equations. A parallel introduction to a computer algebra system is also included in the first half. In the second half, students will study a mathematical topic such as pattern recognition or models for growth and complete a project using the computer algebra system. (UMassOnline).

MATH.5630 Computational Mathematics (Formerly 92.563) - Credits: 3

MATH.5640 Applied Linear Algebra (Formerly 92.564) - Credits: 3
Use of iterative algorithms to find exact or approximate constrained solutions to large, and often spares, systems of linear equations, and on applications, such as medical imaging, in which such problems arise. Maximization of likelihood and entropy. Emphasis on exploiting sparseness, accelerating convergence, and stabilizing calculations in the presence of noise. Block-iterative methods and bounds for singular values will be included. Basic results in matrix theory presented as needed.

MATH.5650 Special Functions (Formerly 92.565) - Credits: 3
Introduction to functions beyond those studied in calculus and which arise in applied mathematics, including gamma, beta, elliptic, Bessel, orthogonal polynomials ... Asymptotic approximation will be introduced.

MATH.5680 Approximation Theory (Formerly 92.568) - Credits: 3
MATH.5720 Optimization (Formerly 92.572) - Credits: 3
Optimization without calculus; geometric programming; convex sets and convex functions; review of linear algebra; linear programming and the simplex method; convex programming; iterative barrier-function methods; iterative penalty-function methods; iterative least-squares algorithms; iterative methods with positivity constraints; calculus of variations; applications to signal processing, medical imaging, game theory.

MATH.5750 Applied Statistics with R (Formerly 92.575) - Credits: 3
This is a methods course focusing on the applications of statistics using R programming language. Topics include: Study designs, review of inference and regression, categorical data, logistic regression, rates and proportions, and nonparametric methods. Additional topics may be considered if time permits. Only one of 92.575(R) and 92.576(SAS) may be applied toward a Masters degree in Mathematics.

MATH.5760 Statistical Programming using SAS (Formerly 92.576) - Credits: 3
An introduction to creation and manipulation of databases and statistical analysis using SAS software. SAS is widely used in
the pharmaceutical industry, medical research and other areas. Cannot be used as a Math Elective.

**MATH.5780 Statistical Inference and Data Mining** (Formerly 92.578) - Credits: 3

Topics in nonasymptotic direct computational methods for statistical inference in data mining. Background in probability and statistics required.

**MATH.5840 Stochastic Process** (Formerly 92.584) - Credits: 3

Markov chains and processes, random walks, stationary, independent increments, and Poisson processes. Ergodicity. Examples (e.g., diffusion, queuing theory, etc.).

**MATH.5870 Measure and Probability Theory** (Formerly 92.587) - Credits: 3

This course presents the mathematical foundations of Probability Theory, including the concepts of Probability Space and random variable. Various types of convergence of sequences and measurable functions will be introduced, and precise statements and proofs of the probability limit theorems (Law of Large Numbers, Central Limit Theorems, etc.) will be given. Theory of measure and Lebesgue integration will be introduced. If time permits, conditional probabilities will be discussed.

**MATH.5880 Mathematical Statistics** (Formerly 92.588) - Credits: 3

Random variables, densities, joint and conditional distributions, expectations, variance, estimation, sufficiency and completeness, hypothesis testing, limiting distributions.

**MATH.5900 Statistical Quality Control** (Formerly 92.590) - Credits: 3

Overview of quality and managing quality, Define Measure Analyze Improve Control (DMAIC), the six sigma approach to quality, visual representation of data, Pareto charts, histograms, process capability vs specification (process) limits, t-tests, ANOVA, and other statistical hypothesis testing in quality, normal probability plots, control charts, measurement system analysis, application of regression analysis to manufacturing and/or design, Minitab.

**MATH.5910 Linear Statistics Modeling and Regression** (Formerly 92.591) - Credits: 3


**MATH.5920 Multivariate Statistics** (Formerly 92.592) - Credits: 3

Nonlinear model building via the method of least squares. Discriminant and factor analysis, principal components, profile analysis, canonical correlation, cluster analysis. Experience on real data sets.

**MATH.5930 Experimental Design** (Formerly 92.593) - Credits: 3

How to design, carry out, and analyze experiments. Randomized block designs, randomization, blocking, matching, analysis of variance and covariance, control of extraneous variables.

**MATH.6510 Selected Topics in Mathematics** (Formerly 92.651) - Credits: 3

Intended to satisfy individual student needs. Topics include various fields of mathematics.

**MATH.6530 Selected Topics** (Formerly 92.653) - Credits: 3

Advanced topics in various fields of mathematics and related fields. Since topical coverage varies from term to term, a student may be allowed to receive credit more than once for this course.

**MATH.7420 Thesis Review** (Formerly 92.472) - Credits: 1

**MATH.7430 Master's Thesis in Mathematical Sciences** (Formerly 92.743) - Credits: 3

Master's Thesis Research.

**MECH.1010 Kinetic Projects** - Credits: 3

Kinetic Projects is a hybrid course designed for a variety of majors to explore the intersections between mechanical engineering and sculpture. In this project-driven class, students will learn principles and practice in both the fields of engineering and art, and put them into practice by creating functioning kinetic objects to be displayed in a public setting. The course will also include guest lectures from practitioners in Art and Engineering. The course also provides an introduction to technical communications, teamwork, data analysis,
computer coding, and introduction to CAD prototyping, report-writing and/or oral presentation.

**MECH.1070 Introduction to Mechanical Engineering**  
(Formerly 22/25.107) - Credits: 2

This course provides a hands-on introduction to mechanical engineering and the engineering design process. Through assignments and projects, students learn how to: identify a problem, develop alternative solutions, select the best alternative, make critical decisions, and work as a team. Lecture and lab component.

**MECH.1CO-OP Curricula Practical Training** - Credits: 0-1

Curricula Practical Training. "Variable credit course, student chooses appropriate amount of credits when registering."

**MECH.2000 Mechanical Engineering Project I**  
(Formerly 22.200) - Credits: 1

Students work on engineering design/build/test (DBT) projects under the supervision of a mechanical engineering faculty member. Projects can include student club based DBT projects.

**MECH.2010 Computer Aided Design**  
(Formerly 22.201) - Credits: 2

Course emphasis is on introducing the use of computer aided design tools in the engineering problem solving process. Assigned design projects require the use of both wire frame and solid modeling tools. Lecture and lab activities are used to support project requirements, and to provide more in-depth understanding of computer aided engineering design and drawing.

**MECH.2020 Manufacturing Laboratory**  
(Formerly 22.202) - Credits: 2

This is an introductory course in manufacturing processes covering the basic machine tool practices utilized in the manufacturing of a product. The objective of the course is to develop a broad understanding of manufacturing operations and their relationship to engineering product design. Students manufacture, fabricate and measure the accuracy of a mechanical assembly from design drawings, using lathes, milling machines, drill presses and other conventional processes.

**MECH.2420 Thermodynamics**  
(Formerly 22.242) - Credits: 3

The first and second laws of thermodynamics are introduced and applied to the analysis of thermodynamic systems in terms of work, heat, energy transformation, and system efficiency. The use of tables, graphs, and equations of state is introduced to obtain various properties of pure substances. The concepts of work, heat and energy, as well as their relationships, are studied. The theory and application of reversible and irreversible thermodynamic process, Carnot cycles, and entropy are studied in relation to the energy analysis of engineering systems. Energy balances and ideal efficiencies of steady flow engineering systems are analyzed.

**MECH.2960 Materials Science for Engineers**  
(Formerly 22.296) - Credits: 3

Properties and characterization of engineering materials. The behavior of engineering materials is studied experimentally to develop an understanding of properties important in materials selection and engineering design. Structure-property-processing relationships are discussed. Topics include stress, strain, strength, stiffness, thermal expansion, hardness, tensile and bending tests, strain gages, corrosion, microstructure of metals, polymers, ceramics and composites.

**MECH.3000 Mechanical Engineering Project II**  
(Formerly 22.300) - Credits: 1

Students work on engineering design/build/test (DBT) projects under the supervision of a mechanical engineering faculty member. Projects can include student club based DBT projects.

**MECH.3020 Instrumentation and Measurement Laboratory**  
(Formerly 22.302) - Credits: 3

Students set up and conduct specific experiments designed to study: 1) fundamental ME instrumentation systems; 2) fundamental experimental techniques and 3) basic physical principles of mechanical systems. Experiments are divided into two areas; solid-mechanical and thermo-fluids. Students develop models for use in validating and comparing with experimental results. Written communication techniques are emphasized.

**MECH.3110 Applied Strength of Materials**  
(Formerly 22.311) - Credits: 3

Strength of materials principles are applied to the stress analysis of machine components and structures. The effects of buckling and combined bending, torsion, and axial loadings are studied together with the effects of stress risers due to geometrical complexities. Topics include: 3D stress transformations; principal stresses; Mohr’s circle; failure criteria; torsion of non-circular and hollow cross sections; stress concentration factors; equilibrium and energy
methodsglobal and local buckling; introduction to finite element methods; introduction to composites.

MECH.3210 Kinematics of Mechanisms (Formerly 22.321) - Credits: 3

Design and kinematic analysis of mechanisms. Course topics include linkage synthesis and motion analysis (position, velocity and acceleration), cam, gear and power train design, and technical communication. This course meets the Essential Learning Outcome of Critical Thinking and Problem Solving as defined under the Core Curriculum requirements. As such, the course will reinforce the students’ ability to identify, analyze, interpret, and evaluate arguments, data, evidence, problems, and conclusions as part of formulating an opinion or conclusion, and then use that information to design, evaluate and implement a strategy to achieve a desired outcome.

MECH.3220 Control of Mechanical Systems (Formerly 22.322) - Credits: 3

Design of cams and gear trains and control of mechanical devices. Course topics include: cam sizing and manufacture, cam and gear train kinematics, dynamic force analysis, machine balancing, introduction to the control of mechanical systems. The major project involves the design, analysis, manufacture, and dynamic testing of a cam having specified performance requirements; computer aided design (CAD) and computer numerically controlled (CNC) milling machines are applied. Dynamic simulation (MATLAB) is used throughout the course.

MECH.3410 Conduction & Radiation Heat Transfer (Formerly 22.341) - Credits: 3

The theory of steady state and transient heat conduction in solids is developed and applied. The concepts of Biot and Fourier numbers are covered and their applications are studied. The principals of thermal radiation with application to heat exchange between black and non-black body surfaces are studied. The use of radiation networks (electrical network analogy) is examined. Surface radiation properties are extensively covered. Design projects are integrated into the course.

MECH.3420 Convective Processes (Formerly 22.342) - Credits: 3

Internal and external flows with friction, Reynolds number, laminar and turbulent flows. Mathematical development of the hydrodynamic boundary layer. Boundary layer separation and fluid dynamic drag. Flow in pipes. Forced and free convective heat transfer, the thermal boundary layer, Reynolds’ analogy, Prandtl and Grashof numbers. Empirical engineering convection relations. Students engage in a design project throughout the term.

MECH.3610 Mathematical Methods for Mechanical Engineers (Formerly 22.361) - Credits: 3

This course focuses of the application of a variety of mathematical techniques to solve engineering problems. Topics include, error analysis, root finding, optimization, linear algebra, solutions to linear and non-linear systems, statistics, curve fitting, eigen value analysis, Fourier analysis, numerical integration and differentiation as well as numerical solutions to ordinary differential equations. MATLAB program development and modification as well as application of existing codes are required.

MECH.3810 Fluid Mechanics (Formerly 22.381) - Credits: 3

A calculus-based engineering course which deals with the development of basic fluid mechanic relations. Emphasis is placed on the control-volume approach for solving problems. Topics include fluid behavior and fluid properties: hydrostatic pressure and forces; buoyancy and stability; continuity, momentum, and Bernoulli equations; similitude and dimensional analysis; scale analysis and modeling; internal and external flows with friction; Reynolds number; laminar and turbulent flows; mathematical development of the hydrodynamic boundary layer; boundary layer separation and fluid dynamic drag; fluid flow in pipes and ducts; friction and minor losses.

MECH.3820 Heat Transfer (Formerly 22.382) - Credits: 3

A calculus-based engineering course providing treatment of the fundamental modes of heat transfer. Topics include: steady-state and transient heat conduction in solids; forced and natural convection; the concept of thermal boundary layer; scale analysis and dimensionless number such as Reynolds, Prandtl, and Grashof numbers; Reynolds analogy; empirical engineering convection relations; thermal radiation involving heat exchange between black and non-black body surfaces.

MECH.4000 Mechanical Engineering Project III (Formerly 22.400) - Credits: 1

Students work on engineering design/build/test (DBT) projects under the supervision of a mechanical engineering faculty member. Projects can include student club based DBT projects. Completion of 22.400, 22.300, and 22.200 can count as a mechanical engineering technical elective (academic petition required).

MECH.4030 Thermal Fluids Laboratory (Formerly 22.403) - Credits: 3
22.403) - Credits: 3
Continuation of Mechanical Engineering Lab I. Focuses on digital data acquisition systems used on mechanical engineering equipment. Students design measurement systems composed of various transducers, their associated signal conditioners and digital data acquisition and recording devices. Statistical methods are emphasized. Experiments require the students to provide calibration and to select appropriate sampling rates and test durations. Systems under test range from simple multisensor laboratory apparatus to actual operating mechanical systems. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

MECH.4040 Advanced Mechanical Dynamic Measurement Systems (Formerly 22.404) - Credits: 3
This course is an extension of 22.302 Mechanical Engineering Lab I, and extends the laboratory measurements for a wide variety of dynamic systems applications including first order and second order systems using both time domain and frequency domain approaches for the measurement and analysis of dynamic response. Lectures will delve into more depth on time domain digital signal processing (extending the ME lab I course material) and progress into frequency domain representations of time response. This course counts as a mechanical engineering technical elective.

MECH.4230 Capstone Design (Formerly 22.423) - Credits: 3
Students perform independent design work and participate in team efforts to develop conceptual designs from functional requirements. Perform design analysis and synthesis, modeling, fabrication, testing, cost estimating, and documenting the essential elements of the system design. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL), Information Literacy (IL), and Written & Oral Communication (WOC).

MECH.4250 Design of Machine Elements (Formerly 22.425) - Credits: 3
The principles of mechanics and commonly used failure theories are applied to the design and analysis of machine elements subjected to static and dynamic (fatigue) load conditions. Elements studied include power screws, bolts, springs, bearings, gears, lubrication, shafts, brakes, clutches, and belts.

MECH.4260 Green Energy Engineering (Formerly 22.426) - Credits: 3
Introduces a comprehensive range of green energy sources, and the tools and techniques to use that energy. A strong emphasis is given to residential applications, particularly those that are cost effective. Topics include solar energy, photovoltaic, water power, wind power, geothermal heating, and bio-fuel production and use. Course will also investigate architectural considerations essential to effective implementation of green energy. Course is open to Seniors in engineering and science and those with a solid knowledge of vector notations and college algebra. Familiarity with the MATLAB computing environment would be useful.

MECH.4280 Fundamentals of Engineering (ME) Review (Formerly 22.428) - Credits: 3
This is a review course for students planning on taking the Mechanical Engineering version of the Fundamentals of Engineering (FE) Exam. Lectures will review theory, and students will be required to complete representative multiple-choice practice and test questions. Subject areas to be covered are as follows: mathematics and statistics, computers, ethics and economics, electromagnetism, engineering mechanics, materials, thermal fluids, measurement and instrumentation, dynamic systems and controls, and ME design and analysis. FE exam protocols will also be reviewed. The course counts as a mechanical engineering technical elective. Taking and/or passing the FE exam is not required in order to pass this course.

MECH.4410 Thermo-fluid Applications (Formerly 22.441) - Credits: 3
Topics covered include: heat exchanger analysis and design; thermodynamic analysis of: gas power cycles, steam and combined cycles, and refrigeration cycles; mixtures of ideal gases; air-vapor mixtures and psychometric charts with application to air conditioning systems; flow of a compressible fluid through a variable area passage: Mach number, choking conditions, and normal shock.

MECH.4420 Thermo-fluid Systems Design (Formerly 22.442) - Credits: 3
Application of the principles of thermodynamics, fluid mechanics and heat transfer to the design of thermo-fluid systems. Techniques will be presented for modeling, simulation, and economic analysis. The evolution of thermo-fluid systems from the Industrial Revolution to state-of-the-art systems as well as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability of systems will be studied. Use and regulation of thermo-fluid systems on a global and regional scale will be investigated. Systems to be studied and designed include combined power cycles, trigeneration (combined power, heating, and cooling) as well as energy storage systems.
MECH.4510 Dynamic Systems Analysis (Formerly 22.451) - Credits: 3

Dynamic modeling of mechanical, electrical, electromechanical, hydraulic and thermal components. Application of ordinary differential equations, Laplace transforms, and numerical simulation for the response of these systems; response due to initial conditions and to transient and sinusoidal inputs using both time and frequency domain approaches considered. Use of block diagrams and numerical simulation using MATLAB and Simulink for linear time invariant systems is emphasized. Project work includes model identification and synthesis from measured data for first and second order systems.

MECH.4530 Mechatronics (Formerly 22.453) - Credits: 3

Devices and methods to monitor and control mechanical systems, with particular emphasis on the use of embedded microprocessors.

MECH.4730 Design Theory and Constraints (Formerly 22.473) - Credits: 3

Concepts of world class design and manufacturing of modern products, including the issues of Design for Quality (DFQ), cost and the customer will be studied. Tools and techniques to be studied include Total Quality Management (TQM), statistical process control, process capability studies, six sigma quality, design efficiency ratings, design for cost, design of experiments, Analysis of Variance (ANOVA) of the mean and signal-to-noise ratio, and quality function deployment. Industrial case studies are used and student project work is required.

MECH.4830 Aerodynamics and Flight Mechanics (Formerly 22.483) - Credits: 3


MECH.4860 Ocean Engineering (Formerly 22.486) - Credits: 3


MECH.4910 Industrial Experience I (Formerly 22.491) - Credits: 1-3

MECH.4920 Industrial Experience II (Formerly 22.492) - Credits: 3

MECH.4930 Industrial Experience III (Formerly 22.493) - Credits: 3-9

MECH.4991 Directed Studies in Mechanical Engineering (Formerly 22.499) - Credits: 1-3

This course provides seniors in Mechanical Engineering with the opportunity to pursue the study of a technical topic or project, individually under the supervision of a faculty member and, if desired, a responsible project engineer from industry. The course is to result in a term paper or technical report.

MECH.5010 Graduate Research Seminar - Credits: 0-1

Research seminar for students to listen to and engage with engineering-relevant researchers. Invited speakers will present recent research advances in fields relevant to mechanical engineering, and engage with the audience through a question and answer session. "Variable credit course, student chooses appropriate amount of credits when registering."

MECH.5040 Energy Engineering Workshop (Formerly 22.504) - Credits: 3

A group design of an innovative energy system. Integration of many aspects of the student’s engineering background, including design concepts, technical analyses, economic and safety considerations. Ideally the whole design cycle of design, build, test. A formal report and oral presentation.

MECH.5050 Directed Studies - ME (Formerly 22.505) - Credits: 1-3

MECH.5100 Dynamics and Diagnostics of Rotating Machinery (Formerly 22.510) - Credits: 3

Course provides the theoretical and practical background in the fundamentals of dynamics and diagnostics of rotating machinery. The course starts with an overview of rotating machinery components and systems with emphasis on their designs, and then builds and in-depth understanding of the dynamics of rotating systems by analyzing the design and dynamics of their component. Diagnostics, health monitoring, and associated signal processing theories regarding rotating machinery are emphasized, with applied examples such as
aircraft engines, gas turbines, rotorcrafts, wind turbines, and automotive drivetrains, along with other turbomachines.

**MECH.5110 FEA of Textiles and Composites - Credits: 3**

This course covers applications of finite element analysis to the mechanical behavior of textiles and composites, including topics such as mechanics of orthotropic materials, elasticity and strength of laminates, computational micromechanics, meso-scale finite element modeling, material testing, modeling techniques. These topics will be studied using software packages such as Abaqus and Matlab.

**MECH.5120 Applied Finite Element Analysis (Formerly 22.512) - Credits: 3**

An introduction to finite element methods using popular commercial packages. The features common to different programs as well as special features of particular programs are presented. Primary focus is on hands-on familiarity with the software with a limited discussion of the underlying finite element theory. ALGOR, ADINA, ABAQUS, LS-DYNA, HyperMesh, and FEMAP are among the pre/post-processing and analysis packages used in the class. This is a WWW based course and access to a PC, the Internet, and a frames-capable browser is required.

**MECH.5130 Theory of Finite Element Analysis (Formerly 22.513) - Credits: 3**

Matrix algebra and the Rayleigh-Ritz technique are applied to the development of the finite element method. The minimum potential energy theorem, calculus of variations, Galerkin’s and the direct-stiffness method are used. Restraint and constraint conditions are covered. C0 and C1 continuous shape functions are developed for bar, beam, and two and three dimensional solid elements. Recovery methods, convergence and modeling techniques are studied. Applications to problems in static stress analysis and heat conduction.

**MECH.5140 Finite Element Analysis of Composites (Formerly 22.514) - Credits: 3**

**MECH.5150 Structural Dynamic Modeling Techniques (Formerly 22.515) - Credits: 3**


**MECH.5160 Experimental Modal Analysis (Formerly 22.516) - Credits: 3**

Prerequisite: 22.4xx/5xx Experimental Modal Analysis I (or permission of instructor) Review of system transfer and FRF matrices for development of a modal model. Review of DSP techniques for experimental modal analysis. Excitation techniques for the development of the system FRF matrix; SISO and MIMO techniques. Modal parameter estimation using time and frequency domain techniques. Advanced data manipulation for dynamic analysis. Introduction to structural dynamic modification and system modeling concepts. Models developed using MATLAB and commercially available software.

**MECH.5170 Structural Dynamics (Formerly 22.517) - Credits: 3**

Prerequisite: MECH.5150 Development of system equations of motion for m dof systems. Proportional and non-proportional damping. Dynamic response using mode superposition, maximum response, frequency domain techniques and direct integration using central difference, Runge-Kutta, Wilson theta, and other techniques. Models developed using MATLAB.

**MECH.5180 Signal Proc Techniques (Formerly 22.518) - Credits: 3**

The course covers analytical/numerical modeling and analysis of signal processing. The course topics include: Fourier Series, Linear Systems and Transfer Functions, Laplace Transforms, Analog filters, Fourier Transforms, Analog to Digital Conversion (A/D &D/A), Quantization, Sampling and Nyquist Theorem, Aliasing, Discrete Fourier Transform (DFT), Windowing &Leakage, FFT &STFT, Spectrograms, Spectral Analysis and Estimation, Convolution, ARMA processes, Correlation, Coherence, Kurtosis, Multi-rate filters and the Wavelet Transform , FIR &IIR Filters, Adaptive Filters, Signal Processing Hardware and Implementation.

**MECH.5190 Engineering Spectral Analysis (Formerly 22.519) - Credits: 3**

Analytical and experimental background for the fundamental understanding of time and frequency domain signals, required for digital signal processing, vibration, and acoustic signal analysis. Introductory theory is based on simplified concepts form different mechanical signatures in the time domain. The spectral conversion from time domain to frequency domain is illustrated from a phenomenological perspective using examples and dynamic signal analyzer illustrations. The concepts of vibration and acoustic measurement methods are studied through practical projects and LabVIEW exercises. Students will be prepared for more advanced topics on
dynamic systems, controls, vibrations, advanced signal processing, acoustics, and experimental structural dynamics. Familiarity with Matlab required.

**MECH.5200 Numerical Methods for Partial Differential Equations (Formerly 22.520) - Credits: 3**

Mathematical approaches for numerically solving partial differential equations. The focus will be (a) iterative solution methods for linear and non-linear equations, (b) spatial discretization and meshing (c) finite difference methods (FDM), (d) finite volume methods (FVM), (e) finite element methods (FEM) and (f) boundary element methods (BEM). The theory behind of each of these methods will be developed and discussed. Computer programming applications involving the solution of linear and non-linear PDEs in multiple dimensions will play a key role in this course. Unique computer programming assignments will be selected from different engineering/science fields (possibilities include: fluid flow, heat transfer, electrostatics, electromagnetism, structural analysis, medical, ocean engineering etc.) to illustrate the broad applicability of numerical methods. Students will be expected to complete programming assignments -- while most class examples will deal with pseudo code and/or matlab, a working knowledge of one of the following programming languages is recommended: Matlab, Octave, C, C++, fortran, Java, BASIC, or Python.

**MECH.5210 Solar Fundamentals (Formerly 22.521) - Credits: 3**

Utilization Terrestrial irradiation on tilted surfaces; radiation, conduction, convection in collectors; absorptance, emittance, reflection, transmittance of solar irradiation; energy flow in flat plate and concentrator collectors; storage; design tools; small project; web-based.

**MECH.5220 Wind Energy Fundamentals - Credits: 3**

An overview of all aspects of wind energy power generation: The nature of and statistics of wind, turbine siting requirements, aerodynamics of the rotor system, mechanical power transmission, generators, blade construction, structural analysis of turbine components, electrical power distribution.

**MECH.5230 Structural Health Monitoring (Formerly 22.523) - Credits: 3**

Detail the entire process of structural health monitoring applications, including operational evaluation, data acquisition, normalization and cleansing, feature extraction and data compression, and statistical model development and pattern recognition. Aiming at detecting, localizing, and evaluating the damage severeness, topics that will be covered in this course include: sensors and sensor networks, signal processing and detection theory, nondestructive evaluation techniques, time and frequency modeling, damage prognosis, unsupervised/ supervised learning, probability and statistics in feature evaluation. Case study of SHM activities will be conducted throughout the entire course, including mechanical, aerospace and civil structures.

**MECH.5240 Fund of Acoustics (Formerly 22.524) - Credits: 3**

Fundamentals of acoustics are introduced. Topics include: Motivation for studying acoustics, oscillatory motion, harmonic waves, the wave equation, sound pressure levels, decibel scale, frequency analysis, sound power, intensity, acoustic sources, directivity, sound radiation, sound power measurement, sound in enclosures, acoustic mode shapes, reverberation time, sound absorbing material, impedance, transmission loss, cavity resonators, reactive and dissipative mufflers, and applications to noise control.

**MECH.5250 Grid-Connected Solar Electric Systems (Formerly 22.525) - Credits: 3**

Students will study the concepts and design considerations of grid-connected, solar-powered, electrical generation systems, from residential through utility scale. Emphasis will be on practical applications that help make the student “work ready” at graduation. Grading consists of two tests during semester; one individual project (residential scale PV system); and one group project (commercial-scale system). This course fulfills an elective requirement for renewable energy students.

**MECH.5260 Transport Processes in Energy Systems (Formerly 22.526) - Credits: 3**

Course focuses on the development of a fundamental understanding of transport processes from a multi-scale and multi-physics perspective, and the application of such understanding to the analysis of energy engineering systems. Derivations of the equations describing the mechanisms for mass, momentum, and energy transport are presented, together with approaches for the evaluation of material properties and constitutive relations. Emphasis is placed on a holistic view of transport processes as combinations of transient, advective, diffusive, and reactive phenomena.

**MECH.5270 Solar Energy Engineering (Formerly 22.527) - Credits: 3**

Systems engineering, stochastic modeling, design, and life-cycle cost analysis of several solar systems: photovoltaics, passive heating, solar cooling, and daylighting; Web Based.

**MECH.5280 Photovoltaics Manufacturing (Formerly 22.528)**

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Overview of the manufacturing processes used to make a typical crystalline solar cell. Detailed study of selected processes and manufacturing problems, such as solar cell testing, characterization, reliability issues, factors affecting yields, automated material handling, affect of impurities in crystal growth.

MECH.5290 Fuel Cell Fundamentals (Formerly 22.529) - Credits: 3

The primary objective of this course is to understand the fundamental science and engineering of fuel cells and redox flow batteries (i.e., reversible fuel cells). The fundamental principles of electrochemistry, thermodynamics, and kinetics of electrochemical reaction processes, as well as mass transport in electrochemical energy systems will be considered. Emphasis will be placed on operating principles and the design and diagnostics of the proton exchange membrane fuel cell as a portable energy conversion system, and the vanadium redox flow battery as a large-scale energy storage system. Cell components and their influence on the overall performance of these systems will be discussed in detail. An introduction to the cost analysis of electrochemical energy storage will be presented.

MECH.5300 Autonomous Robotic Systems (Formerly 22.530) - Credits: 3

This course covers concepts related to autonomous robotic systems, emphasizing the synthesis and design of control algorithms for autonomous robotic vehicles. Topics that will be covered in the course include: Linear and nonlinear systems analysis, stability in the sense of Lyapunov, linearization of nonlinear dynamic equations, rigid body equations of motion in three dimensions, dynamic model derivation of aerial, space, marine and ground vehicles, fundamentals of flight dynamics, feedback control design for autonomous robotic vehicles, guidance and navigation, description of components typically encountered to autonomous robotic vehicles, cooperative control of multi-robot teams and state estimation.

MECH.5310 Math Methods In Mechanical Engineering (Formerly 22.531) - Credits: 3

MECH.5320 Off-Grid Solar Electric System (Formerly 22.532) - Credits: 3

This course examines the technical, financial and societal aspects of photovoltaic (PV) systems that are not connected to the electrical grid. Topics include: reasons for going off the grid, the components of an off-grid PV system, how to size a PV system to meet the required load, site impacts on performance, determining the loss of load probability (LOLP) for a system, hybrid systems, e.g. solar plus a generator, energy storage solutions, regulatory issues, and cost. Systems sized to meet the annual load requirements of a remote communication system, a net-zero home, and a small village will be examined. HOMER/Microgrid, PVWatts, and other software will be used to design these systems.

MECH.5330 Nanomaterials for Energy - Credits: 3

Introduction of fundamental materials development and principles in addressing issues associated with affordable and sustainable energy. The course starts with basic concepts in materials science and engineering, with special attention paid to the origin of size effects in controlling the properties of nanomaterials. Then a range of materials issues related to development of renewable energy resources and sustainable energy technologies will be discussed. Topics to be covered include: photovoltaic materials and solar energy conversion; thermoelectric materials; materials for electrical energy storage and generation; materials for hydrogen production; piezoelectric energy harvesting; and materials for other emerging energy processes.

MECH.5340 Green Combustion and Biofuels (Formerly 22.534) - Credits: 3

Fundamentals of combustion and pollutant formations in application to internal combustion engines, turbines, and fire safety. Concepts include flame structure, flame speed, flammability, ignition, reaction kinetics, nonequilibrium processes, diffusion flames, and boundary layer combustion. Additional specific emphasis on combustion modeling, green approaches to energy production, and biofuels.

MECH.5350 Fundamentals of Sustainable Energy - Credits: 3

Introduction to scientific principles associated with sustainable energy technologies. Topics include: thermodynamic laws and engineering fundamentals in energy processes, thermodynamic energy conversion, wind and geothermal energy, photovoltaics, ocean thermal energy conversion, electrochemical energy, biomass, and selected emerging energy technologies.

MECH.5420 Convective Heat/Mass Transfer (Formerly 22.542) - Credits: 3


MECH.5440 Combustion Modeling - Credits: 3
This course is focused on combustion modeling and computational combustion. It will introduce methods for modeling laminar and turbulent premixed and non-premixed flames, as well as particulate combustion. Specific emphasis will be placed on the theory and derivation of the methods, their implementation, and the use of existing computational tools. Models will include combustion kinetics, convective and diffusive transport, equilibrium, simple reactors, canonical premixed and non-premixed flames, and methods for treating turbulent flows. Practical applications include internal combustion engines and gas turbines.

MECH.5450 Advanced Industrial Heat and Mass Transfer (Formerly 22.545) - Credits: 3

This course specializes in obtaining practical solutions for applied and industrial heat transfer problems related to device development and production processes. Topics include review of heat transfer modes (i.e. convection, conduction and radiation), transport phenomena in material processing and manufacturing, analytical models and numerical simulations. Representative problems include curing of polymers, thermal conditioning of human body, food packaging and long-term food preservation, thermal management of electrical and electronic equipment, control of water vapor and pollutant transfer, material processing, and heat and mass exchangers.

MECH.5490 Cooling of Electronic Equipment (Formerly 22.549) - Credits: 3

This course focuses on teaching the primary techniques for cooling electronics, and methods for modeling their performance. Heat-transfer fundamentals: conduction, convection, radiation, phase change, and heat transfer across solid interfaces. Heat-generating electronic equipment: ICs, power converters, circuit cards and electrical connectors. Thermal management equipment: heat sinks, interface materials, heat spreaders including liquid loops, and air movers. System design: system packaging architectures, facilities, system analysis. Advanced Topics: spray cooling, refrigeration.

MECH.5500 Vibrations (Formerly 22.550) - Credits: 3

This course provides the analytical background for the fundamental understanding of vibration analysis, modeling and testing of mechanical systems. The course starts with an overview of the concepts in vibrations and later builds an in-depth understanding of the vibrations of single degree of freedom and multi degree of freedom systems. Both free and forced vibrations of these systems under steady-state and transient mechanical excitations will be investigated. The important concepts of modal analysis and vibration measurement methods will be studied. The continuous system modeling, nonlinear and random vibrations will also be touched upon.

MECH.5520 Probabilistic Methods and Analysis - Credits: 3

The course will review the fundamentals of probability and statistics, and introduce the methodologies that are commonly adopted in mechanical engineering domain. The concepts of uncertainty, confidence and risk of engineering decision-making will be emphasized. Specific topic areas will include: random vibration and analysis, random data processing, probability evolution, uncertainty quantification in system modeling, model validation and verification, data fusion and model updating, Bayesian inference and statistical learning. Course assignments will be primarily deployed in Matlab environment.

MECH.5530 MEMS & Microsystems (Formerly 22.553) - Credits: 3

The purpose of this course is to give a broad introduction to Micro-electro-mechanical Systems (MEMS) technology, and will provide graduate students in mechanical, electrical, manufacturing and related engineering disciplines with necessary fundamental knowledge and experience in the design, manufacture, and packaging of microsystems. The topics include basic sensing and actuating principles, modeling of electromechanical components, material properties, fabrication technologies, process integration, system design, and packaging of MEMS and microsystems. The course will also cover current literature, MEMS markets and applications. The course will be a combination of lectures, case studies and homework assignments. The students are expected to possess prerequisite knowledge in college mathematics, physics, and chemistry, as well as in engineering subjects such as fundamental materials science, electronics, thermal-fluid, and machine design.

MECH.5540 Dynamic Systems and Controls (Formerly 22.554) - Credits: 3

Matrix-based classical and modern techniques are applied to the dynamics of control systems. Design of controllers, and full and reduced-order observers. Introduction to optimal control and Kalman filters.

MECH.5570 Microsystem Design (Formerly 22.557) - Credits: 3

Design aspects of Microsystems (MEMS). Topics covered include working principles of various microsystems, analytical and numerical modelling, and case studies. Course incorporates lectures, computer laboratories and term project presentations.
MECH.5580 Aero/Wind Eng (Formerly 22.558) - Credits: 3
This course will introduce and examine classical and modern theoretical and computational two and three dimensional aerodynamics and aeroelastic modeling with applications in wind and subsonic aero/hydrodynamics applications. In addition, wind and meteorological science as well as simple FEM structural modeling and coupling concepts will be examined. The class will comprise scheduled lectures and discussions. Students will be expected to perform presentations and directed projects which involve computer programming.

MECH.5590 Multi-Scale Computational Fluid Dynamics I (Formerly 22.559) - Credits: 3
Derivation of governing equations; Scale analysis; Role of relative dimensionless parameters; Discretization of the governing equations; Finite-Difference, Finite-Volume, and/or Finite Element Techniques; Solutions of several problems in micro/meso/macro scale applications.

MECH.5600 Multi-Scale Computational Fluid Dynamics II (Formerly 22.560) - Credits: 3
Applications of CFD methods to the solution of multi-phase problems such as: heat pipes, fuel cells, nanofluidics, material processing and manufacturing, etc.

MECH.5620 Solid Mechanics I (Formerly 22.562) - Credits: 3
Topics covered include the theory of stress, kinematics of strain, Hooke's Law, work and energy, equations of stress equilibrium, Navier's equations, strain compatibility, and the Beltrami-Michell equations. Problems for uniformly varying 3-D states of stress, torsion, and plane deformation are studied. Axisymmetric deformation is considered. Green's function solutions for plane and axisymmetric problems are studied.

MECH.5630 Dynamic Behavior of Materials - Credits: 3
The time-dependent material behavior and stress-wave propagation in solids. Topics will be selected from applied mechanics and materials science, e.g. mathematical and physical description of one dimensional and three dimensional waves in solids, strain rate-dependent behavior of materials, viscoelasticity of materials and its time-and frequency-domain descriptions including relaxation and creep, introduction to shock waves, introduction to experimental techniques for material characterization in dynamic environment such as ultrasonic testing, split Hopkinson bar technique, dynamic mechanical analysis, and drop tower and impact experiments.

MECH.5710 Quality Engineering (Formerly 22.571) - Credits: 3
Focuses on methodologies used by world class companies to guide the design and development of high quality, low cost products in the most timely manner through the use of analytical tools in case studies: Topics include: new product creation strategy and process, organizational aspects of multi-disciplinary design teams, concurrent project management, and structural methodologies for identifying customer requirements and manufacturing process design, control and selection. In particular, focus is on the interrelationship of CE, manufacturing and Quality tools and methodologies and how they contribute in determining the appropriate level of product/process quality and design efficiency.

MECH.5740 Design For Reliability Engineering (Formerly 22.574) - Credits: 3
(3-0)3 Design for Reliability Engineering provides a systematic approach to the design process that is focused on reliability and the physics of failure. It provides the requirements on how, why, and when to use the wide variety of reliability engineering tools available in order to achieve the reliability goals of the total design cycle. Topics include the product design cycle and customer requirements, analytical physics, reliability statistics, accelerated testing, accelerated reliability growth, industry standard predictive models, design reliability assessment, reliability FMEA, product risk evaluation and thermodynamic reliability.

MECH.5750 Industrial Design of Experiment (Formerly 22.575) - Credits: 3
Concepts of Robust Design and statistical Design Of Experiments (DOE) as applied to the design and manufacturing of new high technology products. Classical and current methodologies of DOE including Full Factorial, Fractional Factorial, Taguchi, Central Composite and Yates Algorithms. The course will also provide for different methods for experimental design and analysis, including average and variability analysis. Commercial software packages and case studies using industrial experiments will be used to illustrate the material.

MECH.5760 Engineering Project Management (Formerly 22.576) - Credits: 3
Skills are developed enabling engineers to be effective decision makers and technical leaders in an environment where technology management, business operations and strategies for contract compliance are critical to achieving competitive advantage. Elements of the Project Planning and Control System are presented along with analytical methods important
for maintaining Projects on schedule and within budget.

MECH.5790 Robotics (Formerly 22.579) - Credits: 3
Common robotics joints and robotics classification. Planes of motion and fold lines. Robotics capability. Forward and inverse kinematics and the RobSim software package. Trajectory planning and elementary obstacle avoidance. Robotics dynamics and feasible trajectory evaluation. Design of the control system for the non-linear robotics problem. Classroom studies are followed by hands-on applications in the Automated Manufacturing Assembly and Robotics Laboratory.

MECH.5810 Advanced Fluid Mechanics (Formerly 22.581) - Credits: 3
Fundamental equations of fluid motion, kinematics, vorticity, circulation, Crocco’s theorem, Kelvin’s theorem, Helmholtz’s velocity laws, secondary flows. Stream function, velocity potential, potential flows. Unsteady Bernoulli equation, gravity water waves.

MECH.5830 Advanced Aerodynamics (Formerly 22.583) - Credits: 3

MECH.5840 Ocean Engineering (Formerly 22.584) - Credits: 3
Physical Properties of the Ocean Environment, ocean wave mechanics, computer solutions of wave interactions, physical modeling of marine vehicles and coastal environments (modeling and scaling laws), resistance and propulsion of surface ships and submarines, and forces on floating and submerged objects such as buoys, pipelines, piers, and breakwaters. Research report required summarizing some aspect of ocean engineering.

MECH.5890 Finite Element in Thermofluids (Formerly 22.589) - Credits: 3
The Galerkin finite element technique is first applied to a simple one-dimensional steady state convection/conduction equation. The element equations are derived and the assembly process is described. These concepts are then extended to two-dimensional transient problems. A finite element package is used to solve a variety of fluid flow problems. All course materials are available on the WWW.

MECH.5910 Mechanical Behavior of Materials (Formerly 22.591) - Credits: 3
Quantification of structure-property relationships requires application of solid mechanics concepts to materials microstructure. Using micromechanics approach, the course focuses on the deformation and fracture behavior of metals, ceramics, composites and polymeric. Topics include: elastic behavior, dislocations, crystal plasticity, strengthening mechanisms, composite materials, glassy materials, creep and creep fracture, tensile fracture, and fatigue.

MECH.5930 Graduate Co-op Education (Formerly 22.593) - Credits: 0
The prediction, analysis, and prevention of failure in mechanical design is covered. Failure mechanisms such as creep, plastic deformation, crack propagation, cyclic fatigue, thermal fatigue, fretting and galling are considered. Theories of failure such as Columb-Mohr, Beltrami, and Huber-Von Mises are used to predict failure. Cumulative damage theories such as those of Gatts, Corten and Dolan, Marin, and Manson will be studied. Statistical methods of analysis and test data interpretation are studied. Materials such as steels, aluminum alloys, solders, plastics, and composites will be considered.

MECH.5950 Graduate Co-op II (Formerly 22.595) - Credits: 0
MECH.5960 Mechanics of Composite Materials (Formerly 22.596) - Credits: 3
Analysis of anisotropic lamina and laminated composites. Methods of fabrication and testing of composites. Other topics include environmental effects, joining and machining.

MECH.5970 Processing of Composites (Formerly 22.597) - Credits: 3
Methods of fabrication. Analysis of forming, fiber orientation, permeability, polymer rheology, flow through porous media, consolidation, cure kinetics, combined flow and cure models. Effect of manufacturing defects

MECH.5980 Experimental Characterization of Composites - Credits: 3
Characterization of composite material properties and performance. Constituent testing of matrix and reinforcement materials. Characterization of microstructure. Mechanical
property testing according to ASTM standards. Interpretation of test results.

**MECH.5CO-OP Curricula Practical Training (Formerly 22.5CO-OP) - Credits: 0-1**

Curricula Practical Training. "Variable credit course, student chooses appropriate amount of credits when registering."

**MECH.6020 Special Topic: Thermo-Fluids (Formerly 22.602) - Credits: 3**

Study of advanced topics in thermo-fluid energy systems and processes not covered in the regular curriculum. Contents may vary from year to year.

**MECH.6030 Special Topic: Vibration Dynamics (Formerly 22.603) - Credits: 3**

Study of advanced topics in vibrations/dynamics not covered in the regular curriculum. Contents may vary from year to year.

**MECH.6110 Matrix Methods for Structural Dynamics (Formerly 22.611) - Credits: 3**

3-0-3 Prerequisite: 22.515 Matrix linear algebra. Solution of algebraic equations using Gaussian elimination and decomposition variants. Eigenanalysis using various direct similarity techniques and simultaneous vector iteration methods. Algorithm development of solution techniques. Solution techniques for structural mechanics, dynamic systems and stability. Models developed using MATLAB.

**MECH.6140 Advanced Finite Element Methods (Formerly 22.614) - Credits: 3**

Nonlinear finite element methods as applied to large deformation and nonlinear material behavior are the focus of this course. Various classical and contemporary constitutive models and their implementation in the finite element method are considered. Procedures for determining material parameters from a matrix of material test results are investigated.

**MECH.6150 Micromechanics of Composites and Metamaterials - Credits: 3**

Overall behavior of composite materials and metamaterials. The fundamentals of homogenization for elastic composites, variational principles and energy-based bounds, and dynamic homogenization concepts and techniques are introduced. Voigt and Reuss mixture rules are discussed and expanded to dilute distribution, self-consistent, Mori-Tanaka, and periodic approaches with examples from particulate, whisker, platelet, and fiber-reinforced composites. The effects of damage and cracks and the concept of metamaterial are discussed and examples are presented. The use of finite element calculations for static, nonlinear, and dynamic homogenization will be discussed and the application to non-mechanical and coupled problems are explored.

**MECH.6500 Nano. Transport Phen. for Manufacturing Nanodevice (Formerly 22.650) - Credits: 3**

This course on nanoscale transport phenomena constitutes a bridge between existing fluid and heat transfer courses in multiple disciplines and emerging nanoscale science and engineering concepts to reflect the forefront of nanomanufacturing. The course is designed to incorporate recent advances in manufacturing polymer-based nanodevices. Key issues of the implementation and maintenance costs for fabrication will be addressed. Hands-on laboratory experiments will be performed to complement the lectures with the ultimate goal of designing and building a complete nanodevice at the end of the course. The course will prepare graduates for employment focused on designing and manufacturing nano/microfluidic systems, lab-on-a-chip devices, electronics devices, medical devices, and other emerging.

**MECH.6690 Fracture Mechanics (Formerly 22.569) - Credits: 3**

The application of fracture mechanics and approaches for exploring the impact of cracks on engineering structures. Topics will be chosen from a range of mathematical techniques, applied mechanics, and materials science, e.g. theoretical strength, stress concentration, linear and nonlinear fracture mechanics, stress singularity, fracture modes, energy methods, stable and unstable crack growth thermal cracks, crack tip plastic zone, Dugdale and Irwin models, the R-curve, power-law materials, and the J-integral. Students should have a good understanding of the principles of strengths of materials and be able to apply these principles to the solution of problems in solid mechanics. The associated knowledge in complex variables and partial differential equations will be reviewed as needed.

**MECH.7410 Master's Thesis - Mechanical Engineering (Formerly 22.741) - Credits: 1**

**MECH.7420 Master's Thesis - Mechanical Engineering (Formerly 22.742) - Credits: 2**

**MECH.7430 Master's Thesis - ME (Formerly 22.743) - Credits: 3**

MS Thesis Research
MECH.7460 Master's Thesis - ME (Formerly 22.746) - Credits: 6
MS Thesis Research

MECH.7490 Master's Thesis - Mechanical Engineering (Formerly 22.749) - Credits: 9
MS Thesis Research

MECH.7510 Adv Projects In Mechanical Engineering (Formerly 22.751) - Credits: 1-3
Doctoral Dissertation Research

MECH.7530 Doctoral Dissertation/Mechanical Engineering (Formerly 22.753) - Credits: 1-3
Doctoral Dissertation Research

MECH.7560 Doctoral Dissertation/Mechanical Engineering (Formerly 22.756) - Credits: 6
Doctoral Dissertation Research

MECH.7590 Doctoral Dissertation/Mechanical Engineering (Formerly 22.759) - Credits: 9
Masters and doctoral students who have attained the required number of thesis credits may enroll in:

MECH.7610 Continued Grad Research (Formerly 22.761) - Credits: 1
Continued Grad Research

MECH.7630 Continued Graduate Research (Formerly 22.763) - Credits: 3
Continuing Graduate Research

MECH.7660 Continued Graduate Research (Formerly 22.766) - Credits: 6
Continuing Graduate Research

MECH.7690 Continued Graduate Research (Formerly 22.769) - Credits: 9
Continuing Graduate Research

MECH.7710 Systems Analysis I (Formerly 22.771) - Credits: 3
Study of the key areas in multiple engineering disciplines including Mechanical, Electrical, Software, Systems and Optical. Students are introduced to weekly topics and then work in multidiscipline teams to solve technical assignments. Topics covered include: Concept of Operations and Requirements development, integration, test and verification, vibration/shock analysis, thermal analysis, power supply design, digital electronics & FPGA, intro to optical engineering, SCRUM planning, continuous integration and UML/SW design. Content may vary year to year. This course is part of the Engineering Leadership Development Program (ELDP) and team taught by industry experts at BAE Systems.

MECH.7720 Systems Analysis II (Formerly 22.772) - Credits: 3
Introduction and analysis of complex systems aligned with the key product lines of BAE Systems. Students are introduced to multiple types of systems and then work in multidiscipline teams to solve technical assignments. The systems covered include but are limited to: Electronic Warfare (EW), Communications Electronic Attack (Comms EA), Wide Area Airborne Surveillance (WAAS), Signal Intelligence (SIGINT), RADAR Navigation, Radio Communications, and Infrared Countermeasures (IRCM). Content may vary year to year. This course is part of the Engineering Leadership Development Program (ELDP) and team taught by industry experts at BAE Systems.

MECH.7730 Systems Analysis III (Formerly 22.773) - Credits: 3
Study of project management concepts, product development methods, transition to operations and new business capture. Topics covered include but are not limited to risks and opportunities management, earned value management, lean product development, business strategy, design for manufacturability/maintainability (DFM^2), and request for information (RFI) response. Content may vary year to year. This course is part of the Engineering Leadership Development Program (ELDP) and team taught by industry experts at BAE Systems.

MSIT.5200 Digital Storage Architectures (Formerly 91.520 and COMP.5200) - Credits: 3
This course will focus on existing and proposed technologies for storing digital information. Both hardware and software issues will be examined, beginning with device and controller organization and proceeding through aggregation techniques, interconnect architectures and host consideration. At each level, specific components will be evaluated with respect to critical storage criteria, such as bandwidth and latency, fault
tolerance, infrastructure requirements and cost. Students must already have completed a bachelor’s degree in a related discipline and must meet all undergraduate prerequisite requirements specified for graduate IT programs to enroll in this course and in a graduate career.

MTEC.1010 Engineering Graphics (Formerly 23.101) - Credits: 2

This course presents material in both class and laboratory format. Topics covered include: geometric constructions; multi-view sketching and projection; sectional views; isometric and oblique drawing; and dimensioning.

MTEC.1020 Engineering Design and Graphics (Formerly 23.102) - Credits: 3

This course presents material in both class and laboratory format. Topics covered include: dimensioning, print reading, auxiliary views, graphs, screw threads, gears, and the design process. Working in teams, a major design project with written and oral reports is required.

MTEC.2000 Computer Aided Drafting (CADrf) (Formerly 23.200) - Credits: 3

This course introduces the student to the use of CAD for construction of basic shapes and multi view drawings. It is a project oriented course introducing the student to graphic design using AutoCAD. AutoCAD, as it is applied in MTEC.2000, is a two dimensional CAD program used to produce computer design models. Course stresses hands-on work with AutoCAD. Course is a fundamentals approach and requires no experience with other CAD programs.

MTEC.2020 Thermo/Fluids Laboratory (Formerly 23.202) - Credits: 2

The course covers the theory and the practical relevance of selected principles of thermo-fluids and fluid mechanics. Fundamentals of measurement and interpretation in the areas of thermo-fluids and fluid mechanics will be studied. The student will be responsible to collect data with the supplied test apparatus, interpret the physical significance of the data, in relation to the laws and principles of thermofluids, and to report findings. Strong emphasis is placed upon developing technical report writing skills.

MTEC.2040 Manufacturing Technology Laboratory (Formerly 23.301/MTEC.3010) - Credits: 2

Students will develop an understanding of precision metrology and the machine tools, related equipment, and systems used in manufacturing. Students will learn the inter-relationships between machine tools, various machining methods, engineering design considerations, and manufacturing techniques studied in the MET program. Lecture, case studies, and laboratory work are supported by a comprehensive text with supplemental materials provided by the instructor to enhance student learning. Students will work with lathes, drill presses, vertical milling machines, and abrasive finishing methods during laboratory sessions to manufacture several precision finished parts from engineering drawings. Course grades will be determined from student performance on examinations and laboratory projects.

MTEC.2060 Applied Computer Aided Manufacturing (Formerly 23.419/MTEC.4190) - Credits: 3

This course is an introduction to computer aided manufacturing with an overall perspective focusing on the design process and how computer technology have affected the modern manufacturing environment. Introduces students to computer aided design systems, process engineering, basic tooling design, machining, programmable logic controllers (PLC), fundamentals of numerical control (NC), process planning, and concurrent engineering with the objective of design optimization for manufacturing and commercialization.

MTEC.2110 LABVIEW(TM) Programming with Engineering Applications (Formerly 23.211) - Credits: 3

LabVIEW(TM) software is a graphical programming language "G" that is widely used in industrial setting by engineers and scientists alike. Materials covered in the course will be basic to programming structures. As an example the course will cover For Loops, While Loops, Case Structures, and Boolean Logic. Control, data acquisition, data reduction, and analysis tools associated with the software program will be covered, and used. A comprehensive semester project will be assigned to teams of students to solidify the basic programming topics covered, teach the Virtual Instrument (VI) hierarchy, and to emphasize the importance of teamwork. Special Notes: Can be used as an MET elective or as a substitute for 90.211 (Introduction to Programming with C-Part I) in the MET Program.

MTEC.2210 Statics (Formerly 23.221) - Credits: 3

Statics is the study of objects in equilibrium and the forces acting on that object. Students will develop mathematical models to predict and analyze forces and their distributions with the use of the free body diagram. The concepts presented in this course directly relate to other mechanical and civil engineering fields. Students must have a basic understanding of trigonometry, geometry, physics and calculus. This course is in a combined section with CET.
MTEC.2220 Dynamics (Formerly 23.222) - Credits: 3

This course introduces the student to the kinematics and kinetics of particles, systems of particles, and rigid bodies. This course covers the basic methods of analysis including Newton’s 2nd Law (force, mass, acceleration), Work and Energy, and Impulse and Momentum. This course is in a combined section with CET.

MTEC.2230 Mechanics of Materials (Formerly 23.223) - Credits: 3

This course discusses the principles of strength of materials and the relationships between externally applied forces and internally induced stresses in various types of structural and machine members and components. Included are axial, torsional, and flexural loadings, stress-strain relationships, deformation of materials, elastic deformation, principal stresses, temperature effects, Mohr’s circle, shear and bending moment diagrams, the design of beams, and the deflection of beams.

MTEC.2260 Technical Communications for Engineering Technology (Formerly 23.226) - Credits: 3

This course introduces students to presenting ideas, data, and proposals in clear concise formats to maximize understanding and impact. Both written and presentation skills are stressed and familiarity with MS Word, Excel and PowerPoint is preferred but not a prerequisite. The end-product is a complete understanding of the elements which blend together to create effective communication in a technical environment.

MTEC.2410 Elements of Thermodynamics I (Formerly 23.241) - Credits: 3

This course presents a thorough treatment of the concepts and laws of thermodynamics. The first law (energy) and the second law (entropy), properties of liquids and gases, and common power cycles (Rankine and Otto) are covered. Included is an overview of the global energy problem and power generation technologies, both established and novel.

MTEC.2420 Applied Fluid Mechanics (Formerly 23.242) - Credits: 3

This course addresses the Properties of Fluids and basic concepts of Continuity, Momentum, Hydrostatics, and Fluid Flow Kinematics. Analysis of flow of real fluids in pipes, ducts and open channels is conducted. The study of compressible flows, fluid couplings as well as flow measurement techniques will also be discussed.

MTEC.2430 Elements of Thermodynamics II (Formerly 23.243) - Credits: 3

This course is a continuation of Thermodynamics I analyzing in more detail various real world, practical power generation cycles, such as Rankine, reheat, regenerative, Otto, and Diesel. Also covered are refrigeration cycles, the basics of psychrometry, and the thermodynamics of combustion.

MTEC.2620 Engineering Data Analysis (Formerly 23.262) - Credits: 3

This course introduces students to basic statistical techniques, probability, risk analysis, and predictive modeling, and how they impact engineering and manufacturing activities in both analytical and forward looking activities. Topics covered basic statistics, probability, combinations, permutations, regression, correlation, and predictive model development with the objective of building working statistical models for a technical environment. Pre-Requisites: 92.126, Proficiency in MS Excel or equivalent.

MTEC.2950 Materials Science (Formerly 23.295) - Credits: 3

Properties of materials, selection of materials and processing of materials for appropriate applications are the focus of this course. Case studies are utilized to demonstrate failures which need not have occurred. Materials which are considered include metals and alloys, ceramics, polymers, and composites.

MTEC.3020 Mechanics/Materials Laboratory (Formerly 23.302) - Credits: 2

Methods of material testing and analysis are covered in this course with an emphasis on proper measurement procedures, data reduction, and presentation. Lectures cover the background required to perform post laboratory calculations, and overview measurement techniques, laboratory result reporting, and formal presentations that are given by students to the class.

MTEC.3050 Manufacturing Processes (Formerly 23.305) - Credits: 3

The course will focus upon a variety of manufacturing processes used for metals, ceramics and plastics, material interactions that occur during manufacturing, mechanical test methodology and material response to stress at different temperatures, methods to select appropriate processes to achieve product specification and methods to investigate process history based on material properties.
MTEC.3140 Manufacturing Productivity (Formerly 23.314) - Credits: 3

The course will focus upon three primary categories of manufacturing improvement: theory of constraints/workflow, work definition and design, and quality improvement. Each student should understand and be conversant in the principles of productivity and able to lead a productivity improvement project upon successful completion of the course. Case studies will be used to illustrate the proper implementation of productivity improvement principles.

MTEC.3200 Machine Design (Formerly 23.320) - Credits: 3

This course first briefly discusses materials strength and deformation, fracture toughness, and stress intensity factor to build the cornerstones for any machine design work. It then focuses on the design of five basic machine parts: fasteners, springs, bearings, gears, and shafts. The primary subjects in this course are thread standards and definitions, the mechanics of power screws, threaded fasteners, analyses and design of springs, fatigue loading, bearing types, bearing life, bearing load, selection of bearings, thin film lubrication, hydrodynamic theory of lubrication, gear conjugate action, contact and interference of gears, shaft design, and analyses.

MTEC.3530 Forensic Engineering (Formerly 15/23.353) - Credits: 3

This course is a survey of forensic engineering with particular emphasis on using engineering science and technology to investigate and reconstruct failures of engineered systems. Topics include qualifications of the forensic engineer, the scientific method, failure hypotheses, levels of confidence, physical evidence, field investigation techniques, examination and testing, codes and standards, and personnel safety. Other topics include ethics, the hired gun, junk science, the legal process, introduction to expert witness testimony, trial exhibits, Frye and Daubert decisions, bias, forensic engineering practice, and engineering reports.

MTEC.3540 Problems in Mechanical Engineering Technology (Formerly 23.354) - Credits: 3

The course provides the student with analytical skills necessary to solve a variety of engineering problems. Lectures consist of review and extension of concepts taught in statics, dynamics, mechanics of materials, and machine design with emphasis on applying that knowledge to solve engineering problems. Students become proficient with advanced topics such as multiaxial stress-strain calculations, strain energy, impact, failure analysis, and various solution techniques in vibrations.

MTEC.4020 Engineering Measurement Laboratory (Formerly 23.402) - Credits: 2

This course provides hands-on experiments that are designed to teach the fundamentals of instrumentation devices and experimental techniques. Basic physical principles of theory that apply to the mechanical engineering technology student are covered for purposes of verifying experimental techniques and teaching the importance of experimental result verification. This course allows students to: 1) assemble measurement systems which include transducers, signal conditioners, and data acquisition systems; 2) conduct experiments on relevant mechanical systems; 3) data verifications using theoretical models. Effective written and verbal communication techniques are also emphasized throughout the course.

MTEC.4140 Engineering Economics (Formerly 23.414) - Credits: 3

This course introduces students to accounting and finance operations and principles, and how they impact engineering and manufacturing activities in both analytical and forward looking planning activities. Topics covered include financial statements, costing, depreciation, time value of money, cash flows, capital budgeting, and capital recovery with the objective of building working financial models for a technical environment. Pre-Requisites: 49.201 Economics I or instructor permission. Proficiency in MS Excel or equivalent.

MTEC.4320 Capstone Design (Formerly 23.432) - Credits: 3

The course uses the Engineering Design Process methodology to formulate solutions to a product or project design effort. The design process is reviewed from problem statement to final design. The course utilizes casework, class exercises, examples of the preparation and use of customer and engineering specifications, and brainstorming techniques to generate feasible solutions to problems, and the process for selecting the most viable solution. Students learn to generate labor and materials budgets for product/project development and methods for the effective oral and written communication of these results. Students complete the course by delivering a comprehensive presentation of the product development effort and results.

MTEC.4440 Mechanical Vibrations (Formerly 23.444) - Credits: 3

The course will teach students methods to analyze single and two degree of freedom systems considering free vibration, harmonically excited motion, and transient vibration. Concepts of two degree of freedom systems generalized to multi-degree of freedom systems will be introduced. Various analytical
approaches to vibration analysis will be taught. Solutions for continuous systems will be solved by the finite difference, finite element, and mode summation methods. Dynamic systems excited by random forces of displacements (random vibrations) will be covered. Additional mathematical content beyond Calculus C will be introduced within this course as required.

MTEC.4750 Heat Transfer (Formerly 23.475) - Credits: 3

This course focuses on the study of the fundamentals of heat transfer. Case studies are utilized to enhance the students’ knowledge of the basic principles of heat transfer and to develop their problem-solving ability in conduction, convection and radiation heat transfer.

MTEC.4800 Computer Aided Design (Formerly 23.480) - Credits: 3

Using Autodesk Inventor software, this course is a continuation of 23.200, Computer Aided Drafting. This course introduces 3D CAD techniques to demonstrate and utilize 3D parametric modeling in the design process. Solid models will be constructed, used to create assemblies, and drawings. These models, assemblies, and drawings will be modified and optimized using advanced operations. A design project and written report are required.

MTEC.4840 Introduction to Pro/ENGINEER (Formerly 23.484) - Credits: 3

This course introduces the user to the principles of Pro/ENGINEER, solid modeling, and parametric design. It is a hands-on project and exercise-based course. Topics will include: feature-based parametric solid modeling, pick and place features, sketched features, the basics of creating parts and assemblies, and drawing creation. Advanced topics will include 3-D sweeps, helical sweeps, and blends

MTEC.4850 Introduction to SolidWorks (Formerly 23.485) - Credits: 3

This course introduces the student to the use of CAD for construction of basic shapes and multiview drawings. It is a project oriented course introducing the student to graphic design using SolidWorks. SolidWorks is a three dimensional solid modeling program used to produce computer design models. Pre-Requisite:23.200 or some experience with another CAD program is required.

NUTR.1100 Nutrition and Wellness (Formerly 35.210 and NUTR.2100)) - Credits: 3

This course is an introductory course to the science of nutrition as it applies to everyday life and health. Focus will include the six major nutrients: carbohydrates, lipids (fats), protein, vitamins, minerals, and water and their importance in the human body. Digestion, absorption, and metabolism in the human body will be introduced. The course will also examine energy balance and weight management as they relate to nutrition and fitness. The impact of culture, demographics and ethnicity on nutritional intake will be discussed. Students will explore the relationship between nutrition and health through laboratory experiences. Students should not be taking NUTR.1100 if they already took NUTR.2060.

NUTR.2050 Introduction to Nutritional Science (Formerly 35.205) - Credits: 3

This course introduces students to the major in Nutritional Science. Objectives of the major are covered along with beginning nutritional and food science principles, history of the profession, career options, and legal aspects of practice as a nutrition educator. An integrated survey of nutrition science as it relates to human physiological chemistry, food chemistry and biochemistry will also be discussed. This course will include guest speakers from within the department and outside the university. This course will be restricted to nutritional science majors.

NUTR.2060 Human Nutrition (Formerly 35.206) - Credits: 3

This course provides an overview of nutrition and the components of a nutritious diet during the various stages of the life cycle. It emphasizes the impact of nutrition on the major contemporary health problems in the United States. Nutrition issues, trends and research, and their effect on society and the legislative process will be explored.

NUTR.2700 Introduction to Food Safety - Credits: 3

This course focuses on food safety from a ‘farm to fork’ perspective. The class will cover a comprehensive overview of the food safety system addressing the biological, chemical and physical agents with emphasis on domestic food-borne outbreaks, public health significance, disease control, and the microbial spoilage of foods. The history and fundamental principles of food safety will be addressed including the risk and hazard analysis of different foods and the important advances in food system that are necessary for controlling hazards in the modern food industry.

NUTR.3010 Food Science with Lab - Credits: 3

This course explores the basic principles of food science such as: food preparation, food ingredients and food preservation, regulatory agencies and food regulations, and concepts that relate to food safety, recipe alteration and menu design. The laboratory component demonstrates and illustrates the
NUTR.3310 Practice of Nutrition Professional (Formerly NUTR.4310) - Credits: 3

This course provides students with the knowledge and application of the skills of the dietetics professional and the governance of nutrition and dietetics practice. Student will learn the importance of quality management of food and nutrition services and the management theories and business principles required to deliver programs and services. Students will also learn the fundamentals of public policy. This course will have an emphasis on preparing the student for supervised practice necessary for a career as a Registered Dietitian Nutritionist.

NUTR.3360 Life Cycle Nutrition (Formerly 36.336) - Credits: 3

Biology of the life cycle including development, growth, maturation, and aging and its impact on nutritional requirements of humans from the zygote to the elderly is considered. How to meet these nutritional requirements is discussed relative to the feeding issues and context of each major life stage. Course emphasizes the critical analyses of beneficial and adverse outcomes of various nutrient intakes and dietary patterns of the nutritional status and well-being through integration of nutrition and other health sciences in understanding nutritional needs during the life cycle. Analysis of cultural, environmental, psychosocial, physical, and economic factors affecting nutritional status through the life span will also be discussed. Methods of nutritional assessment for each stage of the life cycle will be examined.

NUTR.3450 Community Nutrition (Formerly 36.345) - Credits: 3

This course explores the role of the nutrition professional in community needs assessment, intervention development and evaluation, and in forming domestic nutrition policy. Nutrition problems in contemporary communities and of selected target groups in the United States and in developing countries are examined. Programs and strategies to meet nutrition needs outside the acute care setting, such as nutrition education and food assistance are explored. Local, state, and national nutrition policy and initiatives in nutrition will also be examined. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

NUTR.3710 Nutrition and Metabolism (Formerly 36.371) - Credits: 3

This class is advancement into the biochemical and physiologic process through which the nourishment of the human organism is accomplished and how the interactions among nutrients, other aspects of the environment, and the body result in perturbations affecting human health. The process of human nourishment proceeds within the context of an organism with an intricate structure, unique composition, and specific capacities for adaptive change. Basic information from many disciplines relating to body function and structure will be summarized. This will serve as setting the stage for detailed discussions, which describe the nutritional biochemistry and metabolism of the body for the normal state, and for states where nutrient availability is altered of disease is imposed. Prerequisites: 35.206

NUTR.3720 Body Diversity and Health (Formerly 36.372) - Credits: 3

This class will advance the understanding of prevention and treatment of chronic diseases where body size is a significant risk factor. A comprehensive overview of the physiological and social determinants of energy balance will be provided. Methods to complete nutrition assessments and deliver culturally sensitive and unbiased interventions will be reviewed. Evidence based individual and population level strategies that promote healthy habits, a positive body image, and eliminates health disparities will be compared and contrasted to scientifically unsupported approaches.

NUTR.4060 Biochemistry of Lipids (Formerly 36.406) - Credits: 3

This advanced course in the nutritional biochemistry and physiology of lipids will detail the role of lipids in the normal and pathological processes at both the cellular and whole organism level. Topics will range from general discussions of the digestion, absorption and transport of lipids to the role of eicosanoids and lipid soluble antioxidants during normal and diseased states, such as atherosclerosis, diabetes and hypertension. Subject matter will also include a discussion of the various interventions for the prevention and treatment of certain of these disease states. There will also be discussion of the current issues in lipid nutrition.

NUTR.4320 Practice of the Nutritional Professional II - Credits: 3

This course in a continuation of Practice of the Nutrition Professional I. This course provides advanced study in professional nutrition settings that will prepare students for the professional work environment. Concepts related to Ethics, cultural competency, communication, professional development, interprofessional education, and leadership will be emphasized. Sites where students will participate in experiential learning include organizations that provide...
nutrition education, counseling, and services for various life cycle stages such as food pantries, YMCA's, hospitals assisted living facilities, schools, fitness centers, and after-school programs.

NUTR.4630 Vitamins and Minerals (Formerly 36.463) - Credits: 3
Detailed analysis of the digestion, absorption, transport, and intermediary metabolism of vitamins and minerals as essential nutrients. The chemical and biochemical characteristics of vitamins and minerals are examined to account for the physiological functions.

NUTR.4650 Lab Methods in Nutrition Assessment (Formerly 36.465/565) - Credits: 3
This course provides the student the opportunity to assess nutritional status using several modern analytical methods. The course uses spectrophotometry, HPLC and automated procedures to assess the status of vitamins, lipids, iron, glucose, and insulin. The student will learn the mathematical calculations needed for the methods. This course enables the student to appreciate how nutrient analysis is designed and implemented in the analytical laboratory.

NUTR.4720 Nutrigenetics (Formerly 36.472) - Credits: 3
Regulation of eukaryotic gene expression by specific nutrients, hormones, and metabolites will be discussed including transcriptional, post-transcriptional, and translational mechanisms with emphasis on disease development or prevention. Application of material will include determining how human dietary requirements are affected by gene variants and inherited biochemical characteristics. This course will enable students to link their knowledge of nutrition with the growing discipline of the effects of diet on the human genome and specific hereditary diseases.

NUTR.4810 Medical Nutrition Therapy I (Formerly 36.481) - Credits: 3
This course is intended to provide students with current knowledge and application in dietary prevention, treatment, and long-term management of obesity, diabetes, cardiovascular diseases, and upper gastrointestinal diseases. Topics include nutrition counseling and communication skills, professional ethics, medical terminology, clinical laboratory values, dietary menu planning and analysis in specific situations, evaluating nutritional status, case studies for these diseases, and will examine enteral and parental nutrition support for critically ill patients. Students will also develop a basic knowledge related to the principles of fluid and electrolytes balance as well as acid-base balance as they relate to the nutritional care of patients/clients.

NUTR.4820 Medical Nutrition Therapy II (Formerly 36.482) - Credits: 3
This course is a continuation of Medical Nutrition Therapy I that will provide students with current knowledge and application in dietary prevention, treatment, and long-term management of patients with trauma, burns, HIV, cancer, liver, lower gastrointestinal diseases, celiac disease, and renal diseases. Topics include nutrition counseling and communication skills, professional ethics, medical terminology, clinical laboratory values, dietary menu planning and analysis in specific situations, evaluating nutritional status, case studies for these diseases, and will examine enteral and parental nutrition support for critically ill patients. Students will also develop a basic knowledge related to the principles of fluid and electrolytes balance as well as acid-base balance as they relate to the nutritional care of patients/clients.

NUTR.4830 Senior Research in Nutrition I - Credits: 1
Senior Research in Nutrition I will introduce concepts and application of research through critical exploration of the research process, research methodology, and ethics. Students will begin to critically review literature relevant to their field or interests and practice written scientific communication skills related to research.

NUTR.4940 Directed Research in Nutrition (Formerly 36.494) - Credits: 3
Students with their faculty advisor structure a research project in the area of nutrition. A paper embodying the results of the project will be prepared.

NUTR.4960 Senior Research in Nutrition (Formerly 36.496) - Credits: 3
Continuation of 36.494. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL), Information Literacy (IL), and Written &Oral Communication (WOC).

NUTR.5650 Lab Methods in Nutrition Assessment (Formerly 36.465/565) - Credits: 3
This course provides the student the opportunity to assess nutritional status using several modern analytical methods. The course uses spectrophotometry, HPLC and automated procedures to assess the status of vitamins, lipids, iron, glucose, and insulin. The student will learn the mathematical calculations needed for the methods. This course enables the student to appreciate how nutrient analysis is designed and implemented in the analytical laboratory.
PLAS.0010 Plastics Safety Lecture (Formerly 26.001) - Credits: 0
All Plastics Engineering students enrolled in a plastics laboratory course are required to attend a one hour per week safety lecture for safety training.

PLAS.0020 Plastics Safety Lecture (Formerly 26.002) - Credits: 0
All Plastics Engineering students enrolled in a plastics laboratory course are required to attend a one hour per week safety lecture for safety training. Continuation of 26.001.

PLAS.1070 Introduction to Plastics Engineering (Formerly 25.107/26.107) - Credits: 2
This course is designed to teach basic principles of technical drawing, fundamentals of design, fundamentals of computer aided design (CAD), dimensioning and tolerances. Basic concepts of manufacturing, rapid prototyping and 3D printing are covered. The lecture component covers theoretical information, and the lab component covers hands-on learning, where students learn to use a commercial CAD software.

PLAS.2010 Polymer Materials I (Formerly 26.201) - Credits: 3
This introductory course in plastics materials first evaluates how commercial plastics were developed, characterized and compared throughout the relevant industry. Various ASTM testing protocols are reviewed followed by an initial study of commodity plastic materials, including polyethylene, poly (vinyl chloride), polystyrene, diene rubbers and other selected and relatively high-volume resins. Applicable commercial polymerization methods are introduced along with comparative structure/property relationships. Initial comparisons are drawn as between commodity thermoplastic resins and thermoset compositions. Comparative end-use applications are continuously discussed along with a consideration of selected environmental issues (recyclability).

PLAS.2020 Polymer Materials II (Formerly 26.202) - Credits: 3
A critical review of the commercial family of materials known as engineering thermoplastics including an examination of relatively important thermoset polymer systems. Major commercial polymerization reactions are reviewed (e.g. applicable chain growth or step-growth polymerizations) including comparative market performance based upon mechanical, thermal, chemical properties and environmental considerations. Also considered are selective high performance plastic materials suitable for use at elevated temperatures and in other relatively extreme working environments. Recommended Pre-Req: 26.201 Polymer Materials I.

PLAS.2100 Professional Development Seminar (Formerly 26.210) - Credits: 1
The Professional Development Seminar is designed to provide students with the necessary structure, resources, and support to successfully secure and engage in their first Plastics Cooperative Education experience. Through a variety of interactive teaching methodologies and assignments, students will participate in a sequence of learning activities including self-assessment, industry research, and the development of co-op learning objectives. Students will prepare to engage in the job search process through resume-writing, strategic interviewing, professional networking and learn professional behavior and presentation skills. The goal of the course is to assist each student in developing a sound plan of action to successfully participate in the cooperative education experience.

PLAS.2110 Engineering Mechanics (Formerly 26.211) - Credits: 3
Equilibrium of structures subjected to forces and moments. Area and mass moments of inertia., Internal forces, shear and bending moments acting on loaded structures, including cantilevers, beams, trusses, bridges and machine frames. Friction.

PLAS.2120 Dynamics (Formerly 26.212) - Credits: 1
This course covers the fundamentals of Newtonian mechanics, including kinematics, motion relative to accelerated reference frames, work and energy, impulse and momentum, 2D and 3D rigid body dynamics. The course pays special attention to applications in plastics engineering including introductory topics in material and energy balance.

PLAS.2150 Plastics Processing Engineering Laboratory I (Formerly 26.215) - Credits: 1
This lab course focuses on physical property testing of plastics. The tests covered include tensile properties, flexural properties, pendulum impact resistance, drop impact resistance, surface properties, and melt flow rate. The effect of environment on many of these properties is also evaluated.

PLAS.2160 Plastics Process Engineering Laboratory II (Formerly 26.216) - Credits: 1
This laboratory introduces students to the plastics manufacturing processes of single screw extrusion, injection molding, blow molding, sheet thermoforming and rotational molding. Experiments are designed so that the student will
understand the theory of polymer conversion techniques by the interaction between process variables and materials characteristics.

PLAS.2180 Introduction to Design (Formerly 26.218) - Credits: 2
This course is designed to teach basic principles of technical drawing, fundamentals of design, dimensioning and tolerances. Basic concepts of manufacturing and rapid prototyping are covered. The lecture component covers theoretical information, and the lab component covers hands-on learning, where students learn to use a commercial CAD software. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL).

PLAS.2470 Thermodynamics (Formerly 26.247) - Credits: 3
This course introduces the concepts of system definition, pure substance properties, phase behavior and engine cycles. The laws of Thermodynamics are introduced and used to determine equilibrium states of systems, conservation of energy and directionality of energy transformation. Mathematical analysis of closed and flowing systems and engineering devices used in polymer processing is reviewed. It concludes with a discussion of introductory level polymer thermodynamics. Meets Core Curriculum Essential Learning Outcomes for Quantitative Literacy (QL).

PLAS.3060 Methods of Experimental Analysis (Formerly 26.306) - Credits: 3
Methods for design and analysis of experiments provided in three course modules: (1) descriptive and inferential statistics for hypothesis testing; (2) analysis of variance and linear regression for model building; and (3) factorial, fractional factorial, and response surface design of experiments for decision support and optimization. Course incorporates project work with modern statistical programming. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL) and Critical thinking and problem solving (CTPS).

PLAS.3100 Co-op Assessment I (Formerly 26.310) - Credits: 1
The primary goal of this seminar is to assist students in the overall assessment of their overall cooperative education experience. Through facilitated small group discussion, individual consultation and hands on practice, students will have an opportunity to identify and articulate their technical and professional skills, and explore how these skills and their co-op employment might be translated and leveraged into future work environments and their academic program at UML.

PLAS.3140 Fluid Flow (Formerly 26.314) - Credits: 3

PLAS.3150 Plastics Process Laboratory III (Formerly 26.315) - Credits: 1
This laboratory introduces students to the plastics manufacturing processes of twin screw extrusion, film extrusion, tube extrusion, and injection molding process monitoring. Experiments are designed so that the student will understand the theory of polymer conversion techniques by the interaction between process variables and material characteristics.

PLAS.3160 Plastics Process Engineering Laboratory IV (Formerly 26.316) - Credits: 1
This laboratory introduces students to variations of injection molding, extrusion, blow molding and thermoset manufacturing processes not previously studied. Advanced process set-up, including design of experiments, is covered. Experiments are designed so that the student will understand the theory of polymer conversion techniques by the interaction between process variables and material characteristics.

PLAS.3200 Co-op Assessment I (6 months) - Credits: 2
This seminar is designed to support and assist students in the assessment of their 6 month cooperative education experience. Students will reflect of their extended time in a work environment, the impact of their experience on their planning, and how organizational culture, personal interests and values can inform their subsequent decisions for career development. Through facilitated small group discussions, individual consultation and hands on practice, students will have the opportunity to identify and articulate their technical and professional skills.

PLAS.3480 Heat Transfer (Formerly 26.348) - Credits: 3
This course covers the theory and application of steady and transient heat conduction, convection, and radiation. Particular
emphasis is placed on heat transfer problems in plastics processing and modern engineered systems. Computational methods and analysis of heat exchangers are covered.

PLAS.3730 Mold Engineering (Formerly 26.373) - Credits: 4

The course provides a comprehensive systematic approach to mold engineering and design, specifically focused on injection molds. Topics are presented in a top-down manner, beginning with significant design objectives and constraints followed by application specific analysis. Topics include: mold types and functions, mold layout, cost estimation, cavity filling, feed systems, gating, venting, cooling systems, shrinkage, ejector systems, and structural design. Junior status or permission of instructor. Includes laboratory experience in mold design and mold making.

PLAS.3770 Plastics Process Engineering I (Formerly 26.377/577) - Credits: 3

The first course in a two semester sequence to study the fundamental principles of polymer processing, i.e., the conversion of the polymeric materials into useful articles. The course will first study the properties of polymers (bulk and rheological and thermal properties) and why they are important to understanding polymer processing. This course will emphasize the fundamental principles of the extrusion process and examine the correlation between elements of the extruder, polymer properties, and processing variables and why they all must be considered when studying and understanding a plastics processing technique.

PLAS.3780 Plastics Process Engineering II (Formerly 26.378) - Credits: 3

Plastics Process Engineering II introduces four of the five major plastics forming (manufacturing) processes: rotational molding, thermoforming, blow molding, and injection molding with emphasis on how polymeric materials, machine and tooling components, and process variables affect properties of the products produced with each process. The course also examines melt mixing in polymer processing, including mixing in single screw systems and mixing in co-rotating twin screw extruders.

PLAS.3810 Polymer Science for Engineers I (Formerly 26.381) - Credits: 3

An introduction to polymer science with a focus on making polymers. Topics covered include the chemistry, kinetics, and statistics of step and chain polymerizations and copolymerizations, polymerization processes. Industrially relevant polymers and commercial polymerization processes will be highlighted, with coverage of the health and safety aspects of various approaches to the preparation of various polymers given. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

PLAS.3820 Polymer Science for Engineers II (Formerly 26.382) - Credits: 3

An introduction to polymer science with a focus on polymer properties and behavior. Topics covered include analytical techniques (chemical, thermal, and microstructural analysis of polymers, measurement of molecular weight distribution, etc.), as well as the underlying physical, rheological and solution properties that make these techniques possible. Recommended Pre-Req: 26.381 Polymer Science for Engineers I

PLAS.3830 Polymer Science I Lab (Formerly 26.383) - Credits: 1

Synthesis of polymers by step growth, condensation, suspension and free radical emulsion polymerization techniques. Fundamental concepts in polymerization kinetics and mechanism will be covered as well as structure-property considerations and polymerization with functional groups.

PLAS.3840 Polymer Science II Lab (Formerly 26.384) - Credits: 1

Polymer characterization techniques including molecular weight distribution by gel permeation chromatography, crystallinity and order by differential scanning calorimetry; polymer morphology and surface properties, and spectroscopic (nuclear magnetic resonance, Raman, infrared) and mechanical (tensile, dynamic mechanical, rheological) techniques will also be covered. Recommended Pre-Reqs: 26.381 Polymer Science for Engineers I and 26.383 Polymer Science I Lab; Co-Req: 26.382 Polymer Science for Engineers II.

PLAS.3CO-OP Plastics Engineering Curricular Practical Training (CPT) (Formerly 26.3CO-OP) - Credits: 0-1

Plastics Engineering Curricular Practical Training (CPT). "Variable credit course, student chooses appropriate amount of credits when registering."

PLAS.4030 Mechanical Behavior of Polymers (Formerly 26.403/503) - Credits: 3

Topics covered in this course include linear viscoelasticity, creep, stress relaxation, dynamic behavior, hysteresis, stress-strain response phenomena, principles of time-temperature superposition, rubber elasticity, failure and fracture.
mechanisms for polymers, and the effect of additives on mechanical behavior. Real life design examples are used to demonstrate the topics and concepts as much as possible.

**PLAS.4040 Process Control (Formerly 26.404) - Credits: 3**

Basic principles of control systems used with plastics processing equipment. Included are instrumentation, signal conditioning, data acquisition, feedback control, process monitoring, data reduction, and SPC/SQC. Meets Core Curriculum Essential Learning Outcome for Critical Thinking &Problem Solving (CTPS) and Written &Oral Communication (WOC).

**PLAS.4060 Polymer Structure, Properties and Applications (Formerly 26.406) - Credits: 3**

The fundamental relationships between molecular structure, properties and end-use applications of plastics materials will be explored in detail. Molecular structural features include chemical composition, molecular size and flexibility, intermolecular order and bonding, and supermolecular structure. Properties include processability, mechanical, acoustic, thermal, electrical, optical and chemical properties, price, and balance of properties. Applications include rigid solids, flexible solids, foams, film and non-plastic applications.

**PLAS.4100 Coop Assessment II (Formerly 26.410) - Credits: 2**

This seminar is designed to support and assist students in the continued assessment of their cooperative education experience. Through a deepening of their work in Co-op assessment I, students will review their overall performance in the cooperative education program, while continuing to demonstrate their technical and professional skills through written work and public presentations to multiple audiences. It is expected that students will clearly define their future academic and career goals, enhance their professional networks, and develop a future plan to support aspirations related to their major.

**PLAS.4150 Capstone Project I (Formerly 26.415) - Credits: 1**

First half of a two-semester capstone experience. Students, working in teams under the supervision of faculty members, select a project related to the field of plastics engineering, prepare a project charter considering constraints and mitigations, conduct experimental research, and propose potential project solutions.

**PLAS.4160 Capstone Project II (Formerly 26.416) - Credits: 1**

Second half of a two-semester capstone experience. Students, working in teams under the supervision of faculty members, continue a project related to the field of plastics engineering, implement one or more project solutions, conduct experimental research, author a final report, and provide a presentation according to professional conference guidelines.

**PLAS.4170 Honors Capstone Project II (Formerly 26.417) - Credits: 1-3**

A section of capstone laboratory for honor students only. Honors student groups design, perform, analyze, report and defend a research project which incorporates the processing and characterization of plastics materials. Supporting practicum on literature searches, plastics processing, basic plastics testing techniques, and data analysis are included in the course.

**PLAS.4180 Product and Process Design (Formerly 26.418) - Credits: 3**

Theoretical principles and engineering practices for development of new plastic products with a focus on conventional and advanced injection molding processes. Topics include design methodology, plastic materials selection, design for manufacturing, computer aided engineering, mechanical behavior of plastics, structural design of plastic parts, prototyping techniques, experimental stress analysis, assembly techniques for plastic parts, and design for recyclability.

**PLAS.4200 Co-op Assessment 2 (6 months) - Credits: 2**

This seminar is designed to support and assist students in the assessment of their second cooperative education work experience that was for a 6 month cycle. Students will reflect on their extended time in this second work environment, and how their two different co-op work experiences impacts their subsequent decisions for career development. Students will review their overall performance in the cooperative education program, and demonstrate their technical and professional skills through written work and public presentations to multiple audiences.

**PLAS.5000 Advanced Project In Plastics I (Formerly 26.500) - Credits: 0-1**

A laboratory course for advanced projects in the areas of plastics materials, design, processing, elastomers, coatings, adhesives, or medical plastics.

**PLAS.5010 Advanced Project In Plastics II (Formerly 26.501) - Credits: 3**

This seminar is designed to support and assist students in the assessment of their second cooperative education work experience that was for a 6 month cycle. Students will reflect on their extended time in this second work environment, and how their two different co-op work experiences impacts their subsequent decisions for career development. Students will review their overall performance in the cooperative education program, and demonstrate their technical and professional skills through written work and public presentations to multiple audiences.
Continuation of 26.500.

PLAS.5020 Medical Device Development Regulation (Formerly 26.602 and PLAS.6020) - Credits: 3
Comprehensive and in-depth analysis of US medical device diagnostics development and approval requirements. Detailed analysis of quality assurance issues and regulatory reforms implemented under the Food and Drug Administration. Provides a step-by-step guide through the Center for Devices and Radiological Health (CDRH) investigational device exemptions, premarket approval, 510 (k) application process, and product development protocol and review processes.

PLAS.5030 Mechanical Behavior of Polymers (Formerly 26.403/503) - Credits: 3
Topics covered in this course include linear viscoelasticity, creep, stress relaxation, dynamic behavior, hysteresis, stress-strain response phenomena, principles of time-temperature superposition, rubber elasticity, failure and fracture mechanisms for polymers, and the effect of additives on mechanical behavior. Real life design examples are used to demonstrate the topics and concepts as much as possible.

PLAS.5060 Polymer Structure Properties & Applications (Formerly 26.506) - Credits: 3
Relationships between polymer structure (chemical composition, molecular weight and flexibility, intermolecular order and bonding, supramolecular structure) and practical properties (processability, mechanical, acoustic, thermal, electrical, optical, and chemical) and applications.

PLAS.5090 Plastics Processing Theory I (Formerly 26.509) - Credits: 3
Principles of Rheology and continuum mechanics involved in the processing of plastics, and their applications in plastics process engineering including flows in standard geometries and extrusion applications.

PLAS.5110 Polymer Blends (Formerly 26.511) - Credits: 3
Physical, mechanical, and thermal properties, preparation, and testing of polymer blends, alloys, and multiphase systems. Thermodynamic theories and experimental determination of miscibility of polymer blends. Structure property relationships for multiphase systems and interpenetrating networks.

PLAS.5120 Foams (Formerly 26.512) - Credits: 3
This course covers the fundamentals of polymer foaming, processing methods, recent technologies, foam characteristics, and applications. Fundamentals cover the cell nucleation and growth mechanisms in foaming and the role of thermodynamics and kinetics. Batch foaming, extrusion foaming, foam injection molding, and bead foaming are discussed as the common processing methods. The characteristics and performance of polymeric foams, process-structure-property relationships, and the relevant applications in various industries also are presented.

PLAS.5130 New Plastics Materials (Formerly 26.513) - Credits: 3
Critical examination of the new plastics appearing in the research literature and being field-tested for commercialization in the plastics industry.

PLAS.5140 Statistics for Six Sigma (Formerly 26.514) - Credits: 3
A review of statistical techniques for Six Sigma with Applications specifically designed for the plastics processing industry. Those completing the course should be at the Six Sigma green belt level or better.

PLAS.5150 Lean Plastics Manufacturing (Formerly 26.515) - Credits: 3
Methods of analysis and operation of plastics manufacturing facilities. Topics include: performance measurement, inventory control, forecasting, production planning, scheduling, resource management, supply chains, various technologies for improved productivity.

PLAS.5180 Plastics Product Design (Formerly 26.518) - Credits: 3
This course reviews the theoretical principles and the engineering practice associated with the development of new plastic products. The course focuses on design practices for products that will be produced by conventional and advanced injection molding processes. Topics include design methodology, plastic materials selection, design for manufacturing, computer aided engineering, mechanical behavior of plastics, structural design of plastic parts, prototyping techniques, experimental stress analysis, and assembly techniques for plastic parts.

PLAS.5240 Process Analysis Instrument and Control (Formerly 26.524) - Credits: 3
process control. Data acquisition systems, SPC/SQC and Taguchi methods.

PLAS.5280 Plastics Information Data Bases (Formerly 26.528) - Credits: 1
Review of procedures for literature searching, databases, etc.

PLAS.5300 Selected Topics (Formerly 26.530) - Credits: 1-3
Topics in various fields of Plastics Engineering. Content may vary from year to year so that students may, by repeated enrollment, acquire a broad knowledge of contemporary Plastics Engineering.

PLAS.5320 Adhesives and Adhesion (Formerly 26.532) - Credits: 3
Adhesive joining of engineering materials. Surface chemistry, theories of adhesion and cohesion, joint design, surface preparation, commercial adhesives, Rheology, equipment, testing, service life, and reliability.

PLAS.5330 Green Coatings Science and Technology I (Formerly 26.533) - Credits: 3
This course reviews the basic principles of design and formulation of water-borne, high-solids and powder resins used for the development of solvent-less "green" coatings and the use of bio-derived resins, mostly based on soybean oil and other renewable raw materials. The mechanisms and methods of curing and of polymerization for polymers used as coatings will also be covered. The basic principles of formulation of coatings will be introduced. Permission of instructor for Plastics Engineering Undergraduates seeking to take course as technical elective.

PLAS.5340 Coatings Science and Technology II (Formerly 26.534) - Credits: 3
A continuation of 26.533. This graduate course reviews the basic principles of design and formulation of waterborne, high-solids, powder resins that meet current manufacturing regulations. Rheology of polymer and pigment dispersion, and their application to coatings, inks and adhesives will be included here.

PLAS.5350 Rubber Technology (Formerly 26.535) - Credits: 3
Polymerization and compounding of the commercial elastomers. Properties and test methods. Leading applications and methods of processing.

PLAS.5360 Rheology of Polymers (Formerly 26.536) - Credits: 3
Rheology of polymer melts, solutions, latexes, and pigment dispersions, and their application to coatings and adhesives.

PLAS.5370 Business Law for Engineers (Formerly 26.537) - Credits: 3
Business legal issues engineers encounter in practice, including contractual, products liability, and intellectual property issues. Business torts relating to product design, manufacturing and inadequate warning defects. Unreasonably dangerous products and strict liability.

PLAS.5400 Commercial Development of Plastics (Formerly 26.540) - Credits: 3
The concepts of industrial marketing will be reviewed for research, pricing strategies, and product planning for market segmentation, place (distribution)-promotional activities. Topics will include creating a demand, selling, and servicing base resins and additives.

PLAS.5410 Computer Applications in Plastics (Formerly 26.541) - Credits: 3
Problem solving in plastics engineering has been dramatically influenced by the computer and innovative software packages. This graduate course will focus on the application and development of software packages for engineering analyses of plastics processes. Specially, the course will cover the basic CAD programs, Pro/ENGINEER, SOLIDWORKS, followed by basic Pre-and-Post processor software, FEMAP, meshing program HYPERMESH, FEMLAB multiphysics, and MATHEMATICA.

PLAS.5420 Colloidal Nanoscience and Nanoscale Engineering (Formerly 10.542/26.542) - Credits: 3
This course will cover the fundamentals of nanoscale colloidal processes, intermolecular forces and electrostatic phenomena at interfaces, boundary tensions and films at interfaces, electrostatic and London forces in disperse systems, interactions and self-assembly of polymer colloids, nanoparticles, surfactants and biomolecules. Applications include microfluidics; lab-on-a-chip; nano-biocolloids, vesicles, colloidosomes, polymersomes and polymer hydrogel microcapsules for drug delivery and nanostructured materials and devices.
PLAS.5440 Advanced Plastics Materials (Formerly 26.544) - Credits: 3

This course reviews the historical developments of polymeric material systems, commodity, engineering, biodegradable, and high performance thermoplastics. Topics include their synthesis, structure, properties, and applications and there is also an overview of typical additives that are used to modify the properties of plastics. Knowledge of general and/or organic chemistry is recommended as a prerequisite for this course.

PLAS.5450 Additives for Polymer Materials (Formerly 26.545) - Credits: 3

Additives incorporated into polymers to modify processing and end-use properties: reinforcements, plasticizers, stabilizers, flame retardants, colorants, biostats, blowing agents, anti-stats, impact modifiers, and processing aids.

PLAS.5470 Materials for Renewable Energy and Sustainability (Formerly 26.547) - Credits: 3

This course reviews the selection and design of materials for use in energy generation and conservation applications. Both traditional and renewable technologies for energy generation are reviewed, and the differences in materials needs for generation, storage and transmission highlighted. Particular emphasis is placed on organic and polymeric materials technological challenges in solar, wind and hydro/geothermal energy and future transportation fuel production. The concept of life cycle assessment is introduced for the optimization of systems from a materials science perspective. The impacts of global economics, ethics and efficiency are also addressed. The course approaches sustainability as an open-ended, complex engineering problem and introduces students to the broad range of career opportunities for materials engineers in renewable energy.

PLAS.5480 Analytical and Numerical Methods in Plastics Processing (Formerly 26.548) - Credits: 3

This course covers the use of analytical and numerical methods related to engineering. Topics include ordinary differential equations, linear second order differential equations, matrices, vectors, linear systems of equations, partial differential equations. Use of numerical methods to differential equations, linear algebra, regression, interpolation, data analysis, and partial differential equations.

PLAS.5490 Product Design for Elastomers (Formerly 26.549) - Credits: 3

This course covers the basics of thermoset and thermoplastic elastomer product design. Topics include mechanical behavior, large deformation structural analysis, design for manufacturability, performance limitations, and end use applications for elastomers and assembly considerations.

PLAS.5500 Processing with Elastomers (Formerly 26.550) - Credits: 3

This course covers the basics of elastomer processing. Topics include mixing, rheology, extrusion, injection molding, compressing molding, and curing as it applies to elastomers.

PLAS.5510 Extrusion Die Design (Formerly 26.551) - Credits: 3

This is a project-oriented course which utilizes current CAE programs to design extruder dies. This course will study the basic principles of extrusion die design and apply these principles in designing extrusion dies. A review of the extrusion process and the flow behavior of various polymers will be studied.

PLAS.5520 Machine Design (Formerly 26.552) - Credits: 3

Hydraulics, machine logic, drives, pumps, motors, heaters, barrel and screw combinations, mechanical design. Hydraulic and electrical control circuits development. A semester project is required.

PLAS.5530 Medical Device Design I (Formerly 26.553) - Credits: 3

A systematic approach to inventing new medical devices. The class details the process of validating medical needs including market assessment and the evaluation of existing technologies; basics of regulatory (FDA) and reimbursement planning; brainstorming and early prototyping for concept creation. Course format includes expert guest lecturers and interactive practical discussions with faculty. Students will prepare a medical device proposal and presentation.

PLAS.5540 Medical Device Design II (Formerly 26.554) - Credits: 3

This course focuses on how to take a medical device invention forward from early concept to technology translation and implementation planning. Topics include technology research &development; patent strategies; techniques for analyzing intellectual property; advanced planning for reimbursement and FDA approval; choosing translation strategies (licensing vs. start-up); ethical issues including conflict of interest; fundraising approaches and cash requirements; essentials of writing a business or research plan; strategies for assembling a development team. Students will prepare a final medical device
proposal and presentation.

PLAS.5630 Current Topics in Plastics Materials I  
(Formerly 26.563) - Credits: 1
Individual research and presentation in the field of plastics materials.

PLAS.5640 Current Topics in Plastics Materials II  
(Formerly 26.564) - Credits: 1
Individual research and presentation in the field of plastics materials.

PLAS.5650 Thermosets  
(Formerly 26.565) - Credits: 3
Provides an in-depth review of the major families of engineering thermosetting resins: phenolics, aminos, polyesters, epoxies, silicones, and various polyurethanes systems. Emphasis is on the basic chemistry, inherent physical properties and processability, and the effect of polymer modifiers (additives) on the functional properties of molding compounds. Typical market sectors served and related processing/fabrication technologies used in reinforced plastics/composites are reviewed.

PLAS.5660 Polymer Materials Systems Solution  
(Formerly 26.566) - Credits: 3
This course investigates the selection processes to be followed in screening material candidates, and specifying a material of record. Emphasis is placed on prioritizing performance requirements, contrasting potential candidates, reviewing processing demands, and post-fabrication schemes. The course will be based on actual case studies.

PLAS.5680 Dynamic Mechanical Properties II  
(Formerly 26.568) - Credits: 3
Practical review of theoretical concepts of rheological measurements with practical applications of experimental techniques. Emphasis will be on the viscoelastic properties of polymer solutions, melts, and solids with correlation with theoretical dynamic mechanical behavior.

PLAS.5690 Current Topics in Plastics Design I  
(Formerly 26.569) - Credits: 1
Individual research and presentation in the field of plastics design.

PLAS.5700 Current Topics in Plastics Processing I  
(Formerly 26.570) - Credits: 1
Individual research and presentation in the field of plastics processing.

PLAS.5710 Plastics Processing Engineering Laboratory I  
(Formerly 26.571) - Credits: 1
Laboratory study of the interaction between process variables and materials in extrusion, injection molding, blow molding, thermoforming, compounding and mixing.

PLAS.5720 Advanced Plastics Processing Engineering Laboratory  
(Formerly 26.572) - Credits: 1
PLAS.5740 Advance Physical Properties Lab  
(Formerly 26.574) - Credits: 1
Measurement of mechanical properties in tension, compression, shear, and flexure; dielectric constant and dissipation factor; thermal behavior under stress; melt rheology.

PLAS.5750 Biomaterials in Medical Applications  
(Formerly 26.575) - Credits: 3
A comprehensive study of the history, current and future rents within biomedical devices and their applications. Students will be introduced to research techniques used to analyze the different classes of biomaterials. An overview of typical host reactions such as inflammatory response and their evaluation will be touched upon.

PLAS.5760 Advanced Mold Design  
(Formerly 26.576) - Credits: 3
This course provides an integrated approach to mold engineering which includes the interrelationships of polymeric materials, engineering principles, processing, and plastics product design. Major topics include cost estimation, mold layout and feed system design, cooling systems, structural design considerations, and ejector system design. Analytical treatment of the subject matter is given based on the relevant rheology, thermodynamics, heat transfer, fluid flow and strength of materials.

PLAS.5770 Plastics Process Engineering I  
(Formerly 26.377/577) - Credits: 3
The first course in a two semester sequence to study the fundamental principles of polymer processing, i.e., the conversion of the polymeric materials into useful articles. The course will first study the properties of polymers (bulk and
rheological and thermal properties) and why they are important to understanding polymer processing. This course will emphasize the fundamental principles of the extrusion process and examine the correlation between elements of the extruder, polymer properties, and processing variables and why they all must be considered when studying and understanding a plastics processing technique.

PLAS.5780 Advanced Plastics Processing (Formerly 26.578) - Credits: 3

This course reviews the common plastics manufacturing processes, including extrusion, injection molding, blow molding, thermoforming, and rotational molding. After the review, the course focus shifts to the impacts of screw design and processing parameters on the conveyance, melting, devolatilization, and mixing with single screws and compounding with twin screw extruders. This course also includes an overview of die designs, multi-shot and gas assist injection molding, film stretching and methods for heating and cooling in plastics processing.

PLAS.5790 Problems In Biomaterials/Directed Study (Formerly 26.579) - Credits: 3

Selection of a current biomaterial problem of interest by the individual student, examination of pertinent literature to determine present knowledge in the area, formulation of an approach to resolve or clarify the issues involved, and (time permitting) work towards the solution of the selected problem.

PLAS.5820 Current Topics in Plastics Design II (Formerly 26.582) - Credits: 1

Individual research and presentation in the field of plastics product or tooling design.

PLAS.5830 Advanced Research Methodology (Formerly 26.583) - Credits: 3

A systematic evaluation of the techniques used in efficient research and development. Experimental data are analyzed and plotted using a mathematical approach. Creative thinking, problem solving, and student presentation of data are stressed. Extensive reading of research papers, analysis of such, and defense of the analysis required.

PLAS.5850 Computer Aided Engineering I (Formerly 26.585) - Credits: 3

This course provides a fundamental approach to computer-aided engineering for plastics processing. Emphasis is upon the theory and techniques of computer aided engineering as applied to plastics processing problems, allowing students to understand the various assumptions and methods used to create the programs.

PLAS.5890 Polymer Nanocomposites (Formerly 22.570/26.589) - Credits: 3

This course deals with the preparation, characterization, behavior and properties of polymer nanocomposites, with an emphasis on the most commercially relevant systems to date, as well as new developments in the field. The major preparation routes to these materials are discussed, with an emphasis on the importance not only of dispersion but of true thermodynamic compatibility in these systems. From there, the focus shifts to describe the consequences of nanocomposite structure in terms of both molecular behavior and macroscopic properties, as informed by the most up-to-date research literature available. Case studies of specific systems will serve as opportunities to gain deeper understanding, and the safety issues surrounding nanoparticle handling will also be presented. Finally, current research by invited lecturers working in the field will be presented as time permits.

PLAS.5900 Survey of Intellectual Property (Formerly 26.590) - Credits: 3

A review of patents, trademarks, copyrights and their application for protection of technology in the plastics industry. Other topics to be considered will be employee rights/non-competition agreements, foreign protection, and technology licensing. (in the Plastics Industry)

PLAS.5910 Industrial Thesis Development I (Formerly 26.591) - Credits: 1-9

Enables graduate students to work part-time to compliment academic studies with practical industrial experience and acquire/enhance expertise in their research as well as thesis investigation.

PLAS.5950 Thermoplastic Elastomers (Formerly 26.595) - Credits: 3

A comprehensive review of thermoplastic elastomer (TPE) technology. Physical and chemical nature of the various classes of TPE’s will be considered with emphasis on mechanical and rheological properties relevant to engineering applications.

PLAS.5960 Plastics, Elastomers and Additives from Renewable Resources (Formerly 26.596) - Credits: 3

This course will provide an introduction to plastics, elastomers and additives obtained from renewable resources. Processes that involve conversion (chemically/enzymatically) of naturally occurring precursors (monomers) obtained from
renewable resources to plastics and elastomers will be reviewed. Brief discussion of processing, degradation and recycling of these materials will also be included.

PLAS.6010 Graduate Industrial Coop Education I
(Formerly 26.601) - Credits: 1-3
Graduate students interested in developing a practical industrial experience component to complement their academic training may register for this course with advisor’s approval. This credit is not applicable to the mandated degree credit hours.

PLAS.6060 Plastics Manufacturing Systems Engineering (Formerly 26.606) - Credits: 3
The course provides guidance about plastics manufacturing as an integrated system with broadly applicable analysis in three areas: 1) machinery, 2) controls, and 3) operations. The machinery topics include heating/cooling, hydraulics/pneumatics, electric drives, and sensors. The controls topics include signal conditioning, data acquisition, machine controllers, and related control laws. The operations topics include process characterization, process optimization, quality control, and automation. The course is developed to support plastics processing engineers and others involved with plastics manufacturing who are performing process development, research, and machine design.

PLAS.6070 Supply Chain Management for Engineers
(Formerly 26.607) - Credits: 3
This course focuses on design, development, and planning supply chain networks while examining the product’s life cycle with an emphasis of the manufacturing processes. Throughout the course, global supply chain management, supply chain drivers, distribution networks, network design under uncertainty, supply-demand cycle, demand forecasting, inventory management, supply chain performance, end-of-life, cradle-grave and cradle-cradle products, along with supply chain decision-making topics will be covered. These topics will be demonstrated with the implementation of examples, and case studies.

PLAS.6100 Plastics Industry Development 
(Formerly 26.610) - Credits: 3
The goals of this course are numerous. In the large sense, the primary focus of this course will be to review many of the major technological developments and discoveries that have helped make the plastics industry what it is today. Having a thorough understanding of how these developments were implemented commercially can help us implement modern day technologies in a more efficient and productive manner.

PLAS.6110 Coloration of Engineering Thermoplastics -
Credits: 3
A comprehensive approach to all elements of Color Technology focused on needs for future plastics engineers. The course includes theory of color vision, instrumental color measurement and tolerancing, chemistry and processes of commercial dyes and pigments, their testing in polymers, failure modes and elements of industrial color matching. Special attention will be given to weatherability of color formulations.

PLAS.6180 Structural Product Design (Formerly 
26.618) - Credits: 3
Design of plastic and composite products to meet structural requirements including strength, stiffness, impact, fatigue, and creep while remaining low weight, low cost, and easy to manufacture. The course will include an overview of structural properties of polymeric materials as well as application of finite element analysis to homework and project assignments.

PLAS.6420 Characterization of Polymers and Plastics
(Formerly 26.642) - Credits: 3
This course provides an in-depth review of the various means by which important properties of polymers and plastics are determined. Lectures will cover analysis of composition and structure (including deformation techniques) as well as measurements of common physical, mechanical, thermal, barrier, fire and optical properties. Coverage will include both the fundamental basis for the techniques and their practical applications, strengths and weaknesses. Time and resources allowing, selected techniques will be demonstrated in the lab as well.

PLAS.6500 Nanoscale Transport Phenomena for 
 Manufacturing Nanodevices (Formerly 26.650) -
Credits: 3
An interdisciplinary course taught by faculty from the Chemical, Mechanical and Plastics Engineering Department, who have special knowledge in nanoscale fluid mechanics and heat transfer. The course on nanoscale transport phenomena constitutes a bridge between existing fluid and heat transfer courses in multiple disciplines and emerging nanoscale science and engineering concepts to reflect the forefront of nanomanufacturing. The course is designed to incorporate recent advances in manufacturing polymer based nanodevices. Key issues of the implementation and maintenance cost for fabrication will be addressed. Hands-on laboratory experiments will be performed to complement the lectures with the ultimate goal of designing and building a complete nanodevice at the end of the course. The course will prepare
graduates for employment focused on designing and manufacturing nano/microfluidic systems, lab on ship devices, electronic devices, medical devices and other emerging technologies.

PLAS.6750 Biomaterials II (Formerly 26.675) - Credits: 3

The degradation of biomaterials in the biological environment for applications such as sutures, orthopedic implants, dental implants, etc. will be reviewed. Students will analyze issues unique to the field of implants, devices and biomaterials. While reviewing new products and standards, the prospective and possibilities of biomaterials will be studied.

PLAS.6780 New Developments in Polymer Manufacturing - Credits: 3

This course explores advanced concepts and new developments in polymer manufacturing. It is designed for students with prior courses and/or experience in polymer processing.

PLAS.6820 Physical Polymer Science - Credits: 3

Comprehensive course covering physical polymer science and engineering. The role of molecular conformation and configuration in determining the physical behavior of polymers. The amorphous and crystalline states of polymers; polymer/polymer phase diagrams; glass-rubber transition and polymer viscoelastic behavior.

PLAS.7410 Master’s Thesis - Plastics Engineering (Formerly 26.741) - Credits: 1

PLAS.7430 Masters Thesis Plastics Engineering (Formerly 26.743) - Credits: 3

Individual research projects in plastics.

PLAS.7460 Master’s Thesis - Plastics Engineering (Formerly 26.746) - Credits: 6

Individual research projects in plastics.

PLAS.7490 M S Grad Res Plastics (Formerly 26.749) - Credits: 9

Individual research projects in plastics.

PLAS.7510 Doctoral Thesis Research (Formerly 26.751) - Credits: 1

PLAS.7520 Doctoral Thesis Research (Formerly 26.752) - Credits: 2

PLAS.7530 Doctoral Dissertation/Plastics Engineering (Formerly 26.753) - Credits: 3

Individual research projects in plastics.

PLAS.7560 Doctoral Dissertation/Plastics Engineering (Formerly 26.756) - Credits: 6

Individual research projects in plastics.

PLAS.7590 Doctoral Dissertation/Plastics Engineering (Formerly 26.759) - Credits: 9

Individual research projects in plastics.

PLAS.7630 Continued Graduate Research (Formerly 26.763) - Credits: 3

Individual research projects in plastics.

PLAS.7660 Continued Graduate Research (Formerly 26.766) - Credits: 6

Individual research projects in plastics.

PLAS.7690 Continued Graduate Research (Formerly 26.769) - Credits: 9

Individual research projects in plastics.

PTEC.4510 Selected Topics I - Credits: 3

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects.

PTEC.4520 Selected Topics II (Formerly 27.452) - Credits: 3

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects.

PTEC.4530 Selected Topics III (Formerly 27.453) - Credits: 3

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects.
PTEC.4540 Selected Topics IV (Formerly 27.454) -
Credits: 3

Addresses specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects.
ACCT.4010 Advanced Financial Accounting I
(Formerly ACCT/60.401) - Credits: 3
Explores issues in accounting for large, multinational business entities. Consolidation, mergers, home office/branch accounting, international accounting topics, partnership and nonprofit organizations are also examined. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Critical Thinking &Problem Solving (CTPS).

AMST.4010 American Studies Seminar (Formerly 40.401) - Credits: 3
A required seminar for American studies majors normally taken during the second semester of the junior year or during the senior year. Students undertake a research project leading to the writing of a major paper with a theme that combines more than one discipline.

AMST.4910 Directed Studies in American Studies
(Formerly 40.491) - Credits: 1-3
An investigation of a topic using an interdisciplinary approach and leading to the writing of a major paper. The course provides an opportunity for a student to work closely with an instructor on a topic of special interest.

ARTS.4930 Senior Studio I (formerly 70.493) - Credits: 3
Senior Studio I is one of the two capstone courses of the Bachelor of Fine Arts program in the Art Department. Students are required to research, develop and produce a mature, coherent and substantial body of work representing 6 credits (in a two course sequence) that will be presented to the faculty for evaluation as well as exhibited to the public in the BFA Senior Studio exhibition. Enrollment restricted to majors in BFA program. Senior Studio II will focus on research, professional portfolio, resume and artist statement.

ARTS.4970 Senior Studio (formerly 70.497) - Credits: 6
This course is designed to culminate four years of art experience for the BFA studies. The development of personal approach to media and idea is emphasized. Each student will be responsible for developing a self-assigned thematic concern. No assignments will be made by the instructor who will act only as an advisor and coordinator. Course evaluation is by the Senior Studio Review Committee. Enrollment restricted to majors in BFA program. Fall and Spring. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL), Critical Thinking &Problem Solving (CTPS) and Information Literacy (IL).

ATMO.4930 Internship: Atmospheric Science
(Formerly 85.493) - Credits: 1-3
Work experience with private or public employer. Written report and supervisor evaluation required.

ATMO.4950 Honors Research: Atmospheric Science
(Formerly 85.495) - Credits: 3
An individual or team research project carried out by qualified students with the approval of and supervision by a faculty member.

ATMO.4970 Research: Atmospheric Science - Credits: 3
An independent scientific research project carried out by a qualified senior under the supervision of a faculty member.

BIOL.4510 Senior Seminar in Biology (Formerly 81.451) - Credits: 2
This course instructs students in developing effective writing and speaking skills required for preparation of scientific manuscripts and presentations, and communicating in the scientific world. Students will be required to prepare and present oral presentations and to submit written reports.

BMSC.4350 Applied Biomedical Genetics (Formerly 35.435 and HSCI.4350) - Credits: 3
This course covers the pathological aspects of human genetics, with emphasis on the molecular alterations that cause inherited and acquired human genetic diseases, as well as their diagnosis, therapies, and potential prevention. Mendelian, cellular, and molecular genetics are reviewed, as is the metabolic basis of inherited diseases. Current laboratory techniques used for studying and diagnosing genetic diseases will be explored, as will cutting-edge therapies, including gene therapy techniques, along with their legal, ethical, and moral implications. Students will learn the principles of genetic counseling, including cancer genetics, and how they integrate with other health care disciplines. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning. (AIL).

CHEM.3050L Forensic Science I Laboratory (Formerly 84.305) - Credits: 1
Locard's exchange principle, Reagent preparation, crime scene investigation, a case of deductive reasoning, crime scene sketching, Forensic glass analysis, Fingerprint, Introduction to

CHEN.4090 Engineering Economics and Process Analysis (Formerly 10.409) - Credits: 3

This course brings together all the Chemical Engineering core principles applied to the development of economic process designs. Economic evaluations of manufacturing operations and projects including essential concepts in accounting, depreciation, time value of money, and the evaluation of investment alternatives are applied for process analysis and design objectives. The impact of management and production costs, product markets, regulatory, environmental and safe production practices, the analysis of corporate annual reports including balance sheets and income statements, and capital and operating costs are all considered in regard to efficient and economic processes. In addition to lecture materials students are required to complete comprehensive projects. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL), Critical Thinking & Problem Solving (CTPS) and Information Literacy (IL).

CHEN.4100 Chemical Plant Design (Formerly 10.410) - Credits: 3

This course is the logical continuation of CHEN.4090 (Formerly 10.409) The principles of technical and economic evaluation are applied to a chemical engineering problem. A group of students is given a statement of the problem. They are required to find information on raw materials, products, thermodynamic parameters and plant practices in order to develop the assumptions required to carry out an examination of technical and economic feasibility. Each group generates a final report for the problem. In addition to oral presentations, students are required to complete a comprehensive group design project. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL), Critical Thinking & Problem Solving (CTPS) and Information Literacy (IL).

COMP.2040 Computing IV (Formerly 91.204) - Credits: 3

Advanced C++ programming, which deepens students' understanding of object-oriented analysis and design. Basic software engineering principles and practice, including work with APIs. Topics may include program translation, web software, parsing, and regular expressions.

COMP.4060 Compiler Construction I (Formerly 91.406) - Credits: 3

Includes both theory and practice. A study of grammars, specification and classes; the translation pipeline: lexical analysis, parsing, semantic analysis, code generation and optimization; and syntax-directed translation. Use of automatic generation tools in the actual production of a complete compiler for some language.

COMP.4140 Data Communications II (Formerly 91.414) - Credits: 3

A continuation of 91.413. Topics include Multimedia Networks, network Management, Network Security, Wireless and Mobile Networks. Students will track discussion in IETF committees and work in a dedicated network laboratory. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Information Literacy (IL).

COMP.4220 Machine Learning (Formerly 91.422) - Credits: 3

This introductory course gives an overview of machine learning techniques used in data mining and pattern recognition applications. Topics include: foundations of machine learning, including statistical and structural methods; feature discovery and selection; parametric and non-parametric classification; supervised and unsupervised learning; use of contextual evidence; clustering, recognition with strings; small sample-size problems and applications to large datasets.

COMP.4510 Mobile Robotics II (Formerly 91.451) - Credits: 3

Advanced topics in robotics, including laboratory. Topics to be covered include probabilistic methods, including sensor modeling, hidden Markov models, particle filters, localization, and map making. Research-level robots are used in the laboratories.

COMP.4620 Graphical User Interface Programming II (Formerly 91.462) - Credits: 3

A second course in the design and implementation of graphical user interfaces for web-based environments. The course requires the completion of a semester-long project done with others as a team. It explores the writing of a project proposal, the development and presentation of alpha and beta versions, usability testing, and a final presentation to an external audience.

COMP.4631 Mobile App Programming II - Credits: 3

A second course in the design and implementation of mobile applications on Android platform. The course requires the
completion of a semester-long project done with others as a team. It explores the writing of a project proposal, the development and presentation of alpha and beta versions, usability testing, and a final presentation to an external audience.

**CRIM.4890 Capstone Seminar in Criminology & Criminal Justice (Formerly 44.489)** - Credits: 3

This course is designed to provide criminal justice majors with a capstone experience emphasizing integration of knowledge acquired in previous courses on the causes of criminal behavior and responses to it, particularly the institutions, policies and practices of the criminal justice system. Students engage in the development and production of a senior level research paper grounded in relevant criminology and criminal justice literature.

**DGMD.4980 Digital Media Capstone I** - Credits: 3

The first section of the capstone course is designed for guided self-designated projects by seniors in the Digital Media BA program. The course is a part of a sequence of two courses and is designed to be intense engagement that should manifest in the significant project taken from concept through production. Students can work individually and collaboratively under the close supervision of the faculty. The students are required to submit an application that includes a sound project proposal to be eligible for enrollment into the course. The sequential section DGMD.4991 needs to be completed by the BA students to graduate.

**DGMD.4991 Digital Media Capstone II** - Credits: 3

This is the second part of capstone course sequence and is designed for guided self-designated projects by seniors in the Digital Media BA program. The course is a part of a sequence of two courses and is designed to be intense engagement that should manifest in a significant project taken from concept through production. Students work individually and collaboratively under the close supervision of the faculty. The end result of the course should be the completion of a significant project; the final step should result in a public screening. DGMD.4980 needs to be completed for student to qualify for the course.

**ECON.3030 Microeconomic Theory (Formerly 49.303)** - Credits: 3

Provides an advanced examination of price and production theory and the theory of the consumer and the firm.

**EDUC.4100 Pre-practicum** - Credits: 2

The pre-practicum focuses on what it means to be a teacher, as well as the content, dispositions and skills necessary to succeed in the teaching profession. Throughout the pre-practicum, learning about the teaching comes through a variety of opportunities: (1) Structured and focused observations in schools of different demographics; (2) Teaching experiences; (3) Participation in professional seminars on diverse educational topics; (4) Engagement with different types of school professionals around educational topics; (5) Reflection on coursework with a field experience component that bridges the gap between academic knowledge and practitioner knowledge.

**EECE.4991 Capstone Project (Formerly 16.499)** - Credits: 3

The objective of this course is to execute the project defined in Capstone Proposal. The design of the project will be completed, prototyped, tested, refined, constructed and delivered to the client. Practical experience will be gained in solving engineering problems, designing a system to meet technical requirements, using modern design elements and following accepted engineering practices. Students will work in a team environment and deliver the completed system to the project client. Proper documentation of activities is required.

**ENGL.2000 Critical Methods of Literary Inquiry (Formerly 42.200)** - Credits: 3

Examination of diverse critical and theoretical approaches to literature in the development of literary analysis.

**ENGL.3070 History of the English Language (Formerly 42.307)** - Credits: 3

Explores the origins and structure of the English language, tracing the ways that English has evolved from Old English through Middle English to the varieties of Modern English in England and its former colonies, including the United States. We will also examine the literary, social, and political implications of these developments, for instance the evolution of Standard English or the use of dialects. The course does not assume any knowledge of Old or Middle English.

**ENGL.3080 Structure and Variation of the English Language** - Credits: 3

This course introduces students to a variety of approaches to the contemporary English language, with a focus on both structure and variation. Students will explore how English works in terms of its sounds (phonetics and phonology), words (morphology), sentence structures (syntax), meanings (semantics), and use (discourse). Areas of variation may include social and regional dialects, World Englishes, accents, pidgins, creoles, multilingualism, language acquisition,
registers, style, literacy, media, power, and identity. The course will also address attitudes towards language (language ideology), and the implications of language issues for education, work, policy, and everyday life.

**ENGL.3150 Old English Language and Literature (Formerly 42.315) - Credits: 3**

Students will acquire reading knowledge of the Old English Language, spending half the semester mastering grammar and vocabulary, and the second half translating texts such as The Wanderer, Dream of the Rood, and Beowulf. Attention will also be given to early medieval cultures in England.

**ENGL.3154 Middle English: Literature and Language (1066-1500) - Credits: 3**

England in the 11th century had a multi-lingual and diverse culture, with French, German, Scandinavian, and Latin speakers interacting daily. By 1500, England was English-speaking, with various dialects of Middle English emerging from this linguistic mix. In this class, students will learn to read and analyze the dialects of Middle English, translating text such as Sir Gawain and the Green Knight, the Harley Lyrics, the York Plays, and the Canterbury Tales from their original language. We will learn and apply the rules of grammar, pronunciation, and vocabulary. Students will analyze critically questions of creolization, dialect and social class, and the emergence of print culture.

**ENGL.3660 Creative Writing: Poetry II (Formerly 42.366) - Credits: 3**

Combines discussion and critique of student poems with readings in contemporary poetry and poetics. The focus is on enabling students to develop their individual voices, forms, and subjects.

**ENGL.3770 Theories of Rhetoric and Composition (Formerly 42.377) - Credits: 3**

This course will examine the history and theories of composition and rhetoric, studying the field from its inception to more recent developments and challenges. We will also explore our own writing processes and literary practices. The course is furthermore grounded on the idea that literary practices are shaped by our culture. The course introduces practical approaches to as well as theoretical frameworks beneficial for those interested in composition studies. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL).

**ENGL.3860 Editing: Grammar and Style (Formerly 42.386: The Science of Editing) - Credits: 3**

The course will examine the varied editing roles in a publishing company, from acquisitions to copy editing.

**ENGL.3920 Visual Rhetoric (Formerly 42.392) - Credits: 3**

This course introduces students to the theory and practice of visual communication. Students will explore what scholars mean by terms such as visual rhetoric and visual literacy in order to think concretely about how these concepts apply to the communication practices they will engage in their academic, professional, and everyday life. Special attention will be paid to the ways in which visual representations communicate culturally-specific meanings about race, gender, class, sexuality, age, nationality, and difference. Assignments include contributions to a course blog, rhetorical analyses of visual texts, design modules, and a multimodal project.

**ENGL.4290 Introduction to Literary Theory (Formerly 42.429) - Credits: 3**

A solid introduction to major trends in contemporary critical theory. Emphasis on producing a sample critical paper treating one or more current critical approaches to reading a literary text.

**ENGN.4010 Engineering Capstone Design Project (Formerly 25.401) - Credits: 3**

Integrative design experience in engineering. Students work on multi-disciplinary teams and apply their engineering problem-solving skills on open-ended, real-world projects. Projects may be service-oriented in concept and teams may include members from other Departments and Colleges. Emphasis on communication, team-work, report-writing, oral presentations. This course may be used as a Technical elective for all Engineering Departments. Alternatively, this course may be used as a substitute for the culminating Capstone course in Electrical and Computer Engineering (16.499), Mechanical Engineering (22.423) and Plastics Engineering (26.416). Prerequisite: senior status & permission of instructor.

**ENGN.4020 Engineering Capstone Design Project - Credits: 3**

This is the second of a two course capstone sequence. This
course provides an integrative design experience in engineering. Students work of multi-disciplinary teams and apply their engineering problem solving skills on open-ended, real-world projects. Projects may include members form other departments and colleges. This course has an emphasis on team work, Communication, report writing, oral presentations, design, analysis, test and fabrication. This course may be used as a substitute for the culminating capstone course in Electrical and Computer Engineering (EECE.4491), Plastics Engineering (PLAS.4160) and Mechanical Engineering (MECH.4230).

ENTR.3620 Corporate Entrepreneurship (Formerly ENTR/64.362) - Credits: 3

This course focuses on entrepreneurship in established companies. In order to compete in today’s dynamic business environment, organizations need to spur and promote entrepreneurial thinking and actions as a way of remaining innovative and competitive. Thus, the course explores how the entrepreneurship process works within an existing organization, including the identification of strategies companies engage to rejuvenate their business, markets and industries. Students will also study how individuals can play a role in promoting entrepreneurial activities in their organizations.

ENTR.4100 Global Entrepreneurship and Innovation - I (Formerly ENTR/64.410) - Credits: 3

The Course is offered as a 2-week intensive experiential learning of Global Entrepreneurship and Innovation. It is designed to help students to understand the importance of entrepreneurship and innovation in today’s global economy and to cultivate an entrepreneurial mind-set among the students in the UMass Lowell. Students will work in inter-disciplinary, multi-cultural environments exploring problem solving techniques, opportunities identification, business concept development &venture planning using standard business model framework and bringing ideas to reality.

ENTR.4630 Managing Innovation (Formerly ENTR/64.463) - Credits: 3

A critical issue for entrepreneurs and managers is how to translate opportunity into competitive advantage. This course examines theories of innovation and their application to real-world business opportunities. A particular focus is placed on emerging scientific and technical innovations and the opportunities and challenges they present to both existing businesses and new venture entrepreneurs. Students examine innovation strategies, planning models, evaluation models, licensing and the commercialization process required to launch new businesses around innovative products and technologies.

ENVI.4930 Internship: Environmental Studies (Formerly 87.493) - Credits: 1-3

Work experience with private or public employer. Written report and supervisor evaluation required. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Written &Oral Communication (WOC).

ENVI.4950 Honors Research: Environmental Studies (Formerly 87.495) - Credits: 3

An individual or team research project carried out by qualified students with the approval of and supervision by a faculty member. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Written &Oral Communication (WOC).

ENVI.4970 Research: Environmental Studies - Credits: 3

An independent scientific research project carried out by a qualified senior under the supervision of a faculty member.

ETEC.3610 Project Laboratory A (Formerly 17.361) - Credits: 3

The project lab runs for 14 weeks with design, fabrication, and testing of the project during the weeks one through twelve, and the last two weeks for presentation of the projects to the class. It is expected that all projects be presented operational and meeting the design performance requirements. There are exceptions to this. In the case of non-working projects the progress and final report will be heavily relied on for grading.

ETEC.3910 Capstone Design (Formerly 17.391) - Credits: 3

The project lab runs for 14 weeks with design, fabrication, and testing of the project during the weeks one through twelve, and the last two weeks for presentation of the projects to the class. It is expected that all projects be presented operational and meeting the design performance requirements. There are exceptions to this. In the case of non-working projects the progress and final report will be heavily relied on for grading. May do project at work (all requirements of reports, presentation, etc. still required). Pre-Requisites: 17.361, or 17.353 and 17.358 and 17.365

ETEC.3920 Capstone Execution (Formerly 17.392) - Credits: 3

The project lab runs for 14 weeks with design, fabrication, and testing of the project during the weeks one through twelve, and
the last two weeks for presentation of the projects to the class. It is expected that all projects be presented operational and meeting the design performance requirements. There are exceptions to this. In the case of non-working projects the progress and final report will be heavily relied on for grading. May do project at work (all requirements of reports, presentation, etc. still required).

EXER.4120 Clinical Practicum I and II (Formerly 38.412) - Credits: 4

This course is an off-campus experience in either a cardiac/pulmonary rehab clinical facility or in a fitness setting. Students experience practical applications of the concepts and theories learned in the classroom settings. Strength and conditioning, research or industry related setting, or other setting appropriate to the particular student’s interests.

FAHS.4130 BLA Capstone (Formerly 59.413) - Credits: 3

Student enrolled in the BLA program complete the BLA Capstone course during their senior year. This course features a semester-long interdisciplinary project, using knowledge gained from the students’ two BLA concentrations, as well as any minors, as applicable. Students enrolled on-campus may choose to complete an original research study, creative art project (i.e., writing, film, music, drawing, etc.), or a problem-focused community action project. Online students choose to do either an original research project or a creative art project. Projects are completed in consultation with the instructor of the BLA Capstone course.

FINA.3310 Principles of Corporate Finance (Formerly FINA 331/61.431) - Credits: 3

Advanced study of the principles of financial analysis. Covers topics such as acquisition of long-term assets, capital budgeting models, and the analysis of mutually exclusive projects.

GEOL.3150 Environmental Geochemistry (Formerly 89.315) - Credits: 3

Application of geochemical principles to environmental problems including air pollution and atmospheric processes, climate change, water chemistry and water-rock interactions, and the transport and dispersal of organic and inorganic pollutants. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Written &Oral Communication (WOC).

GEOL.4930 Internship: Environmental Geoscience (Formerly 89.493) - Credits: 1-3

Work experience with private or public employer. Written report and supervisor evaluation required. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Written &Oral Communication (WOC).

GEOL.4950 Honors Research: Geoscience (Formerly 89.495) - Credits: 3

An independent scientific research project carried out by a qualified senior under the supervision of a faculty member. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Written &Oral Communication (WOC).

GEOL.4970 Research: Geoscience - Credits: 3

An independent scientific research project carried out by a qualified senior under the supervision of a faculty member.

HIST.4320 Research Seminar (Formerly 43.432) - Credits: 3

Systematic research in primary and secondary sources culminating in the writing of an original research paper using proper methodological and stylistic techniques. Weekly meetings and written and oral progress reports. Students must be acquainted with word-processing techniques. Required of all History majors. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL), Critical Thinking &Problem Solving (CTPS), and Written &Oral Communication (WOC).

MATH.4750 Senior Seminar II (Formerly 92.475) - Credits: 3

Undergraduate seminar on advanced mathematical topics. Students are required to develop an understanding of an advanced subject beyond the scope of an existing course or synthesize two or more different areas form their curriculum. Students are required to participate in the seminar, present their results to the Department and write a substantial thesis in their topic area. Essential course elements include library research, original research, and both verbal and written exposition. The first semester is a graduation requirement for majors in mathematics.

MECH.4230 Capstone Design (Formerly 22.423) - Credits: 3

Students perform independent design work and participate in team efforts to develop conceptual designs from functional requirements. Perform design analysis and synthesis, modeling, fabrication, testing, cost estimating, and documenting the
essential elements of the system design. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL), Information Literacy (IL), and Written & Oral Communication (WOC).

MGMT.3100 Human Resources Management (Formerly MGMT/66.310) - Credits: 3

Current issues in the management of human resources. Recruitment, selection, work force training and development, reward systems, employee health and safety, legal issues, managing diversity, performance evaluation, and human resource planning.

MGMT.4900 Strategic Management (Formerly MGMT/66.490) - Credits: 3

An integration of knowledge in the various functional areas of management toward solution of problems affecting the character and success of the total enterprise. Corporate strategy and its implementation via appropriate policies.

MKTG.3150 New Product & Service Management (Formerly MKTG 315/62.315/62.311) - Credits: 3

Course number was formerly 62.311. Focuses on the process of new product & service development and marketing. Emphasis is given on market opportunity identification, R&Dmarketing interface, business model development, market potential estimation, and market entry timing.

MLSC.3810 Molecular Diagnostics Laboratory - Credits: 2

The Molecular Diagnostics course is designed to instruct students in the principles and laboratory techniques used in Molecular Diagnostics in the clinical laboratory setting. An overview of nucleic acid structure, gene expression, and genetic diseases will be provided. Students will be given both lecture and laboratory instruction in basic molecular testing methodologies.

MTEC.4320 Capstone Design (Formerly 23.432) - Credits: 3

The course uses the Engineering Design Process methodology to formulate solutions to a product or project design effort. The design process is reviewed from problem statement to final design. The course utilizes casework, in-class exercises, examples of the preparation and use of customer and engineering specifications, and brainstorming techniques to generate feasible solutions to problems, and the process for selecting the most viable solution. Students learn to generate labor and materials budgets for product/project development and methods for the effective oral and written communication of these results. Students complete the course by delivering a comprehensive presentation of the product development effort and results.

MUBU.4991 Music Business Internship (Formerly 77.499) - Credits: 6

Music Business Internship

MUSR.4930 Internship in SRT (Formerly 78.493) - Credits: 6

Practical experience in audio-recording under the supervision of a professional firm. At least twenty hours per week for fifteen weeks is spent working at an entry-level position for a firm involved in audio.

MUSR.4940 Senior Project in Sound Recording Technology (Formerly 78.494) - Credits: 6

Advanced projects developed in consultation with faculty advisor. Typical projects include production of a complete record album, investigation of experimental recording techniques, and original research in recording technology. To be completed in place of MUSR.4930 by students not choosing an internship. Permission of Coordinator and Chair

NURS.3110 Health Promotion and Risk Reduction of Families I Practicum (Formerly 33.311) - Credits: 4

This community-based clinical course is focused on health promotion of young families including childbearing women, infants, children, and adolescents. A portion of the clinical experience consists of establishing a relationship by the student with a family. first four semesters of nursing curriculum. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL).

NURS.4210 Selected Topics in Nursing (Formerly 33.421) - Credits: 3

Selected Topics in Nursing is a course for advanced undergraduates in the RN-BS option. The content will vary from semester to semester depending on the research interest of the faculty member(s) teaching the course.

NUTR.4960 Senior Research in Nutrition (Formerly 36.496) - Credits: 3

Continuation of 36.494. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL), Information Literacy (IL), and Written & Oral Communication
PCST.4530 Integrative Seminar in Peace and Conflict Studies (Formerly PCS 453/553) - Credits: 3

The purpose of the integrative seminar is to assist students in developing a robust and mature understanding of the three PCS core questions as they relate to PCS coursework. With a strong evidence focus, students identify patterns, principles, questions, and dilemmas relevant to the core questions emerge from multiple courses they have taken within the PCS program. Students develop a reflective journal, a series of essays, a portfolio of their accumulated work, and a culminating portfolio presentation. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Written & Oral Communication (WOC).

PCST.5530 Integrative Seminar in Peace and Conflict Studies (Formerly PCS 453/553) - Credits: 3

The purpose of the integrative seminar is to assist students in developing a robust and mature understanding of the three PCS core questions as they relate to PCS coursework. With a strong evidence focus, students identify patterns, principles, questions, and dilemmas relevant to the core questions emerge from multiple courses they have taken within the PCS program. Students develop a reflective journal, a series of essays, a portfolio of their accumulated work, and a culminating portfolio presentation. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Written & Oral Communication (WOC).

PHIL.4951 Senior Capstone - Credits: 3

This course is designed to provide philosophy majors with a capstone project involving integration of their coursework in philosophy in the form of an independent research project under the supervision of a faculty member. The capstone will be taken during the senior year (students in the Communications program may take the Practicum instead of the Capstone). The class is designed to meet the Essential Learning Outcomes of Written and Oral Communication, Applied and Integrative Learning, and Information Literacy.

PHIL.4960 Practicum (Formerly 45.496) - Credits: 3

The practicum is a 3-credit internship at a professional site relevant to the student’s course of study. Students are required to write a term paper at the end of their internship.

PHYS.4530L Health Physics Capstone (Formerly 95.453) - Credits: 3

This course will provide the B.S. candidate in Physics (Radiological Health Physics option) with an undergraduate capstone experience through basic independent research, including critical thinking, problem solving, report writing, and presentation skills.

PHYS.4540 Physics Capstone (Formerly 95.454) - Credits: 3

This course will provide the graduating physics major with a capstone experience through an exposure to the rudiments of independent research; incorporating critical thinking, problem-solving, report-writing, and presentation skills learnt in the course of the undergraduate curriculum. Prerequisite: Senior Status.

PLAS.1070 Introduction to Plastics Engineering (Formerly 25.107/26.107) - Credits: 2

This course is designed to teach basic principles of technical drawing, fundamentals of design, fundamentals of computer aided design (CAD), dimensioning and tolerances. Basic concepts of manufacturing, rapid prototyping and 3D printing are covered. The lecture component covers theoretical information, and the lab component covers hands-on learning, where students learn to use a commercial CAD software.

PLAS.2180 Introduction to Design (Formerly 26.218) - Credits: 2

This course is designed to teach basic principles of technical drawing, fundamentals of design, dimensioning and tolerances. Basic concepts of manufacturing and rapid prototyping are covered. The lecture component covers theoretical information, and the lab component covers hands-on learning, where students learn to use a commercial CAD software. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL).

POLI.4960 Experiential Learning in Political Science (Formerly 46.496) - Credits: 3-9

This course provides students with a practical appreciation for the work of politics emphasizing a universal skill set for polycentric, experiential learning. The course is designed to help ease the transition from a political science degree to a variety of academic and professional paths.

POLI.4970 Practicum in the Law Requirement. (Formerly 46.497) - Credits: 3

A program of study and research which includes involvement in and first-hand knowledge and observation of the legal system and legal practice. Open only to political science majors and, with certain restrictions, legal studies minors. The course will be graded S (satisfactory) or U (unsatisfactory). Meets
Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL).

POMS.4020 Global Supply Chain Management (Formerly POMS 402/63.402) - Credits: 3

A supply chain consists of all of the activities and organizations required to produce and deliver a good or service from raw materials to the final end user. Global Operations and Supply Chain Management (GOSCM) involves the coordination of this complex network of organizations and flows of materials, funds, and information among and between the stages of a supply chain. GOSCM integrates the traditional business functions of operations, marketing, logistics, finance, and information systems in an international business context. The course traces the flow of products and services from development through delivery to the final user and will address topics such as global sourcing strategies, managing demand and supply uncertainties distribution strategies and logistics network design for global operations, global strategic alliances, and the role of information technology and Enterprise Resource Planning (ERP) in managing global supply chains. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Information Literacy (IL).

PSYC.4690 Research III: Laboratory (Formerly 47.375 and PSYC.3750) - Credits: 3

An advanced course in which students design and carry out an empirical research project from start to finish, resulting in an individually written research report using APA style and an oral presentation. The primary goal is for students to experience discovery by completing an original study that reasonably extends the prior research literature. Topics may vary, reflecting the interests of the instructor. Students will perform literature reviews; formulate a research question; operationalize variables; develop research designs; obtain ethical review and approval; and collect, analyze, and interpret data. Students will also demonstrate knowledge of the research process in assessments that may include assignments, quizzes, or exams. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Information Literacy (IL).

PSYC.4750 Seminar in Clinical Psychology (Formerly 47.475) - Credits: 3

An advanced seminar to consider special topics in clinical psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as health psychology and behavioral medicine; the nature and causes of or interventions for specific psychological disorders (e.g., autism spectrum disorder, schizophrenia); the community mental health movement; clinical methods of assessment. This is a writing intensive course.

PUBH.4090 Service Learning in Community Health (Formerly 31.409) - Credits: 3

This course is designed to serve as a service learning experience in the fall semester of students’ senior year in Health Education. Students will be expected to participate in a predetermined community health project happening in the City of Lowell for a minimum of 40 hours. During the course of this experience, students will provide the community health organization with their time, knowledge, and effort, and will, in return, gain tremendous experience in the organization, development, implementation, and/or evaluation of Community Health Education and Promotion Projects. Collaboration with various professionals involved in the programs and projects will certainly add to students’ understanding of what a Health Educator does! An integral piece of this service learning experience will be the bi-monthly seminar geared toward asuring the connection between the community experience and the theoretical and academic framework from which it is derived. Through the use of readings, discussions, student presentations, and guest speakers, students will gain wonderful experience in terms of what it means to “build the capacity of a community”. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL).

PUBH.4100 Public Health Capstone (Formerly 31.410) - Credits: 6

This capstone is the culminating experience for all students in the BS in public health that allows students to integrate, synthesize and apply the knowledge of public health gained throughout their undergraduate program. It can be structured as a cumulative, integrative and scholarly experience or an applied experience or inquiry project. Each student will craft an experience that is appropriate for his/her professional goals in aspirations. Projects may include internships, research papers, honors theses, or other appropriate activities that apply a range of public health competencies and skills. Students create a portfolio of work and/or research poster for the experience demonstrating proficiency in the domains of public health.

SOCI.4030 Qualitative Methods for Social Research (Formerly 48.403) - Credits: 3

Qualitative research methods. Discusses various strategies employed by qualitative researchers with special emphasis on field research. For majors only. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning
AIL and Critical Thinking & Problem Solving (CTPS).

THEA.3110 Play Production (Formerly THEA 311) - Credits: 3
Introduction to the design and technical aspects of theatre through hands-on experience working on campus productions. Focus on basic principles of set, lighting, props, costume, makeup, and sound production. May be repeated for credit.

UTCH.1030 Exploring Teaching and Learning in STEM - Credits: 3
This is an experiential learning course that also allows students to explore teaching and learning in a STEM content area. Students plan and teach inquiry-based science, math, technology, or engineering lessons, collect data on students' learning, and determine how they could make adjustments to improve the learning gains of students in a middle school classroom.

WLAN.2992 Directed Studies World Languages Level 4 - Credits: 3
Directed Studies World Languages Level 4. Permission of the instructor and department chair required.

WLFR.2120 French 4 and Culture (Formerly 50.212) - Credits: 3
This course has French 3 and Culture (or equivalent) as a prerequisite and is the 4th and last of the 4-course French language program offered at UML. The course strengthens the four skill acquired in prior levels. It emphasizes increased accuracy and depth of students' abilities and knowledge of French and Francophone culture and language in a communicative approach (instruction occurs in French with almost no use of English). Students express themselves orally and in writing at the national standards level of high-intermediate and understand key-concepts when spoken clearly at native speed.

WLSP.2120 Spanish 4 and Culture (Formerly 54.212) - Credits: 3
This course has Spanish 3 and Culture (or equivalent) as a prerequisite and is the 4th and last of the 4-course Spanish language program offered at UML. The course strengthens the four skill acquired in prior levels. It emphasizes increased accuracy and depth of students' abilities and knowledge of the culture of Spanish speaking countries in a communicative approach (instruction occurs in Spanish with almost no use of English). Students express themselves orally and in writing at the national standards level of high-intermediate and understand key-concepts when spoken clearly at native speed.
ACCT.4010 Advanced Financial Accounting I  
(Formerly ACCT/60.401) - Credits: 3
Explores issues in accounting for large, multinational business entities. Consolidation, mergers, home office/branch accounting, international accounting topics, partnership and nonprofit organizations are also examined. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Critical Thinking &Problem Solving (CTPS).

AEST.3620 Post-digital Aesthetics - Credits: 3
Post-digital Aesthetics explores art after the digital revolution focusing on critical analysis of digital images and environments. We will study how digital technology has transformed art making and also how it impacts the very definition of art. The blurring of boundaries between art, life and design is more than ever evident as human experiences are increasingly mediated through technological devices and high-quality design. The internet has dramatically altered how and why we make art while virtual presence and embodiment in VR bring unprecedented questions about the role of artists and designers in our understanding of the world. This course will be taught as a face-to-face seminar. However, we will also travel beyond the classroom walls into virtual worlds and environments.

ARTS.1010 Art Concepts I (formerly 70.101) - Credits: 3
Art Concepts I will focus on learning the visual language of the creative process through examination of the principles of two-dimensional visual organization. These fundamental basics form the underlying structure of all studio and communication arts. Through slide lecture, guest lecturers, field trips, and studio projects, students will begin to understand the many forms that visual expression takes. The course will develop creative problem solving skills and students will learn to respond to personal challenge. Students will also be instructed in the principles of professional execution and be introduced to diverse modes of thought, media, and aesthetic expression. Meets Core Curriculum Essential Learning Outcome for Critical Thinking &Problem Solving (CTPS).

ARTS.1350 Kinetic Projects (Formerly 70.135) - Credits: 3
Kinetic Projects is a hybrid course designed for a variety of majors to explore the intersections between mechanical engineering and sculpture. In this project-driven class, students will learn principles and practice in both the fields of engineering and art, and put them into practice by creating functioning kinetic objects to be displayed in a public setting. The course will also include guest lectures from practitioners in Art and Engineering. The course provides an introduction to technical communications, teamwork, data analysis, computer coding, computer-aided drafting/design/modeling program usage, prototyping techniques, report-writing and/or oral presentation.

ARTS.4930 Senior Studio I (formerly 70.493) - Credits: 3
Senior Studio I is one of the two capstone courses of the Bachelor of Fine Arts program in the Art Department. Students are required to research, develop and produce a mature, coherent and substantial body of work representing 6 credits (in a two course sequence) that will be presented to the faculty for evaluation as well as exhibited to the public in the BFA Senior Studio exhibition. Enrollment restricted to majors in BFA program. Senior Studio I will focus on research, professional portfolio, resume and artist statement.

ARTS.4970 Senior Studio (formerly 70.497) - Credits: 6
This course is designed to culminate four years of art experience for the BFA studies. The development of personal approach to media and idea is emphasized. Each student will be responsible for developing a self-assigned thematic concern. No assignments will be made by the instructor who will act only as an advisor and coordinator. Course evaluation is by the Senior Studio Review Committee. Enrollment restricted to majors in BFA program. Fall and Spring. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL), Critical Thinking &Problem Solving (CTPS) and Information Literacy (IL).

ATMO.1500 The Physical Science of Climate Change - Credits: 3
Due to the complexity of climate change, there are many important dimensions to the problem, including political, economic, social, and ethical. This course focuses on the physical science dimension of climate change: what are the key scientific principles that are needed to understand the causes and physical impacts of climate change, and to evaluate possible responses and their likely effectiveness? This class is offered for both science and non-science majors.

BIOL.2350 Genetics (Formerly 81.235) - Credits: 4
The theories of both classical and molecular genetics are explored with emphasis on the experimental evidence which has laid the foundation for contemporary understanding of genetics. Included is the nature of the genetic material, gene action, genetic recombination, gene regulation, gene interaction, the production and inheritance of genetic phenotypes, chromosomal mechanics, and the behavior of
genes in populations.

**BIOL.4190 Biochemistry (Formerly 81.419)** - Credits: 3

Studies the structure and properties of proteins, carbohydrates, and lipids which combined with a discussion of elementary enzymology allows for detailed descriptions of several important degradative and biosynthetic pathways, their integration and regulation. Throughout the course, emphasis is on methods and practical application of fundamental information to the solution of problems of current biomedical interest.

**BMEN.4910 Biomedical Capstone I** - Credits: 3

This is the first of a two course capstone sequence. It provides an integrative design experience in engineering. Students work in teams and apply their engineering problem solving skills on open-ended, real-world biomedical projects. This course has an emphasis on team work, communication, report writing, oral presentations, project definition and project planning.

**BMSC.3630 Analytical Instrumentation Laboratory (Formerly 36.363 and MLSC.3630)** - Credits: 2

The course is designed to provide an introduction to the types of analytical instrumentation used in laboratory settings within the applied biomedical sciences. Emphasis is placed on theoretical concepts, instrument components, practical applications, and troubleshooting of modern analytical instrumentation. Analytical methodologies routinely used in the applied biomedical sciences at large are emphasized, including the qualitative and quantitative aspects of each instrumental technique studied.

**CHEM.3460L Physical Chemistry Laboratory I (Formerly 84.346)** - Credits: 2

Laboratory work designed to exemplify principles covered in 84.344. Required for chemistry majors. Meets Core Curriculum Essential Learning Outcome for Critical Thinking &Problem Solving (CTPS).

**CHEM.4090 Engineering Economics and Process Analysis (Formerly 10.409)** - Credits: 3

This course brings together all the Chemical Engineering core principles applied to the development of economic process designs. Economic evaluations of manufacturing operations and projects including essential concepts in accounting, depreciation, time value of money, and the evaluation of investment alternatives are applied for process analysis and design objectives. The impact of management and production costs, product markets, regulatory, environmental and safe production practices, the analysis of corporate annual reports including balance sheets and income statements, and capital and operating costs are all considered in regard to efficient and economic processes. In addition to lecture materials students are required to complete comprehensive projects. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL), Critical Thinking &Problem Solving (CTPS) and Information Literacy (IL).

**CHEN.4100 Chemical Plant Design (Formerly 10.410)** - Credits: 3

This course is the logical continuation of CHEN.4090 (Formerly 10.409) The principles of technical and economic evaluation are applied to a chemical engineering problem. A group of students is given a statement of the problem. They are required to find information on raw materials, products, thermodynamic parameters and plant practices in order to develop the assumptions required to carry out an examination of technical and economic feasibility. Each group generates a final report for the problem. In addition to oral presentations, students are required to complete a comprehensive group design project. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL), Critical Thinking &Problem Solving (CTPS) and Information Literacy (IL).

**COMP.4040 Analysis of Algorithms (Formerly 91.404)** - Credits: 3

Development of more sophisticated ideas in data type and structure, with an introduction to the connection between data structures and the algorithms they support. Data abstraction. Controlled access structures. Trees, lists, stacks, queues, graphs, arrays, hash tables. Algorithm design strategies such as divide and conquer. Elementary techniques for analysis; asymptotic analysis, recursion equations, estimation methods, elementary combinatorial arguments. Examination of problem areas such as searching and sorting, and the indicated representations and algorithms. The student will use the techniques learned in this course and in previous courses to solve a number of logically complex programming problems using pseudocode, with an emphasis on establishing algorithmic correctness and estimating time and space complexity.

**CRIM.4890 Capstone Seminar in Criminology &Criminal Justice (Formerly 44.489)** - Credits: 3

This course is designed to provide criminal justice majors with a capstone experience emphasizing integration of knowledge acquired in previous courses on the causes of criminal behavior and responses to it, particularly the institutions, policies and practices of the criminal justice system. Students engage in the development and production of a senior level research paper grounded in relevant criminology and criminal justice.
literature.

**DGMD.4980 Digital Media Capstone I - Credits: 3**

The first section of the capstone course is designed for guided self-designated projects by seniors in the Digital Media BA program. The course is a part of a sequence of two courses and is designed to be intense engagement that should manifest in the significant project taken from concept through production. Students can work individually and collaboratively under the close supervision of the faculty. The students are required to submit an application that includes a sound project proposal to be eligible for enrollment into the course. The sequential section DGMD.4991 needs to be completed by the BA students to graduate.

**DGMD.4991 Digital Media Capstone II - Credits: 3**

This is the second part of capstone course sequence and is designed for guided self-designated projects by seniors in the Digital Media BA program. The course is a part of a sequence of two courses and is designed to be intense engagement that should manifest in a significant project taken from concept through production. Students work individually and collaboratively under the close supervision of the faculty. The end result of the course should be the completion of a significant project; the final step should result in a public screening. DGMD.4980 needs to be completed for student to qualify for the course.

**ECON.3040 Macroeconomic Theory (Formerly 49.304) - Credits: 3**

Building on Principles of Macroeconomics (ECON.2020), this course studies goods markets and money markets in further detail. Emphasis is placed on aggregate labor markets and also on the relationship between inflation, unemployment, and aggregate output. These topics are contextualized in order to examine aggregate economic developments in the short, medium, and long run. Optimal monetary and fiscal policies are examined against this background. Select additional topics are covered, such as the basics of open-economy macroeconomics. This course meets the Essential Learning Outcome of Critical Thinking and Problem Solving (CTPS) as defined under the Core Curriculum requirements.

**ECON.3450 Health Economics (Formerly 49.345) - Credits: 3**

An introduction to the economic analysis of health care market. The course presents microeconomic models, empirical findings and public policies referring to the following topics: the production and demand for health (the investment/consumption aspects of health and the relationship between socio economic status and health status), the issues of moral hazard and adverse selection in the insurance market, the role of information in the physician-patient relationship, the different regulation and payment systems for providers, the Medicare and Medicaid programs, and the comparisons between the US system and the health systems of other western economies and developing countries. This class aims to help students becoming more informed future citizens and consumers or producers of healthcare. Prerequisites: 49.201 or instructor’s approval. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Social Responsibility & Ethics (SRE).

**EDUC.3400 Mathematics and Problem Solving in the Inclusive E - Credits: 3**

There is a renewed focus in creating math learning environments in the elementary classroom where students are continuously involved in problem solving. In fact, one of the main goals in elementary math is to provide children with the experiences and support to use a variety of strategies to solve real-world problems. This course will help preservice teachers understand how children with different strengths learn math so the can develop, create, implement, and assess lessons and units that align with the Massachusetts Math Common Core State Standards.

**EECE.3110 Electronics I Lab (Formerly 16.311) - Credits: 2**

Laboratory experiments coordinated with the subject matter of Electronics I. This lab explores the characteristics and use of electronic instrumentation for making measurements on electronic circuits. Labs will utilize the methods of designing and characterizing diode and transistor circuits. They will analyze the performance characteristics of digital and linear semiconductor circuits, including logic elements and amplifiers. The design and construction of circuits using monolithic op ampls will also be explored.

**ENGL.2000 Critical Methods of Literary Inquiry (Formerly 42.200) - Credits: 3**

Examination of diverse critical and theoretical approaches to literature in the development of literary analysis.

**ENGL.2330 Play Analysis (Formerly 42.233) - Credits: 3**

An introduction to the principles of play construction and the vocabulary and methods of interpreting play texts for theatrical production. Required of all theatre arts concentrators.

**ENGL.4010 Selected Authors (Formerly 42.401) - Credits: 3**
A study of selected works. Authors to be announced each semester.

**ENGL.4500 Creative Writing: Capstone (Formerly 42.450) - Credits: 3**

In this intensive workshop course, upper-level students in the creative writing concentration work for an entire semester on a reading and longer-form writing project in one of three genres - poetry, fiction, or creative nonfiction. Students devise reading lists specific to their writing projects, with instructor’s guidance. Through a creative process that involves planning and drafting, peer workshop, instructor feedback, and rigorous revision, students ultimately create portfolios that represent their best undergraduate writing.

**ENTR.3610 Starting a New Venture (Formerly ENTR/64.361) - Credits: 3**

This course is designed for students with a curiosity and interest in starting a new business. In this course, students will explore the entrepreneurship process including how entrepreneurs discover and evaluate the sources and opportunities for new business ventures; how they assemble the resources, how they operate and grow a new business; and finally how they harvest their hard work as successful entrepreneurs. The course covers a variety of topics associated with launching and running a new business venture, such as marketing, financing, building the venture team, legal and regulatory issues, and social and environmental issues. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS).

**ENVI.2030L Earth Systems: Geosphere Laboratory (Formerly - Credits: 1**

The Laboratory component Earth Systems: Geosphere requires the student to make measurements, analyze and plot data, draw conclusions from the data plots, characterize and identify earth materials, and interpret geospatial representations. These skills will follow lecture material and increase understanding through active learning.

**ENVI.2040L Earth Systems: Atmosphere and Oceans Laboratory (Formerly 87.204) - Credits: 1**

Earth Systems: Atmosphere and Oceans Lab is designed to complement the lecture material from ENVI.2020 - Earth Systems Atmosphere and Oceans. This course, along with the other Earth Systems courses and corresponding labs use a systems-based approach for the topic of Earth and Environmental Science. This laboratory will concentrate on the Atmosphere and Oceanography.

**ETEC.3610 Project Laboratory A (Formerly 17.361) - Credits: 2**

The project lab runs for 14 weeks with design, fabrication, and testing of the project during the weeks one through twelve, and the last two weeks for presentation of the projects to the class. It is expected that all projects be presented operational and meeting the design performance requirements. There are exceptions to this. In the case of non-working projects the progress and final report will be heavily relied on for grading.

**ETEC.3910 Capstone Design (Formerly 17.391) - Credits: 3**

The project lab runs for 14 weeks with design, fabrication, and testing of the project during the weeks one through twelve, and the last two weeks for presentation of the projects to the class. It is expected that all projects be presented operational and meeting the design performance requirements. There are exceptions to this. In the case of non-working projects the progress and final report will be heavily relied on for grading. May do project at work (all requirements of reports, presentation, etc. still required). Pre-Requisites: 17.361, or 17.353 and 17.358 and 17.365

**ETEC.3920 Capstone Execution (Formerly 17.392) - Credits: 3**

The project lab runs for 14 weeks with design, fabrication, and testing of the project during the weeks one through twelve, and the last two weeks for presentation of the projects to the class. It is expected that all projects be presented operational and meeting the design performance requirements. There are exceptions to this. In the case of non-working projects the progress and final report will be heavily relied on for grading. May do project at work (all requirements of reports, presentation, etc. still required).

**EXER.3050 Exercise Physiology (Formerly 38.305) - Credits: 4**

This course will examine the short and long term effects of exercise of the oxygen transport systems, including understanding the concepts of physiological and metabolic functioning of the human body during aerobic physical activity, exercise, sports performance and training. Students taking this course and its lab co-requisite are advised that the capability to exercise moderately and maximally will be necessary.

**EXER.4220 Exercise Prescription & Programming (Formerly 38.422) - Credits: 3**

This course provides an essential foundation for exercise
prescription and programming, and sound educational practice. Factors that impede or enhance exercise compliance and progress are explored. Clinical teaching skills, safety, and professional behavior are also addressed.

FAHS.2130 Foundations in Liberal Studies (Formerly 59.213) - Credits: 3

Foundations of Liberal Studies is a required course for all BLA majors. This course examines the value and importance of drawing on several academic disciplines to understand issues that are too complex to be addressed effectively using any single discipline. Using a case study approach, we will examine how the elements of various disciplines can be integrated and synthesized to understand and give voice to complex issues dealing with health, environment, governance, peace and conflict, etc. Upon completing the course, students will be able to view the courses in their tow BLA concentrations from an interdisciplinary perspective by observing how elements of each discipline can contribute to the understanding of global problems. These skills will be applied in the BLA Capstone Course.

FAHS.2200 Designing the Future World (Formerly 57.220) - Credits: 3

All purposeful human activity involves design. Every day we are surrounded by the products of design processes--buildings, cars, entertainment, corporations, schools, even laws and regulations. They make our lives easier in many ways, but they may also create significant social and environmental problems. In the past, designers often did not consider the impact of their designs on society, or ignored the negative consequences. Our culture and legal system usually permitted, or even encouraged, this irresponsibility. Today, a small group of scholars, businessmen and women, and activists are rethinking how we design the things around us, with the goal of addressing the most pressing social and environmental issues. This class will introduce students to some of these issues, the people who are confronting them, and the ways in which all of us can contribute to designing a better Future World. With a series of hands on projects, coupled with readings and other resources, students will work to design aspects of the future. In the process you will learn about possible solutions to complex, important problems, but also learn valuable life skills such as problem framing, problem solving, critical thinking, active learning, communication, and simple construction methods. No previous experience is required-only curiosity and eagerness to learn.

FINA.3210 Investment and Portfolio Analysis (Formerly FINA 321/61.304) - Credits: 3

This course is a survey of investments for business students. Topics include the investment environment, markets and instruments, securities trading, market indexes, risk, diversification, the capital asset pricing model, market efficiency, introductory valuation of bonds stocks options and futures, mutual funds, behavioral finance, and strategies for individual investors. Meets Core Curriculum Essential Learning Outcome for Critical Thinking &Problem Solving (CTPS) and Information Literacy (IL).

FINA.3310 Principles of Corporate Finance (Formerly FINA 331/61.431) - Credits: 3

Advanced study of the principles of financial analysis. Covers topics such as acquisition of long-term assets, capital budgeting models, and the analysis of mutually exclusive projects.

GEOL.2150 Forensic Geology (Formerly 89.215) - Credits: 3

This course deals with the application of geological and related principles to the solution of various types of crimes. The course will explore the use of evidence (rocks and minerals, soils, geochemistry, etc.) to identify the source and hence the potential perpetrator of the crime. Meets Core Curriculum Essential Learning Outcome for Critical Thinking &Problem Solving (CTPS) and Quantitative Literacy (QL).

HIST.4320 Research Seminar (Formerly 43.432) - Credits: 3

Systematic research in primary and secondary sources culminating in the writing of an original research paper using proper methodological and stylistic techniques. Weekly meetings and written and oral progress reports. Students must be acquainted with word-processing techniques. Required of all History majors. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL), Critical Thinking &Problem Solving (CTPS), and Written &Oral Communication (WOC).

MATH.2340 Differential Equations (Formerly 92.234) - Credits: 3


MATH.2360 Engineering Differential Equations (Formerly 92.236) - Credits: 3

Introduction to differential equations with an emphasis on engineering applications. Topics include first-order equations,
higher-order linear equations with constant coefficients, and systems of first-order equations. Applications of each topic are introduced and qualitative, analytical, and numerical solution techniques are studied. The software package MATLAB is used throughout the course for both analytical and numerical calculations.

MECH.1010 Kinetic Projects - Credits: 3

Kinetic Projects is a hybrid course designed for a variety of majors to explore the intersections between mechanical engineering and sculpture. In this project-driven class, students will learn principles and practice in both the fields of engineering and art, and put them into practice by creating functioning kinetic objects to be displayed in a public setting. The course will also include guest lectures from practitioners in Art and Engineering. The course also provides an introduction to technical communications, teamwork, data analysis, computer coding, and introduction to CAD prototyping, report-writing and/or oral presentation.

MECH.3210 Kinematics of Mechanisms (Formerly 22.321) - Credits: 3

Design and kinematic analysis of mechanisms. Course topics include linkage synthesis and motion analysis (position, velocity and acceleration), cam, gear and power train design, and technical communication. This course meets the Essential Learning Outcome of Critical Thinking and Problem Solving as defined under the Core Curriculum requirements. As such, the course will reinforce the students’ ability to identify, analyze, interpret, and evaluate arguments, data, evidence, problems, and conclusions as part of formulating an opinion or conclusion, and then use that information to design, evaluate and implement a strategy to achieve a desired outcome.

MGMT.4100 Negotiation Strategy and Process (Formerly MGMT/66.410) - Credits: 3

Analysis and application of the key factors that shape and characterize different negotiation situations; the analytical skill to diagnose potential areas of difference and select appropriate strategies to address them; the interpersonal skills to tactically manage the specific communication and decision-making behaviors during the actual bargaining; and the ability to recognize how one’s own personality, value system and perceptions affect the choice of tactics and behavior.

MGMT.4900 Strategic Management (Formerly MGMT/66.490) - Credits: 3

An integration of knowledge in the various functional areas of management toward solution of problems affecting the character and success of the total enterprise. Corporate strategy and its implementation via appropriate policies.

MIST.3050 Business Applications Development (Formerly 63.330: Application Systems Development, MIST 305) - Credits: 3

Introduction to programming and computing. Topics include fundamental programming constructs, data structures, and object orientation. Through hands-on exercises to build business applications, students will learn programming concepts, software development principles, and computational problem-solving skills. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS).

MKTG.4110 Marketing Analytics (Formerly MKTG 411/62.411/62.312) - Credits: 3

Course number was formerly 62.312. Focuses on marketing strategies and tactics. Emphasis is given on research methods and applications for strategy building and implementation. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Quantitative Literacy (QL).

MLSC.3610 Clinical Laboratory Instrumentation (Formerly 36.361) - Credits: 3

This course is designed to provide an in-depth knowledge of clinical chemistry laboratory instrumentation. Emphasis is placed on theoretical concepts, instrument components and design, calibration and troubleshooting of modern instrumentation, and analytical methodologies in the clinical laboratory. Additionally, qualitative and quantitative applications of instrumental techniques are covered. Computer applications are included where appropriate. The following spectroscopic instruments are studied: ultraviolet, visible and infra red absorption, fluorescence, turbidimetry and coulometry. Chromatographic instrumentation and methods are discussed, such as column and thin layer chromatography, high pressure liquid chromatography, gas chromatography, and ion exchange chromatography.

MTEC.4320 Capstone Design (Formerly 23.432) - Credits: 3

The course uses the Engineering Design Process methodology to formulate solutions to a product or project design effort. The design process is reviewed from problem statement to final design. The course utilizes casework, in-class exercises, examples of the preparation and use of customer and engineering specifications, and brainstorming exercises to generate feasible solutions to problems, and the process for
selecting the most viable solution. Students learn to generate labor and materials budgets for product/project development and methods for the effective oral and written communication of these results. Students complete the course by delivering a comprehensive presentation of the product development effort and results.

MUPF.2330 Conducting 1 (Formerly 75.233) - Credits: 2
Training in basic baton technique and related study for instrumental and choral conducting.

MUSR.3050 Survey: Music Technology (Formerly 78.305) - Credits: 3
The use of technology in music listening, performance, analysis, composition, recording and music study will be presented. The dimensions and applications of technology will be discussed as related to aesthetics, the musician’s experiences, musical style, and the musical experience. Basic introduction to the technologies of audio recording. Course includes required reading, listening, session participation. Music Majors Only.

MUSR.4100 Recording Production (Formerly 78.410) - Credits: 3
Intermediate audio production. Planning and executing recording sessions which involve a variety of musical ensembles under diverse recording conditions; live-performance/concert recordings; multi-track recording, overdub, and remix procedures; application of informed musical judgment to the mixing process; and research in recording techniques. Laboratory required.

NURS.3090 Health Promotion in Nursing Practice Practicum (Formerly 33.309) - Credits: 3
This course is a clinical practicum which focuses on the development of interventions to promote the health of individuals and families. This course aims to refine critical thinking skills and analyze nursing’s unique contribution to health care. Consideration is given to the interrelationships of theory, research and practice.

NURS.4110 Health Promotion and Risk Reduction of Families III Practicum (Formerly 33.411) - Credits: 4
In this clinical course, students provide nursing care to adults in adult inpatient and outpatient settings. The focus of the experience is the development of specifically tailored therapeutic interventions in providing care to adults with acute and chronic illness.

PCST.1250 Introduction to Peace and Conflict Studies (Formerly PCS 125) - Credits: 3
This course will focus on the causes of conflict, conflict resolution methods, and ways to sustain peace. The course will explain and define each of those areas. A mid-term will be administered to examine the students’ grasp of the concepts and key terminology. The second part of the class will emphasize student participation and the application of concepts learned earlier in class. The final is a take home exam that will require the application of theory and praxis in the field of Peace and Conflict Studies.

PHIL.2010 Introduction to Philosophy (Formerly 45.201) - Credits: 3
Examines some of the typical approaches to philosophical questioning and the issues raised in such inquiry: what is true knowledge, what is reality, what is the good, what is the right political order, what is the nature of religious faith? Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS).

PHIL.2020 Introduction to Logic and Critical Reasoning (Formerly 45.202) - Credits: 3
Studies the methods used to distinguish correct from incorrect reasoning. This course will aim at developing (1) an ability to express one’s ideas clearly and concisely; (2) an increased skill in defining one’s terms; and (3) a capacity to formulate arguments vigorously and to scrutinize them critically. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Quantitative Literacy (QL).

PHYS.3930L Advanced Experimental Physics Laboratory I (Formerly 96.393) - Credits: 2
Some of the most significant experiments in the history of physics are revisited. Form measuring the universal gravity constant to observing the quantization of light and matter, this laboratory course challenges students’ experimental skills and tests their understanding of fundamental concepts. Preparing high quality lab reports and presentations is emphasized.

PHYS.4060 Nuclear Instrumentation (Formerly 96.406) - Credits: 3
This course provides the operating principles and applications of nuclear radiation detection systems, including detector theory, electronic signal processing, and measurement and data reduction techniques. The systems covered include gas-filled detectors (ion chambers, proportional counters, and Geiger-Mueller counters), inorganic and organic scintillators, and
high-purity germanium detectors, for the detection of alpha, beta, gamma, and neuron radiation. This course also covers hypothesis testing, detection limits, and detector dead time (offered as 98.506 for graduate credit).

PLAS.4040 Process Control (Formerly 26.404) - Credits: 3

Basic principles of control systems used with plastics processing equipment. Included are instrumentation, signal conditioning, data acquisition, feedback control, process monitoring, data reduction, and SPC/SQC. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Written & Oral Communication (WOC).

POLI.3010 Quantitative Methods in Political Science (Formerly 46.301) - Credits: 3

This is a course in designing Quantitative Research and applying statistics for Political Scientific. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Quantitative Literacy (QL).

POLI.4220 SMR: Political communication and Media Studies (Formerly 46.422) - Credits: 3

Advanced study in contemporary issues in Political Communication and Media Studies.

POMS.4030 Service Management (Formerly POMS 403/63.470) - Credits: 3

This course is intended to provide students with the necessary tools and understanding for managing service operations. Service firms represent the fastest-growing sector of the economy. This course will focus on the various aspects involved in the management of service operations. The service operations are managed differently to their intangibility, time-sensitivity, high levels of customer involvement and lack of engineering standards. This course will explore topics such as design and delivery of services, the measurement of productivity and quality, managing capacity and demand, redesign of service delivery processes, management of technology, and others.

PSYC.2690 Research I: Methods (Formerly 47.269) - Credits: 3

An introductory course on the fundamentals of empirical research in psychological science. Instruction will promote understanding and competence in the basic vocabulary of psychological research, addressing information literacy, measurement, reliability, and validity in observed variables and unobserved constructs. Students will learn critical components of experimental, quasi-experimental, and correlational designs, as well as the basics of descriptive statistics, hypothesis and statistical testing, and matching design to analysis strategies. Students will demonstrate this knowledge through the preparation of a research proposal. Finally, this course will provide students a strong basis from which to pursue advanced coursework in a variety of methodological approaches to psychological research. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

PSYC.4690 Research III: Laboratory (Formerly 47.375 and PSYC.3750) - Credits: 3

An advanced course in which students design and carry out an empirical research project from start to finish, resulting in an individually written research report using APA style and an oral presentation. The primary goal is for students to experience discovery by completing an original study that reasonably extends the prior research literature. Topics may vary, reflecting the interests of the instructor. Students will perform literature reviews; formulate a research question; operationalize variables; develop research designs; obtain ethical review and approval; and collect, analyze, and interpret data. Students will also demonstrate knowledge of the research process in assessments that may include assignments, quizzes, or exams. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Critical Thinking & Problem Solving (CTPS).

PUBH.3010 Introduction to Biostatistics (Formerly 19.301) - Credits: 3

This course covers the basic tools for the entry, analysis, and presentation of data in all areas of public health. Central to these skills is assessing the impact of chance and variability on the interpretation of research findings subsequent to recommendations for public health practice and policy. Specific topics include tools for describing central tendency and variability in data; methods for performing inference on population means and proportions; and statistical hypothesis testing. Software will be used to analyze health datasets, including relational databases and create graphical presentations of study results. Coursework will also focus on the interpretation of statistics in the health science literature and other communication.

PUBH.3060 Community Health Assessment (Formerly 31.306 Socio-Ecological Health Assessment) - Credits: 3

This course focuses on building health assessment skills of Public Health professionals. The course will introduce students to concepts of Community Health Assessments and guide students to practice skills necessary to conduct them. The course will emphasize the importance of using assessment
results to make programmatic and policy decisions and will
direct participants in how to communicate findings to allow
policymakers, health professionals, and members of the public
to take action to improve Public Health. Meets Core
Curriculum Essential Learning Outcome for Critical
Thinking/Problem Solving (CTPS).

PUBH.3100 Infectious Disease (Formerly PUBH.310) -
Credits: 3

This course introduces students to the fundamentals of
communicable diseases and how humans and the environment
affect their distribution and impact. The course will provide an
overview of infectious diseases, how these diseases affect
humans, vectors and sources of these diseases. The course will
also cover infectious disease surveillance, outbreak
investigation and response as well as prevention planning and
bioterrorism.

SOCI.4030 Qualitative Methods for Social Research
(Formerly 48.403) - Credits: 3

Qualitative research methods. Discusses various strategies
employed by qualitative researchers with special emphasis on
field research. For majors only. Meets Core Curriculum
Essential Learning Outcome for Applied &Integrative Learning
(AIL) and Critical Thinking &Problem Solving (CTPS).

UMLO.1030 Living-Learning Community Seminar in
CTPS - Credits: 0-1

The Living Learning Community Seminar in CTPS forges a link
between the LLC and the academic programs that individual
students are pursuing, and invites the student to develop and
launch a plan for personal and professional development, with
a particular focus on the Critical Thinking and Problem
Solving Essential Learning Outcome of the UML Core
Curriculum. In this one-credit course, students draw
intentional connections between their coursework, the practice
of independent research, and the resources and learning
opportunities available to them on campus and in their
communities. Student projects serve to integrate curricular, co-
curricular, and extra-curricular learning experiences. Sections
of this course will vary in topic, and are open only to students
residing in the relevant LLC. "Variable credit course, student
chooses appropriate amount of credits when registering."

WLFR.3440 Advanced French Grammar (Formerly
50.344) - Credits: 3

A systematic study of grammatical and syntactical structures.
Review of more advanced structures.

WLFR.3460 Advanced French Conversation
(Formerly 50.346) - Credits: 3

Advanced oral practice in rapid and idiomatic speech. Topics
of contemporary significance are selected from contemporary
prose.

WLFR.3480 Advanced French Conversation and
Composition (Formerly 50.348) - Credits: 3

Designed to improve and reinforce proficiency in spoken and
written French through regular exercises of oral
communication and free composition, through the analysis of
literary texts and authentic written and oral materials. Taught
in French.

WLFR.3940 Enhancing and Advancing your
Knowledge of French (Formerly 50.394) - Credits: 3

Designed for students who need/wish to enhance and advance
their linguistic skills in French. Conducted entirely in French,
the course will focus on the vocabulary of contemporary
French as well as selected grammatical and syntactical
structures through the analysis of French-speaking Media
(newspapers, Radios, TVs) available on the Web.

WLSP.3500 Introduction to Literary Analysis
(Formerly 54.350) - Credits: 3

In this course, students examine the various definitions and
functions of literary language, and the formal aspects of diverse
genre: narrative, poetry and essay. In this course, students also
study the concept of literature as aesthetic phenomenon and its
socio-cultural implications, through concepts such as author,
reader, narrator and discourse, Major authors, themes, and
genres from both Latin America and Spain are included, with
basic concepts of contemporary literary criticism and theory.
Taught in Spanish.
AEST.3600 Aesthetics and Critical Studies of Graphic Design (Formerly 79.360) - Credits: 3
Examination of the aesthetic theories and practice of graphic design. Significant practitioners of the art will be highlighted.

AMST.2480 Perspectives American Culture (Formerly 40/42.248) - Credits: 3
The goal of this class is to enhance students' ability to read and interpret American texts by learning how to see them in context, to understand the way readers approach texts from interpretative lenses, and to express their insights about American culture in a variety of forms and genres. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

AMST.2570 The Family in American Literature (Formerly 40.257) - Credits: 3
A study of literary selections dealing with traditions of family life, the individual, and social change. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ARCH.2060 History of Architecture (Formerly 58.206) - Credits: 3
A survey of the major technical and stylistic developments in ecclesiastical and secular architecture from Prehistory to the present day studied with an emphasis on the major monuments (Parthenon, Pantheon, Gothic Cathedrals, St. Peter’s, Versailles Palace, Eiffel Tower, Guggenheim Museum). Spring, alternate years.

ARCH.3140 American Architecture (Formerly 58.314) - Credits: 3
This course begins with a discussion of native American building traditions and proceeds chronologically from the 17th through the 20th centuries. Students will gain a familiarity with the major movements in American architecture (such as Colonial, Greek Revival, Victorian, Arts and Crafts, City Beautiful, International Style, Postmodern) as well as the leading architects such as Frank Lloyd Wright and Frank Gehry. The architecture is discussed in its historical context with attention to the inventions, materials and aesthetic assumptions that made it possible.

ARCH.3150 Modern Architecture (Formerly 58.315) - Credits: 3
This course will examine global architecture from the 19th century to the present. It addresses the major movements, "isms", architects, publications, schools, and technological innovations that contributed to varied (and often conflicting) notions of "Modern architecture." Growing nationalism and politics, travel and colonial occupation, the effects of war, and changing conceptions of nature and science, all transformed the built environment. This course will provide a better understanding not only of individual works but also of the ways architecture manifests important themes such as nationalism, regionalism, functionalism, rationalism, and the most current theme, happiness.

ARCH.3160 Architectural Utopias - Credits: 3
Can we build a better world? Many people from various eras and geographical locations have argued we can. The idea of utopia -- a place of harmony free from want and strife -- has shaped both imagined and real places. So has its opposite: dystopia. This course will focus on architectural visions and solutions for utopias from the ancient world to the present: from myths of long-lost cities to projected colonies on the moon and Mars.

ARHI.1010 Art Appreciation (Formerly 58.101) - Credits: 3
The course introduces the student to the technical, aesthetic and historical aspects of architecture, sculpture, and painting. An analysis of the visual elements used in fine arts such as color, line, shape, texture, and principles of design are developed through slide lectures, museum visits and assigned readings. In addition, students investigate the purposes of art and visual communication and develop a heightened sense of critical thinking that allows them to investigate successfully different modes of representation, styles and media in a multicultural society.

ARHI.1050 Comparative Arts (Formerly 58.105) - Credits: 3
This course studies the aesthetic, artistic and intellectual similarities between art history and music history. Discussion of the arts focuses on the development in examining the human creativity and expression through the arts: from ancient times as art and morality followed in the Renaissance as art and sciences continued in the Enlightenment as art and society contrasted in the nineteenth century as art and entertainment. Furthermore, this course surveys some of the fundamental aspects of music and art, such as the nature of aesthetic judgment, the task of art and music criticism, including formalist, representational, and contemporary theories on viewing, analyzing, and interpreting the arts. In addition, with a comparative analysis between the modes of visual and aural representation, visual and aural perception, this course analyzes the principal forms and genres of the visual and aural
elements of art history and music history, providing an understanding for human creativity and expression. Spring, alternate years.

ARHI.2030 History of Art I: Prehistoric to Medieval Art (Formerly 58.203) - Credits: 3

A survey of the origins of painting, sculpture, and architecture from the prehistoric period through approximately 1300 CE. Works of art are discussed in their historical, cultural, and artistic contexts.

ARHI.2040 History of Art II: Renaissance to Modern Art (Formerly 58.204) - Credits: 3

A survey of the origins and development of painting, sculpture, and architecture from Renaissance times to the Modern period. Emphasis is placed on representative works of art from the Renaissance, Baroque, Rococo, Nineteenth Century Movements-Neoclassicism, Romanticism, Impressionism, Cubism, Dadaism, Surrealism and Abstract Art. The aim of the course is to introduce the student to basic critical and art historical methods as well as the analysis of style and content within sequential cultural contexts.

ARHI.2110 Nineteenth Century Art (Formerly 58.211) - Credits: 3

A study of the major artists and artistic movements of the 19th century. This course examines major cultural, social and political forces (e.g. class struggles, racial and gender inequalities, industrialization, scientific discoveries, emancipation, education reform, the influence of early "social media," etc.) through the lens of the visual arts and pays particular attention to how these forces impacted the way art was produced, viewed, and understood.

ARHI.3020 Studies In World Art (Formerly 58.302) - Credits: 3

Historical and critical examination of regions works of art from China, Asia, the Islamic world, India, Africa, North America, Latin America, Native American Art and Mexico. Topics vary from year to year. Course may be repeated.

ARHI.3130 American Art (Formerly 58.313) - Credits: 3

This course centers on the study of American painting, sculpture, and decorative arts from the period of first contact up through the mid-twentieth century. One of the central questions of American art remains its definition: when does it start? What sources does it draw upon? In this class we will discuss American art through its ties to the peoples, events, institutions, and landscape that shaped it.

ARHI.3151 Islamic Art and Contemporary Society (Formerly as 59.315) - Credits: 3

This course introduces students to Islamic art through a survey of works across the broad reach of the Islamic world including Saudi Arabia, Northern and Saharan Africa, Spain, the former Ottoman Empire surrounding Turkey and the Greater Middle East. The last unit of the course looks at Islamic art in the diaspora. The course highlights works form c. 500 CE to the present, ending with the ultra modern city of Dubai.

ARHI.3310 Asian Art (Formerly 58.331) - Credits: 3

The purpose of this course is to provide a general overview of the art of the traditional cultures of Asia, China, India and Japan. This survey provides a critical and historical examination of these cultures.

ARHI.3350 The Golden Age of Spanish Art - Credits: 3

This course is a survey of art in Spain from the discovery of the Americas in 1492 through the mid-seventeenth. This roughly 150-year period, known as the Spanish Golden Age or Siglo de Oro, witnessed the expansion of the Spanish empire across the Atlantic and Asia and gave rise to many of Spain's greatest artistic achievements. This course will survey the unprecedented contributions of Spanish painters, sculptors and architects; the patrons and political forces contributing to this Golden Age of artistic production; and the place of the Spanish golden Age within broader European and global contexts.

ARHI.3360 Arts of Sub-Saharan Africa - Credits: 3

This course surveys the arts of Sub-Saharan Africa from the 12th century to the present day. It will situate works of art firmly in the history, aesthetics, values, and motivations of the cultures that created it. Students will discover that each culture has its own unique relationship with art and history. The course will also address the process of ambiguities of living and making art in global, post-colonial world. Students will gain not only a strong foundation of art historical knowledge but also how that knowledge affects our current interactions with African art through museum exhibitions and collections.

ARHI.3400 Women and Art (Formerly 58.340) - Credits: 3

An introduction to key issues and theoretical approaches to the study of women and art. This course examines women as makers of art, as subjects of art, and as interpreters of art. The class will explore the ways artists have represented the intersections of gender identities, sexual orientation, power,
race, class and nationality in their works and the socio-cultural conditions in which specific artists have been excluded or marginalized in art practice, exhibition, collecting and critical discourse.

**ARHI.3410 Medieval Art (Formerly 58.241) - Credits: 3**

This course examines the rich cross-cultural artistic heritage of the medieval world from the Late Antique period (third century CE) through the Gothic period (fourteenth century CE). The course includes the study of paintings, sculpture, illuminated manuscripts, mosaics and architecture. It will explore materials and technique, the relationship of images to sacred texts and rituals, and the controversies regarding image production. Drawing examples for the eastern Mediterranean to the rocky coast of Ireland, the course will draw out the way works of art reflected relationships between the Jewish, Christian, and Islamic religions.

**ARHI.3520 Contemporary Art and Culture (Formerly 58.352) - Credits: 3**

Examination of issues of content, theory, and criticism in contemporary art. Current exhibitions and criticism are integral to the course. Topics vary from year to year. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**ARHI.3530 History of Public Art in the Modern Era (Formerly 58.353) - Credits: 3**

This course serves as an introduction to the history of public art in the modern and contemporary world. The history of public art is examined in relation to such concerns as the definition of public space, community involvement in the creative process, the institutional and economic support system for the arts, the modern understanding of memorial sculpture, and the use of the visual arts to foster public dialogue and cultural exchange.

**ARHI.3600 Museum Issues (Formerly 58.360) - Credits: 3**

The art museum in the United States is a unique social institution because of its blend of public and private support and its intricate involvement with artists, art historians, collectors, the art market, and the government. This course will study the art museums history and status in our society today. Special consideration will be given to financial, legal and ethical issues that face art museums in our time. Short papers, oral reports and visits with directors, curators and other museum officials in nearby museums will be included along with a detailed study of a topic of ones choice.

**ASAM.2120 Introduction to Asian American Studies - Credits: 3**

This course provides students with an overview of the multidisciplinary field of Asian American Studies from two distinct disciplines. The course begins with the history of Asian American Studies and the methods used to advance the field. Next, various aspects of the Asian American experience, such as gender and sexuality, are examined. Students also participate in service learning in partnership with Asian-serving community organizations in and around Lowell, MA. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility &Ethics (SRE).

**CRIM.1010 The Criminal Justice System (Formerly 44.101) - Credits: 3**

This course presents a brief history of the Criminal Justice System and an analysis of its structure and function. This course required of all CJ majors and is a prerequisite for all other courses in criminal justice. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**DGMD.1000 Introduction to Digital Media (Formerly JMS 100/DGMD 100) - Credits: 3**

This foundational course that surveys the history and current state of digital and web-based media from a variety of perspectives: cultural and ethical, as well as the production and monetization of media. Students engage with and become critical consumers of media, learning how we use it to disseminate, market, entertain, influence and disrupt.

**ECON.3020 Labor Economics (Formerly 49.302) - Credits: 3**

An introduction to the economic analysis of behaviors and institutions in the labor market: labor supply and participation, labor demand by firms, wage determination under different institutional settings, and gender, race or ethnicity as determinants of different labor market outcomes. The course presents microeconomic models, empirical findings and their public policy implications on topics such as minimum wage, affirmative action, social insurance programs, workplace safety, and subsidized day care.

**ENGL.2430 Contemporary Women Writers (Formerly 42.243) - Credits: 3**

Contemporary Women Writers introduces students to American women writers of the last fifty years. We examine the historical, socio-cultural, political, and personal influences on
these writers’ work by studying trends and events in recent American history and themes reflected in the works. By studying contemporary women’s writing in this contextualized fashion, students can appreciate larger trends in our society, the role writing plays in examining such trends, and the value of literature as an exploration of human growth and struggle. Through discussion, group collaboration, critical analysis, and by designing their own graphic organizers, students gain a breadth of knowledge in the following areas: the themes and stylistic concerns of contemporary American women’s writing; the key historical events that influence contemporary American women’s writing; the critical reading of literary texts. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2460 Gay & Lesbian Literature (Formerly 42.246) - Credits: 3

Explores the treatment of homoeroticism and homosexual love in literature from Antiquity to the present. Emphasis is given to texts reflecting the construction of a homosexual identity and recurring motifs among gay, lesbian, and bisexual writers. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2570 The Family in American Literature (Formerly 42.257) - Credits: 3

A study of literary selections dealing with traditions of family life, the individual, and social change. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2580 Disability in Literature (Formerly 42.258) - Credits: 3

This course explores how texts -- including novels, short stories, poems, memoirs, essays, plays, and videos -- portray people with disabilities. We will consider the problematic stereotypes about disabilities that sometimes appear in popular culture and literary depictions, and read texts that provide insight into a diverse community of people with a range of disabilities.

ENGL.2770 American Ethnic Literature (Formerly 42.277) - Credits: 3

The course addresses the literature of America’s immigrant and cultural groups and how it contributes to defining our national character. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2830 World Literature in Translation I - Credits: 3

A survey of world literature (works outside British and American literary traditions) through 1660; all course readings are translated into English. Students will become familiar with conventions of different literary genres, including epic and lyric poetry, drama, fables and folktales, and religious and philosophical texts. The course also provides the major cultural, religious, and political contexts of the literary texts. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2840 World Literature in Translation II - Credits: 3

A survey of world literature (works outside British and American literary traditions) since 1660; all course readings are translated into English. Students will become familiar with conventions of various literary genres, including short and long fiction, autobiography, lyric poetry, and drama. The course also provides the major cultural, religious, and political contexts of the literary texts.

ENGL.2850 Crime in Literature (Formerly 42.285) - Credits: 3

A study of how various authors use crime as a plotting device to study character, reveal social order, and critique social institutions. This course will focus particularly on detective and mystery fiction, sketching the history and development of these genres. Students might also study fiction and film outside these genres that explore significant questions of crime or criminality. Ultimately, students will think about how fictional representations of criminals, victims, policing, gender, and race relate to cultural assumptions and expectations. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.3330 American Autobiography (Formerly 42.333) - Credits: 3

A study of autobiographical writing from Colonial America to the present. Works from the 17th to the 21st century will allow students to explore the genre of autobiography and related sub-genres, including the captivity narrative, the slave narrative, and the immigration narrative. Readings will also explore literary and political autobiographies. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3350 American Women Novelists (Formerly 42.335) - Credits: 3

A study of selected novels by American women. Focus on the female voice within the American tradition. Treatment of such issues as domesticity, education, and authorship. Meets Core
Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

**ENGL.3420 Women Writers and the Past (Formerly 42.342) - Credits: 3**

Women Writers and the Past. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

**ENGL.3440 Women in Theatre (Formerly 42.344) - Credits: 3**

A study of the significant contributions of women to the literature and art of the theatre in various periods and cultures. Topics may include: plays written by women, the progress of women in theater, the evolution of female roles, and the portrayal of feminism on the stage.

**ENGL.3450 British Women Novelists (Formerly 42.345) - Credits: 3**

Selected novels by writers such as Austen, the Brontes, Eliot, Woolf, Bowen, and Drabble. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

**ENGL.3640 African American Drama (Formerly 42.364) - Credits: 3**

A study of the history and development of African American drama, with emphasis on major aesthetic, political, and social movements in African American culture. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

**ENGL.3780 Asian American Literature (Formerly 42.378) - Credits: 3**

Asian Americans hold an intriguing place in the cultural imagination: as perpetual foreigners, as so-called 'model minorities' that serve to maintain hegemonic power relations, and as living embodiments of America's memory of its involvement in recent wars. As artists, however, Asian Americans have contributed and impressive body of literary work, and we'll examine some of the most enduring and provocative of these texts. We'll explore themes such as trauma and the immigrant experience, issues of exile and dislocation, Asian Americans' embattled place in our country's history, and the intersections of race and ethnicity with gender and sexuality. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

**ENGL.3790 Postcolonial Literature (Formerly 42.379) - Credits: 3**

When the peoples of Africa, India, the Caribbean, Ireland, and Canada finally gained, to a greater and lesser extent, independence from the British during the 20th century, they found that their national, cultural, and individual identities had been radically altered by the experience of colonization. In this course, we will examine how authors have related this postcolonial condition. We will examine a diverse body of texts--poetry which eloquently describe the heroic journey out of colonialism, drama which lays bare the conflicts of assimilation, and novels which fantastically present political struggle--as we determine how postcolonial theory and literature affects and possibly redefines all literature.
and cultivate an entrepreneurial mindset among students in the Manning School of Business entrepreneurship concentration. It will cover different forms of entrepreneurship such as small businesses, growth ventures, corporate entrepreneurship and social entrepreneurship. The course will focus on the types of innovation, turning innovation into an ongoing new venture and on the entrepreneurial process. Innovation and entrepreneurship theories and concepts will be discussed with real life examples and cases.

EXER.2020 Introduction to Exercise Science
(Formerly 38.202) - Credits: 3

This course will provide a broad overview of the various fields and career options within Exercise Science. Course content will include a history of the profession, potential career and graduate studies options, the legal and ethical aspects of practice, and an introduction to basic fitness terminology and principles using ACSM guidelines. Students will have the opportunity to network with guest speakers for all different careers and explore various environments in which Exercise Physiologists work.

EXER.4180 Senior Seminar (Formerly 38.418) - Credits: 3

This course is specifically designed to enhance the practicum experience in the senior year.

GNDR.2400 Introduction to Gender Studies
(Formerly GNDR 240) - Credits: 3

This course is an interdisciplinary introduction to the field of Gender Studies that examines both commonalities and differences among diverse groups of women. A variety of topics are presented such as past and present stratification in work and family, sexual identities, medial representations of women, and violence against women. Social movements for women's equality and feminist theories and methods are also introduced.

HIST.1050 Western Civilization I (Formerly 43.105) - Credits: 3

This course surveys some important issues and tendencies in the history of Western Civilization from its origins through the early modern period, including ancient Mesopotamia, classical Greece and Rome, the Middle Ages, and the Renaissance. These include "civilization" and the rise of cities, different imaginings of god(s) and humanity, evolving forms of political organization, continuity and change in social organization and everyday life, and the ongoing dialogue of faith and reason. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HIST.1070 World Civilizations to 1500 (Formerly 43.107) - Credits: 3

This class examines societies and cultures from ancient until early modern times with the underlying assumption that world history is an important conceptual tool for understanding our interdependent world. Course topics analyze the nature of the earliest human communities, the development of the first civilizations and the subsequent emergence of cultures in selected areas of Eurasia, Africa, and the Americas. This course also offers a consideration of issues related to the connections and relationships that shaped civilizations as a result of migration, war, commerce, and the various cultural expressions of self, society, and the cosmos before 1500. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HIST.1080 World Civilizations Since 1500 (Formerly 43.108) - Credits: 3

This course will introduce you to the study of world history, its relevance for living in the present, and the challenge to think critically about the emergence and subsequent development of the modern world since 1500. Participants in this course will examine experiences that transcend societal and cultural regions, focus on processes of cross-cultural interaction, and investigate patterns that influenced historical development and continue to impact societies on a global scale. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HIST.1110 United States History to 1877 (Formerly 43.111) - Credits: 3

This course surveys United States history from the early settlement of North America through the Civil War and Reconstruction. It considers the role of the political and economic leadership in the building of the nation as well as actions of ordinary people whose energies and aspirations constitute the fabric of United States society. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HIST.1120 United States History since 1877 - Credits: 3

This course surveys the history of the United States from the end of Reconstruction to the present. It covers significant developments in the politics, economy, culture, and other aspects of American life during that period. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HIST.2740 Native American History (Formerly...
43.274) - Credits: 3
A comprehensive study of the Native Americans through historical and first-hand accounts of their lives. Designed to enlighten students and to represent fairly the Native Americans, dispelling some of the existing myths about them.

HIST.2810 Sub-Saharan Africa (Formerly 43.281) - Credits: 3
This course provides a basic introduction to the history of the African continent. It will expose students to the processes and patterns that have shaped modern African history. The course examines the historical roots of the many challenges that the continent faces today. But, at the same time, it will also provide students with the knowledge to shatter the myths and stereotypes about Africa.

HSCI.3080 Global Health (Formerly 30.308) - Credits: 3
The focus of this course is on examining health issues from a global perspective including issues related to maternal and child health, aging, infectious diseases, sanitation, and health inequality. Nutritional and environmental health issues in diverse societies are analyzed. Social determinants of health and access to health care in developing and developed countries are emphasized. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

MECH.4420 Thermo-fluid Systems Design (Formerly 22.442) - Credits: 3
Application of the principles of thermodynamics, fluid mechanics and heat transfer to the design of thermo-fluid systems. Techniques will be presented for modeling, simulation, and economic analysis. The evolution of thermo-fluid systems from the Industrial Revolution to state-of-the-art systems as well as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability of systems will be studied. Use and regulation of thermo-fluid systems on a global and regional scale will be investigated. Systems to be studied and designed include combined power cycles, trigeneration (combined power, heating, and cooling) as well as energy storage systems.

MKTG.4120 Global Marketing (Formerly MKTG 412/62.412/62.303) - Credits: 3
Course number was formerly 62.303. Focuses on the marketing aspect of global business. Emphasis is given on cultural dynamics and economics as well as political, social and regulatory constraints as they affect the global marketing practice and strategy implementation. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

MUHI.1050 Musical Practices 2 (Formerly 74.105) - Credits: 1
Musical Practices 2 builds upon the basic study of musical elements, vocabularies, and concepts established in Musical Practices 1, extending the exploration of these principles in more depth, with a primary focus on non-western musical traditions and cultural practices.

NURS.2120 Introduction to Nursing Practice (Formerly 33.212) - Credits: 3
Nursing as a health profession is introduced in this foundation course. The course is organized using functional health patterns. Within the context of the American Nurses Association Standards of Clinical Practice, standards of professional performance are introduced and standards of care are emphasized. Students, at the completion of this course, will demonstrate an understanding of the nursing process and competencies to perform basic nursing interventions in a laboratory and a clinical setting. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

NURS.3080 Health Promotion in Nursing (Formerly 33.308) - Credits: 2
This course is designed as a transition course for registered nurse students pursuing a baccalaureate degree with a major in nursing. It introduces the theory and research related to the concepts of health/ promotion and risk reduction. These concepts are presented as essential components of professional nursing practice. This course includes a clinical practicum which focuses on the development of interventions to promote the health of individuals and families. This course aims to refine critical thinking skills and analyze nursing’s unique contribution to health care. Consideration is given to the interrelationships of theory, research and practice.

NUTR.3450 Community Nutrition (Formerly 36.345) - Credits: 3
This course explores the role of the nutrition professional in community needs assessment, intervention development and evaluation, and in forming domestic nutrition policy. Nutrition problems in contemporary communities and of selected target groups in the United States and in developing countries are examined. Programs and strategies to meet nutrition needs outside the acute care setting, such as nutrition education and food assistance are explored. Local, state, and national nutrition policy and initiatives in nutrition will also be
examined. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

**PHIL.2960 Introduction to World Religions (Formerly 45.296) - Credits: 3**

A study of religious knowledge and the phenomena of religion from a philosophical standpoint. The course considers explanations for religious behavior, some central issues in religious belief, and the values and goals of religious systems. Various world religions provide specific data for these topics.

**PHIL.3060 Feminist Theory Politics (Formerly 45.306) - Credits: 3**

What is sexist oppression? Is our culture still sexist, or is the need for feminism over? How should we respond to sexism in other cultures? Do men and women have different natures? Are our culture's sexual representations of women necessarily degrading, and if so, why? We'll consider these questions, and others, by examining the arguments and methodology of analytic feminism. We'll start by tracing the historical development of feminism in the 18th, 19th, and 20th centuries, and then turn to several contemporary feminist analyses of sexist oppression. We'll then use these feminist frameworks to examine more specific issues. Possible topics include: feminist analyses of sexual objectification in pornography, feminist arguments in ethics and social theory, feminist analyses of science, and feminist criticisms of gendered labour. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**PHIL.3080 Philosophy of Race and Gender (Formerly 45.308) - Credits: 3**

This course will focus on issues of identity and difference. We will discuss the ways in which group identities are formed and broken down. We will discuss how differences are constituted and reconstituted. These issues are central to theories of race and gender, racism and sexism. Some of the questions which we will raise are these: What motivates forming group identities? How are they formed? How is identity used within oppressive social structures? How can it be used to transform society? Why do some differences make a difference and others don't? Can we choose our group identities? Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**PHIL.3105 Philosophy of Disability - Credits: 3**

Examines the basic issues and problems in the philosophical study of disability, including engagement with the interdisciplinary field of disability studies. Provides a survey of issues relating to the lived experience of disability, disability and well-being, theories of disability, and the concepts of normality, fitness and ableism as they relate to the practice and institutions of medicine, politics, religion, and society more generally.

**PHIL.3400 Mysticism: East and West (Formerly 45.340) - Credits: 3**

This course explores the religious and psychological phenomenon known as the mystical experience, both within the context of organized religion and outside it. We will approach this subject from a comparative standpoint, considering examples from Christianity, Judaism, and Islam and also from Eastern religions such as Buddhism and Taoism. We will make use of philosophy, psychology, theology, and literature in order to try to understand mysticism and its relation to religion. Readings include The Upanishads, the Tao Te Ching, the Bible, and Plato. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**PHIL.3500 World Philosophies (Formerly 45.350) - Credits: 3**

This course will fuse the historical and the thematic approaches in order to undertake a comparative examination of the relations of the great philosophical traditions (Chinese, Indian, Western, Islamic, and Japanese) to the perennial issues of philosophy. The main focus will be the continuing vitality and heuristic fertility of these traditions and their ability to define how human.

**PHIL.3710 Buddhist and Zen Philosophy (Formerly 45.371) - Credits: 3**

Explores Buddhist and Zen philosophy and practice from ancient India through its developments in China and Japan to contemporary America. Attention is given to significant philosophical movements such as Abhidharmika, Madhyamika, Yogacara, Huayan, and Chan (Zen).

**PHIL.3750 Philosophy of Sex and Love (Formerly 45.375) - Credits: 3**

The aim of this course is to introduce students to both historical and contemporary discussions surrounding the topics of sex and love. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**PHIL.3780 Philosophy of Peace and Nonviolence (Formerly 45.378) - Credits: 3**

This course examines philosophical theories of peace, pacifism,
and nonviolence. We will study ancient and modern accounts, secular and religious traditions, as well as feminist perspectives in the philosophy of peace and nonviolence. We will explore philosophical applications of nonviolence toward nonhuman animals and the natural environment, along with specific cases of nonviolent resistance in contemporary global conflicts.

PHIL.3850 Philosophy of Popular Culture (Formerly 45.385) - Credits: 3

This course analyzes those forms of art/entertainment commonly referred to under the umbrella term "popular culture" through a variety of philosophical lenses. After seeking to establish a categorization of "popular culture," students will examine the mediums of music, film, television, advertisements and sports. Throughout the course, students will read/listen/watch various examples of the mediums listed above and attempt to answer various questions about them such as: what societal values make these examples popular at a current moment? What cultural assumptions do these examples reflect? What is the artistic/aesthetic merit of these examples?

PHIL.3880 Latin American Philosophy - Credits: 3

Students in this course will be introduced to current and longstanding debates within Latin American Philosophy. They will also be exposed to many of the principle texts and thinkers within this burgeoning tradition. The class includes a survey of Latin American philosophy ranging from pre-colonial Aztec thought to the debates over the struggle for Latin American independence, and also the question of identity: what constitutes Latin American philosophy.

POLI.1120 Introduction to Comparative Politics (Formerly 46.112) - Credits: 3

What is democracy? What factors explain the demise of some authoritarian regimes? How can we explain the persistent underdevelopment of certain countries? What factors explain why civil war emerges in some weak states but not in others? These are the kinds of questions that Comparative Politics seeks to answer and this class will introduce central topics and theories in comparative politics. It will also analyze variations in similarities across regions of the world using in-depth analysis and systematic comparison across and within countries. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

POLI.1210 Introduction to International Relations (Formerly 46.121) - Credits: 3

Surveys some recent methods and approaches used in the study of international politics and provides an introduction to current problems of foreign policies of major world powers. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

POLI.3630 Politics of China (Formerly 46.363) - Credits: 3

A study of the recent development of governmental institutions, parties, and ideology in China. Emphasis is placed on the processes of nation-building in the post World War II period.

POLI.3700 Latin American Politics (Formerly 46.370) - Credits: 3

The context, background and forces shaping the contemporary politics of the Latin American region.

POLI.3750 Politics of Pacific Rim (Formerly 46.375) - Credits: 3

An examination of the politics, policies and institutions of Japan, the "four tigers" and other countries of the Pacific rim area.

POLI.3980 The War on Drugs (Formerly 46.398) - Credits: 3

The war against drugs stands as both a major foreign policy priority for the US and the International community in general, and as a constant source of debate and contention. The aim of this course is to provide students with analytical tools, concepts, and information, which will enable them to critically evaluate the war on drugs beyond the common myths and misconceptions that often surround this highly controversial topic. By analyzing a wide range of countries around the world, students would gain an in depth and nuanced perspective of the relation between drug trade, violence, corruption, development, and democracy. Students will also gauge arguments and possible impacts on different drug policy options.

POLI.4470 Theories of Political and Criminal Violence (Formerly 46.447) - Credits: 3

The study of violence has been a central piece of debates in comparative politics that range from the causes of revolution to the analysis of civil wars. This course aims to provide a broad overview of different bodies of research on violence. The class will also revisit crucial debates in the study of violence, such as the problems of separating criminal and political violence (such as interstate wars). By the end of the class, students will be able to identify major theoretical and methodological approaches to violence, major debates and concepts, as well as key cases across the world.
PSYC.2090 Social Psychology (Formerly 47.209) - Credits: 3

Presents an introduction to the study of social behavior in interpersonal relationships, groups, organizations, and the community: Diversity in regard to groups of peoples, cultures, and views is emphasized. Topics include non-verbal communication, social attraction, attitudes and attitude change, group dynamics, prejudice, labeling, stereotyping, interpersonal influence, and applications to social problems. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PSYC.2550 Community Psychology (Formerly 47.255) - Credits: 3

Surveys the field of community psychology, including principles of social justice, diversity, and social change. The course reviews historical antecedents, paradigms, conceptual models, strategies and tactics of social and community change and action; examples from selected contexts and social systems, including education, mental health, community organizations, the workplace, health care, justice system, and social services will be employed. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

SOCI.1010 Introduction to Sociology (Formerly 48.101) - Credits: 3

Serves as the basic course in sociology. Emphasis is directed at the ways in which social institutions such as government, schools, the economy, social class, and the family develop and influence our lives. It is concerned not only with presenting various ways to understand our relationship to society but also with ways to change it. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

UMLO.1010 Living-Learning Community Seminar in DCA - Credits: 1

The Living Learning Community Seminar in DCA forges a link between the LLC and the academic programs that individual students are pursuing, and invites the student to develop and launch a plan for personal and professional development, with a particular focus on the Diversity and Cultural Awareness Essential Learning Outcome of the UML Core Curriculum. In this one-credit course, students draw intentional connections between their coursework, the practice of independent research, and the resources and learning opportunities available to them on campus and in their communities. Student projects serve to integrate curricular, co-curricular, and extra curricular learning experiences. Sections of this course will vary in topic, and are open only to student residing in the relevant LLC.

UTC.2020 Interactions and Equity (Formerly UTL.202) - Credits: 3

This course examines the organization of instructional settings that maximize learning for all. Students will examine gender issues, cultural issues, bilingual education and learning disabilities as they impact learner success. A major portion of the course is a field experience in which students interview high school teachers, observe a high school classroom, then teach three lessons. The purpose of these experiences is to ensure that students recognize the diversity of students and their specific learning needs. This course is required for STEM TEACHING MINOR.

WLAN.2992 Directed Studies World Languages Level 4 - Credits: 3

Directed Studies World Languages Level 4. Permission of the instructor and department chair required.

WLFR.2120 French 4 and Culture (Formerly 50.212) - Credits: 3

This course has French 3 and Culture (or equivalent) as a prerequisite and is the 4th and last of the 4-course French language program offered at UML. The course strengthens the four skill acquired in prior levels. It emphasizes increased accuracy and depth of students' abilities and knowledge of French and Francophone culture and language in a communicative approach (instruction occurs in French with almost no use of English). Students express themselves orally and in writing at the national standards level of high-intermediate and understand key-concepts when spoken clearly at native speed.

WLFR.3760 French Cinema & Society (Formerly 50.376) - Credits: 3

Covers the dramatic presentation French society gives of itself during the period of profound social and economic change, from the New Wave and the May 68 events to today’s younger generation facing an uncertain tomorrow. Each screening (in French with subtitles) is preceded by an introduction placing the film in its historical context. In English.

WLIT.2120 Italian 4 and Culture (Formerly 52.212) - Credits: 3

This course has Italian 3 and Culture (or equivalent) as a prerequisite and is the 4th and last of the 4-course Italian language program offered at UML. The course strengthens the four skill acquired in prior levels. It emphasizes increased accuracy and depth of students' abilities and knowledge of the culture of Italy in a communicative approach (instruction occurs in
Italian with almost no use of English). Students express themselves orally and in writing at the national standards level of high-intermediate and understand key-concepts when spoken clearly at native speed.

**WLIT.3250 Italian American Literature and Culture (Formerly 52.325) - Credits: 3**

Discusses the most prominent authors and works of Italian-American Literature as they, by using the ethnic setting, are able to convey universal human concerns and themes. The discussion on Italian-American ethnic issues will include such films as The Godfather, Moonstruck, The Sicilian, Goodfellas, and The Untouchables. Conducted in English.

**WLIT.3300 Italian Women Writers (Formerly 52.330) - Credits: 3**

Studies women writers of Italy by giving attention to the genres of narrative, poetry, theater and autobiography. Authors are selected according to their impact on issues affecting women, gender studies, feminism, avant-garde, modernism, social relations and psychological discourse. Conducted in English.

**WLIT.3730 Italian Humanism (Formerly 52.373) - Credits: 3**

A study of the waning of the Middle Ages and the dawning of the Renaissance as seen through the work of Petrarch and Boccaccio. Emphasis is on the study of sources and the influence of Petrarch and Boccaccio upon the literatures of western Europe. Conducted in English.

**WLIT.3780 Italian Cinema and Culture (Formerly 52.378) - Credits: 3**

A guide to contemporary Italian studies through literary and cultural approaches. The works of central figures in contemporary Italian letters are examined in view of their impact on Italian life. Emphasis is given to poets, novelists, the new cinema, the influences of existentialism, and the impact of America on Italian literature. Conducted in Italian/English.

**WLPO.3370 Portuguese Literature in Translation (Formerly 53.237) - Credits: 3**

This course offers a broad overview of Portuguese literature, in English translation, from the Middle Ages to the contemporary period, placing literary movements and major authors in their historical and aesthetic context. It focuses on promoting a basic level of cultural literacy about Portugal based on representative reading drawn from the last seven centuries of the country’s history situated in their social, cultural and historic contexts. Course assignments lead students to develop skills in textural interpretation, critical thinking, and academic writing.

**WLSP.2120 Spanish 4 and Culture (Formerly 54.212) - Credits: 3**

This course has Spanish 3 and Culture (or equivalent) as a pre-requisite and is the 4th and last of the 4-course Spanish language program offered at UML. The course strengthens the four skill acquired in prior levels. It emphasizes increased accuracy and depth of students’ abilities and knowledge of the culture of Spanish speaking countries in a communicative approach (instruction occurs in Spanish with almost no use of English). Students express themselves orally and in writing at the national standards level of high-intermediate and understand key-concepts when spoken clearly at native speed.
ACCT.4310 Federal Income Taxes (Formerly ACCT/60.431) - Credits: 3

Deals with the basic rules and regulations of the Internal Revenue Code as it affects the individual and the corporation. An understanding of the code is developed through lectures, assigned readings, research, and the solution to a wide variety of problems. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

AMST.4010 American Studies Seminar (Formerly 40.401) - Credits: 3

A required seminar for American studies majors normally taken during the second semester of the junior year or during the senior year. Students undertake a research project leading to the writing of a major paper with a theme that combines more than one discipline.

AMST.4910 Directed Studies in American Studies (Formerly 40.491) - Credits: 1-3

An investigation of a topic using an interdisciplinary approach and leading to the writing of a major paper. The course provides an opportunity for a student to work closely with an instructor on an topic of special interest.

ARTS.1130 Digital Foundations (Formerly 70.113) - Credits: 3

This course explores the computer as a tool of the visual language. Topics included are raster and vector-based image making, art for the internet & mobile devices, and current image capture and output methods. This course will introduce Photoshop, Illustrator, Flash and a basic programming with the aim of expanding the artist’s toolkit. Lectures, readings, and discussions will provide an overview of history and contemporary ideas on the use of computers in art. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

ARTS.4930 Senior Studio I (formerly 70.493) - Credits: 3

Senior Studio I is one of the two capstone courses of the Bachelor of Fine Arts program in the Art Department. Students are required to research, develop and produce a mature, coherent and substantial body of work representing 6 credits (in a two course sequence) that will be presented to the faculty for evaluation as well as exhibited to the public in the BFA Senior Studio exhibition. Enrollment restricted to majors in BFA program. Senior Studio I will focus on research, professional portfolio, resume and artist statement.

ARTS.4970 Senior Studio (formerly 70.497) - Credits: 6

This course is designed to culminate four years of art experience for the BFA studies. The development of personal approach to media and idea is emphasized. Each student will be responsible for developing a self-assigned thematic concern. No assignments will be made by the instructor who will act only as an advisor and coordinator. Course evaluation is by the Senior Studio Review Committee. Enrollment restricted to majors in BFA program. Fall and Spring. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL), Critical Thinking & Problem Solving (CTPS) and Information Literacy (IL).

BIOL.4510 Senior Seminar in Biology (Formerly 81.451) - Credits: 2

This course instructs students in developing effective writing and speaking skills required for preparation of scientific manuscripts and presentations, and communicating in the scientific world. Students will be required to prepare and present oral presentations and to submit written reports.

BMEN.4910 Biomedical Capstone I - Credits: 3

This is the first of a two course capstone sequence. It provides an integrative design experience in engineering. Students work in teams and apply their engineering problem solving skills on open-ended, real-world biomedical projects. This course has an emphasis on team work, communication, report writing, oral presentations, project definition and project planning.

BMSC.3310 Clinical Immunology (Formerly 36.331 and MLSC.3310) - Credits: 3

This course introduces the fundamental concepts of human immunology, focusing on the molecules, cells, and tissues associated with the recognition of entities that can elicit an immune response, the various mechanisms via which immune responses are initiated and executed upon recognition of these entities, and the biochemical and physiological regulatory pathways of immune responses. The applications of immunological biotechnology in clinical and laboratory diagnostics will be presented, as well as examples of how the activation of the immune system can lead to disease. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Written & Oral Communication (WOC).

CHEM.2600 Information Retrieval (Formerly 84.260) - Credits: 2

An introduction to the important chemical and chemical-related reference sources including journals, patents, technical
publications, and compiled reference works, and instructions in their use. Assignments require the use of each source discussed. On-line searching using computerized chemical and chemical related databases is also introduced. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

CHEN.4090 Engineering Economics and Process Analysis (Formerly 10.409) - Credits: 3

This course brings together all the Chemical Engineering core principles applied to the development of economic process designs. Economic evaluations of manufacturing operations and projects including essential concepts in accounting, depreciation, time value of money, and the evaluation of investment alternatives are applied for process analysis and design objectives. The impact of management and production costs, product markets, regulatory, environmental and safe production practices, the analysis of corporate annual reports including balance sheets and income statements, and capital and operating costs are all considered in regard to efficient and economic processes. In addition to lecture materials students are required to complete comprehensive projects. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL), Critical Thinking &Problem Solving (CTPS) and Information Literacy (IL).

CHEN.4100 Chemical Plant Design (Formerly 10.410) - Credits: 3

This course is the logical continuation of CHEN.4090 (Formerly 10.409) The principles of technical and economic evaluation are applied to a chemical engineering problem. A group of students is given a statement of the problem. They are required to find information on raw materials, products, thermodynamic parameters and plant practices in order to develop the assumptions required to carry out an examination of technical and economic feasibility. Each group generates a final report for the problem. In addition to oral presentations, students are required to complete a comprehensive group design project. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL), Critical Thinking &Problem Solving (CTPS) and Information Literacy (IL).

CIVE.3100 Engineering Materials (Formerly 14.310) - Credits: 3

A treatment of the properties of engineering materials that influence the design, construction and maintenance of Civil Engineering works. Included are such materials as ferrous and non-ferrous metals, timber, asphalt, and cementitious materials. Supplemented by laboratory testing of various engineering materials.

COMP.4040 Analysis of Algorithms (Formerly 91.404) - Credits: 3

Development of more sophisticated ideas in data type and structure, with an introduction to the connection between data structures and the algorithms they support. Data abstraction. Controlled access structures. Trees, lists, stacks, queues, graphs, arrays, hash tables. Algorithm design strategies such as divide and conquer. Elementary techniques for analysis; asymptotic analysis, recursion equations, estimation methods, elementary combinatorial arguments. Examination of problem areas such as searching and sorting, and the indicated representations and algorithms. The student will use the techniques learned in this course and in previous courses to solve a number of logically complex programming problems using pseudocode, with an emphasis on establishing algorithmic correctness and estimating time and space complexity.

COMP.4060 Compiler Construction I (Formerly 91.406) - Credits: 3

Includes both theory and practice. A study of grammars; specification and classes; the translation pipeline: lexical analysis, parsing, semantic analysis, code generation and optimization; and syntax-directed translation. Use of automatic generation tools in the actual production of a complete compiler for some language.

COMP.4140 Data Communications II (Formerly 91.414) - Credits: 3

A continuation of 91.413. Topics include Multimedia Networks, network Management, Network Security, Wireless and Mobile Networks. Students will track discussion in IETF committees and work in a dedicated network laboratory. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Information Literacy (IL).

COMP.4220 Machine Learning (Formerly 91.422) - Credits: 3

This introductory course gives an overview of machine learning techniques used in data mining and pattern recognition applications. Topics include: foundations of machine learning, including statistical and structural methods; feature discovery and selection; parametric and non-parametric classification; supervised and unsupervised learning; use of contextual evidence; clustering, recognition with strings; small sample-size problems and applications to large datasets.

COMP.4510 Mobile Robotics II (Formerly 91.451) - Credits: 3

This introductory course gives an overview of mobile robotics techniques used in data mining and pattern recognition applications. Topics include: foundations of machine learning, including statistical and structural methods; feature discovery and selection; parametric and non-parametric classification; supervised and unsupervised learning; use of contextual evidence; clustering, recognition with strings; small sample-size problems and applications to large datasets.
Advanced topics in robotics, including laboratory. Topics to be covered include probabilistic methods, including sensor modeling, hidden Markov models, particle filters, localization, and map making. Research-level robots are used in the laboratories.

**COMP.4620 Graphical User Interface Programming II**
*(Formerly 91.462) - Credits: 3*

A second course in the design and implementation of graphical user interfaces for web-based environments. The course requires the completion of a semester-long project done with others as a team. It explores the writing of a project proposal, the development and presentation of alpha and beta versions, usability testing, and a final presentation to an external audience.

**COMP.4631 Mobile App Programming II - Credits: 3**

A second course in the design and implementation of mobile applications on Android platform. The course requires the completion of a semester-long project done with others as a team. It explores the writing of a project proposal, the development and presentation of alpha and beta versions, usability testing, and a final presentation to an external audience.

**CRIM.3900 Criminal Justice Research Methods**
*(Formerly 44.390) - Credits: 3*

An introduction to research methods for the criminal justice professional including terminology, standard methodologies, and elementary statistics. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

**DGMD.2200 Screenwriting - Credits: 3**

In this class students will be immersed in the art and craft of creating compelling stories for the screen in both fiction and nonfiction genres. As it has been said many times about media making, the story is the heart of media production. Students will develop screenwriting abilities through gaining knowledge of and experience with story conception and development: character development; story structure; dramatic action; dialogue; scene/sequence construction and writing for emotional impact.

**ECON.2120 Statistics for Business and Economics II**
*(Formerly 49.212) - Credits: 3*

Discusses interval estimation, hypothesis testing, analysis of variance, applied regression theory, correlation analysis, and other selected topics.

**ECON.3180 Financial Markets and Monetary Policy**
*(Formerly 49.318) - Credits: 3*

This course studies the formal role of money, interest rates, interest rate determination, and financial markets within the context of aggregate economic activity. These topics are related to central banks, with a focus on the Federal Reserve, and linked to money supply and the tools of monetary policy. Formal theories and practical implementation of strategies and tactics of monetary policy are addressed, as well as their implications for aggregate economic activity. This course meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Written & Oral Communication (WOC).

**EDUC.3600 Teaching Science through Inquiry in the inclusive - Credits: 3**

In this course, students will do what scientist do: have a chance to ask and answer questions about the world around us, collect data in a variety of ways and use data to help investigate the world. Students will explore how carefully coaching children to learn the skills that scientists use can build their developing science literacy. Students will work in pairs and, with a mentor teacher in a local school, plan, implement, and assess a science unit. Using high-quality science kits, teaching pairs will focus on a different set of science teaching skills each week. The course instructor and mentor teacher will observe and provide verbal and written feedback each week. Must take 1 undergraduate laboratory science course.

**ENGL.4230 Shakespeare I**
*(Formerly 42.423) - Credits: 3*

A study of selected histories, comedies, and tragedies. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Written & Oral Communication (WOC).

**ENGL.4240 Shakespeare II**
*(Formerly 42.424) - Credits: 3*

A study of selected histories, comedies, and tragedies not covered in 42.243. Shakespeare I is not a prerequisite.

**ENGN.4020 Engineering Capstone Design Project - Credits: 3**

This is the second of a two course capstone sequence. This course provides an integrative design experience in engineering. Students work of multi-disciplinary teams and apply their engineering problem solving skills on open-ended, real-world projects. Projects may include members form other departments and colleges. This course has an emphasis on team work, Communication, report writing, oral presentations, design, analysis, test and fabrication. This course may be used...
as a substitute for the culminating capstone course in Electrical and Computer Engineering (EECE.4491), Plastics Engineering (PLAS.4160) and Mechanical Engineering (MECH.4230).

**ENTR.3620 Corporate Entrepreneurship (Formerly ENTR/64.362) - Credits: 3**

This course focuses on entrepreneurship in established companies. In order to compete in today’s dynamic business environment, organizations need to spur and promote entrepreneurial thinking and actions as a way of remaining innovative and competitive. Thus, the course explores how the entrepreneurship process works within an existing organization, including the identification of strategies companies engage to rejuvenate their business, markets and industries. Students will also study how individuals can play a role in promoting entrepreneurial activities in their organizations.

**ENTR.4630 Managing Innovation (Formerly ENTR/64.463) - Credits: 3**

A critical issue for entrepreneurs and managers is how to translate opportunity into competitive advantage. This course examines theories of innovation and their application to real-world business opportunities. A particular focus is placed on emerging scientific and technical innovations and the opportunities and challenges they present to both existing businesses and new venture entrepreneurs. Students examine innovation strategies, planning models, evaluation models, licensing and the commercialization process required to launch new businesses around innovative products and technologies.

**ENVI.1010 Environmental Science Seminar (Formerly 87.101) - Credits: 1**

A survey of the field of environmental science, curriculum options, and career opportunities. Presentations by members of the department and guest speakers. This course is intended primarily for students majoring in the various options of environmental science. It does not satisfy specific science requirements for majors in the Division of Science, nor does it qualify as a science with lab perspective.

**EXER.2170 Research Methods in Exercise Science - Credits: 3**

This course involves an in-depth study of current research methods and topics with specific applications to the field of Exercise Physiology. The content includes the sources of data acquisition, research design, testing procedures, and treatment of data. Each student must participate in a senior research project utilizing information gained from the lecture portion of the class. All 1st 2nd and 3rd year course work in the exercise physiology major. All exercise physiology undergraduate courses (number 38) are restricted to EP majors only. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Quantitative Literacy (QL).

**EXER.4170 Research Methods in Exercise Physiology (Formerly 38.417) - Credits: 3**

This course involves an in-depth study of current research methods and topics with specific applications to the field of Exercise Physiology. The content includes the sources of data acquisition, research design, testing procedures, and treatment of data. Each student must participate in a senior research project utilizing information gained from the lecture portion of the class. All 1st 2nd and 3rd year course work in the exercise physiology major. All exercise physiology undergraduate courses (number 38) are restricted to EP majors only. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Quantitative Literacy (QL).

**FAHS.4130 BLA Capstone (Formerly 59.413) - Credits: 3**

Student enrolled in the BLA program complete the BLA Capstone course during their senior year. This course features a semester-long interdisciplinary project, using knowledge gained from the students’ two BLA concentrations, as well as any minors, as applicable. Students enrolled on-campus may choose to complete an original research study, creative art project (i.e., writing, film, music, drawing, etc.), or a problem-focused community action project. Online students choose to do either an original research project or a creative art project. Projects are completed in consultation with the instructor of the BLA Capstone course.

**FINA.3210 Investment and Portfolio Analysis (Formerly FINA 321/61.304 ) - Credits: 3**

This course is a survey of investments for business students. Topics include the investment environment, markets and instruments, securities trading, market indexes, risk, diversification, the capital asset pricing model, market efficiency, introductory valuation of bonds stocks options and futures, mutual funds, behavioral finance, and strategies for individual investors. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Information Literacy (IL).

**HIST.2980 Introduction to Historical Methods (Formerly 43.298) - Credits: 3**

An introduction for the undergraduate student to the nature and principles of history. The course takes up methodology, historiography, research methods, electronic resources, bibliography, and the technical and stylistic problems involved
in the presentation of research in scholarly form. Required of all history majors in the sophomore year. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Social Responsibility & Ethics (SRE).

MATH.4750 Senior Seminar II (Formerly 92.475) - Credits: 3
Undergraduate seminar on advanced mathematical topics. Students are required to develop an understanding of an advanced subject beyond the scope of an existing course or synthesize two or more different areas form their curriculum. Students are required to participate in the seminar, present their results to the Department and write a substantial thesis in their topic area. Essential course elements include library research, original research, and both verbal and written exposition. The first semester is a graduation requirement for majors in mathematics.

MECH.4230 Capstone Design (Formerly 22.423) - Credits: 3
Students perform independent design work and participate in team efforts to develop conceptual designs from functional requirements. Perform design analysis and synthesis, modeling, fabrication, testing, cost estimating, and documenting the essential elements of the system design. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL), Information Literacy (IL), and Written & Oral Communication (WOC).

MGMT.4200 Leadership Processes (Formerly MGMT/66.420) - Credits: 3
Examines leadership as a dynamic influence process in organizations. The role of leader characteristics and styles, matching leadership behavior and situations, issues in power and politics, empowerment and participation, conditions for leadership effectiveness. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

MIST.3030 Database Management Systems (Formerly 63.303, MIST 303) - Credits: 3
An introduction to databases and Database Management Systems (DBMS). Topics include basic concepts of database technology, an introduction to SQL, techniques for logical and physical database design, interaction with a commercial DBMS, and data warehousing.

MKTG.3150 New Product & Service Management (Formerly MKTG 315/62.315/62.311) - Credits: 3
Course number was formerly 62.311. Focuses on the process of new product & service development and marketing. Emphasis is given on market opportunity identification, R&D marketing interface, business model development, market potential estimation, and market entry timing.

MTEC.2260 Technical Communications for Engineering Technology (Formerly 23.226) - Credits: 3
This course introduces students to presenting ideas, data, and proposals in clear concise formats to maximize understanding and impact. Both written and presentation skills are stressed and familiarity with MS Word, Excel and PowerPoint is preferred but not a prerequisite. The end-product is a complete understanding of the elements which blend together to create effective communication in a technical environment.

MUBU.2010 Computers In Music Business (Formerly 77.201) - Credits: 3
This course provides students with fundamental collaborative computing tools applicable to the music industry. Topics will include standard office applications, web tools, and media processing tools. Students will develop skills and efficiency through collaboration with each other and outside artists. The internet will provide opportunities for researching relevant sharing platforms for the effective dissemination of information. Projects to include e-press kit creation/promotional website, video creation, and other media development.

MUED.3010 Technology in Music Education (Formerly 73.301) - Credits: 3
Introduction to the role of computers and technology in music education programs. Course includes the development of computer literacy, including knowledge of word processing, database and spreadsheet applications as essential to educators, and explores MIDI, the Internet, music software, recording, multimedia and other technologies as educational tools.

MUSR.3900 Acoustics & Psychoacoustics (Formerly 78.390) - Credits: 3
The physical attributes of sound and acoustic measurement; displacement, time, velocity, acceleration, force, energy, resonance, wave shapes and spectral energy distribution are examined for most instruments; acoustic properties of the ear and enclosed environments; acoustic measurements and instruments. The interrelationships and differences of physical acoustics and psychoacoustics are stressed.

NURS.3010 Research in Nursing and Health Care
This course provides an overview of the research process. Health care research interests and the methodology of various disciplines are examined. Through a review of research studies, students examine the basic steps in the process of research. Ethical problems in the world of research are explored and students learn how research influences health care practice and policy. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

**NUTR.4960 Senior Research in Nutrition (Formerly 36.496) - Credits: 3**

Continuation of 36.494. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL), Information Literacy (IL), and Written & Oral Communication (WOC).

**PHIL.4951 Senior Capstone - Credits: 3**

This course is designed to provide philosophy majors with a capstone project involving integration of their coursework in philosophy in the form of an independent research project under the supervision of a faculty member. The capstone will be taken during the senior year (students in the Communications program may take the Practicum instead of the Capstone). The class is designed to meet the Essential Learning Outcomes of Written and Oral Communication, Applied and Integrative Learning, and Information Literacy.

**PHIL.4960 Practicum (Formerly 45.496) - Credits: 3**

The practicum is a 3-credit internship at a professional site relevant to the student’s course of study. Students are required to write a term paper at the end of their internship.

**PHRM.3200 Molecular Pharmacology - Credits: 3**

This course is designed to give students an understanding of the molecular basis of drug action. Upon completion of this course, students will be able to describe receptor-ligand interactions, signal transduction pathways, the different classes of target biomolecules for drugs and how genetic variability influences drug action.

**PHYS.4530L Health Physics Capstone (Formerly 95.453) - Credits: 3**

This course will provide the graduating physics major with a capstone experience through an exposure to the rudiments of independent research; incorporating critical thinking, problem-solving, report writing, and presentation skills learnt in the course of the undergraduate curriculum. Prerequisite: Senior Status.

**PHYS.4540 Physics Capstone (Formerly 95.454) - Credits: 3**

This course will provide the graduating physics major with a capstone experience through an exposure to the rudiments of independent research; incorporating critical thinking, problem-solving, report writing, and presentation skills learnt in the course of the undergraduate curriculum. Prerequisite: Senior Status.

**PLAS.4150 Capstone Project I (Formerly 26.415) - Credits: 1**

first half of a two-semester capstone experience. Students, working in teams under the supervision of faculty members, select a project related to the field of plastics engineering, prepare a project charter considering constraints and mitigations, conduct experimental research, and propose potential project solutions.

**POLI.2010 Research Methods in Political Science (Formerly 46.201) - Credits: 3**

Introduces the Political Science major to the scope of politics as a discipline. Highlights value questions through analysis of the political, socio-demographic and constitutional background of selected contemporary public issues and policies.

**POLI.4220 SMR: Political communication and Media Studies (Formerly 46.422) - Credits: 3**

Advanced study in contemporary issues in Political Communication and Media Studies.

**POLI.4470 Theories of Political and Criminal Violence (Formerly 46.447) - Credits: 3**

The study of violence has been a central piece of debates in comparative politics that range from the causes of revolution to the analysis of civil wars. This course aims to provide a broad overview of different bodies of research on violence. The class will also revisit crucial debates in the study of violence, such as the problems of separating criminal and political violence (such as interstate wars). By the end of the class, students will be able to identify major theoretical and methodological approaches to violence, major debates and concepts, as well as key cases across the world.

**POMS.4020 Global Supply Chain Management (Formerly POMS 402/63.402) - Credits: 3**

A supply chain consists of all of the activities and organizations required to produce and deliver a good or service from raw
materials to the final end user. Global Operations and Supply Chain Management (GOSCM) involves the coordination of this complex network of organizations and flows of materials, funds, and information among and between the stages of a supply chain. GOSCM integrates the traditional business functions of operations, marketing, logistics, finance, and information systems in an international business context. The course traces the flow of products and services from development through delivery to the final user and will address topics such as global sourcing strategies, managing demand and supply uncertainties distribution strategies and logistics network design for global operations, global strategic alliances, and the role of information technology and Enterprise Resource Planning (ERP) in managing global supply chains. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Information Literacy (IL).

PSYC.2690 Research I: Methods (Formerly 47.269) - Credits: 3
An introductory course on the fundamentals of empirical research in psychological science. Instruction will promote understanding and competence in the basic vocabulary of psychological research, addressing information literacy, measurement, reliability, and validity in observed variables and unobserved constructs. Students will learn critical components of experimental, quasi-experimental, and correlational designs, as well as the basics of descriptive statistics, hypothesis and statistical testing, and matching design to analysis strategies. Students will demonstrate this knowledge through preparation of a research proposal. Finally, this course will provide students a strong basis from which to pursue advanced coursework in a variety of methodological approaches to psychological research. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

PUBH.3050 Introduction to Epidemiology (Formerly 31.305) - Credits: 3
This course is designed to introduce basic epidemiological methods used in the study of current major health problems. Content includes explanation of the scope and focus of epidemiology, simple measures of disease frequency and association used in the study of the distribution and determinants of disease, types of epidemiological study designs, and practical applications. Emphasis on interpretation of epidemiological information and application of findings. Prerequisite: Community Health and an elementary statistics course. Required for seniors in Community Health Education; open by permission to other upper division students in Health Professions. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Quantitative Literacy (QL).

SOCI.4020 Quantitative Methods for Social Research
ACCT.3210 Cost Accounting (Formerly ACCT/60.321) - Credits: 3
An examination of the manufacturing function from the view of the cost accountant. Managerial control of the elements of product costs will be studied with an emphasis on cost accumulation systems both historical and estimated. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

ARTS.3820 Art & Design of Data Visualization - Credits: 3
This course focuses on applying foundations of artistic information graphics and data visualization to increasingly self-directed data driven projects. Participants will use data from various sources and engage diverse topics. The course covers the various purposes and formats of data visualization, the basic terminology and concepts used in the field, and the application of design techniques to the creation of static and interactive creative displays powered by data sets of varying sizes. Elements of typographic design, layout, and color theory will be used to sharpen communication and make projects accessible. The theory of information visualization will be balanced with hands on use of proprietary and open source tools including Adobe, Spreadsheets, and scripting (e.g. JavaScript).

ATMO.1410 Weather and Climate (Formerly 85.141) - Credits: 3
General meteorology course. Topics include atmospheric composition, solar radiation, temperature, moisture and condensation relationship between air pressure and wind, weather patterns, severe weather, optical phenomena in the atmosphere, and the behavior and possible change of climate. Appropriate for KCS major science elective.

BIOL.2350 Genetics (Formerly 81.235) - Credits: 4
The theories of both classical and molecular genetics are explored with emphasis on the experimental evidence which has laid the foundation for contemporary understanding of genetics, included is the nature of the genetic material, gene action, genetic recombination, gene regulation, gene interaction, the production and inheritance of genetic phenotypes, chromosomal mechanics, and the behavior of genes in populations.

BMSC.3630 Analytical Instrumentation Laboratory (Formerly 36.363 and MLSC.3630) - Credits: 2
The course is designed to provide an introduction to the types of analytical instrumentation used in laboratory settings within the applied biomedical sciences. Emphasis is placed on theoretical concepts, instrument components, practical applications, and troubleshooting of modern analytical instrumentation. Analytical methodologies routinely used in the applied biomedical sciences at large are emphasized, including the qualitative and quantitative aspects of each instrumental technique studied.

CHEM.3440 Physical Chemistry I (Formerly 84.344) - Credits: 3
Covers basic physical chemical topics: laws of thermodynamics, solutions, chemical and phase equilibria, electrochemistry, kinetics, atomic, and molecular structure. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

CHEN.3150 Unit Operations Laboratory (Formerly 10.315) - Credits: 3
Students perform laboratory base experimental analyses in fluid flow and heat transfer and fluid flow and heat transfer unit operations processes common in Chemical Engineering practice. The course is team based and students are expected to develop and improve in their ability to work and interact in a group environment. Written and oral reports are required. Safety in both lab and industrial practice are emphasized. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL) and Written &Oral Communication (WOC).

COMP.4040 Analysis of Algorithms (Formerly 91.404) - Credits: 3
Development of more sophisticated ideas in data type and structure, with an introduction to the connection between data structures and the algorithms they support. Data abstraction. Controlled access structures. Trees, lists, stacks, queues, graphs, arrays, hash tables. Algorithm design strategies such as divide and conquer. Elementary techniques for analysis; asymptotic analysis, recursion equations, estimation methods, elementary combinatorial arguments. Examination of problem areas such as searching and sorting, and the indicated representations and algorithms. The student will use the techniques learned in this course and in previous courses to solve a number of logically complex programming problems using pseudocode, with an emphasis on establishing algorithmic correctness and estimating time and space complexity.

ECON.2010 Principles of Microeconomics (Formerly 49.201) - Credits: 3
Studies the principles of production and exchange. An
introduction to demand, supply, pricing, and output under alternative market structures. Derived demand and resource markets are introduced. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

ECON.3020 Labor Economics (Formerly 49.302) - Credits: 3
An introduction to the economic analysis of behaviors and institutions in the labor market: labor supply and participation, labor demand by firms, wage determination under different institutional settings, and gender, race or ethnicity as determinants of different labor market outcomes. The course presents microeconomic models, empirical findings and their public policy implications on topics such as minimum wage, affirmative action, social insurance programs, workplace safety, and subsidized day care.

ECON.3030 Microeconomic Theory (Formerly 49.303) - Credits: 3
Provides an advanced examination of price and production theory and the theory of the consumer and the firm.

EDUC.3400 Mathematics and Problem Solving in the Inclusive E - Credits: 3
There is a renewed focus in creating math learning environments in the elementary classroom where students are continuously involved in problem solving. In fact, one of the main goals in elementary math is to provide children with the experiences and support to use a variety of strategies to solve real-world problems. This course will help preservice teachers understand how children with different strengths learn math so they can develop, create, implement, and assess lessons and units that align with the Massachusetts Math Common Core State Standards.

EECE.3650 Electronics I (Formerly 16.365) - Credits: 3
A brief introduction to solid-state physics, leading to discussion of physical characteristics of p-n junction diodes, bipolar junction transistors, and field-effect transistors: active, saturated, and cutoff models of bipolar transistors and triode, constant current, and cutoff models of MOSFETs. Circuit models for diodes, and diode applications. Circuit models for transistors, and transistor applications in bipolar and MOS digital circuits and low-frequency amplifier circuits. Analysis of digital circuits and linear circuits based on application of circuit models of devices and circuit theory.

ENG.4010 Engineering Capstone Design Project (Formerly 25.401) - Credits: 3
Integrative design experience in engineering. Students work on multi-disciplinary teams and apply their engineering problem-solving skills on open-ended, real-world projects. Projects may be service-oriented in concept and teams may include members from other Departments and Colleges. Emphasis on communication, team-work, report-writing, oral presentations. This course may be used as a Technical elective for all Engineering Departments. Alternatively, this course may be used as a substitute for the culminating Capstone course in Electrical and Computer Engineering (16.499), Mechanical Engineering (22.423) and Plastics Engineering (26.416). Prerequisite: senior status & permission of instructor.

ENTR.4640 Finance for Emerging Business Enterprises (Formerly ENTR/64.464) - Credits: 3
Course content covers financial aspects of an entrepreneurial venture from its start to a potential sale. Major sources of financing covered in the course include venture capital, private placement, bank credit, and public financing. Other financial concepts covered include organization of the business, financial forecasting, financial analysis, firm valuation and acquisitions.

ENVI.2020 Earth Systems: Atmosphere and Oceans (Formerly 87.202) - Credits: 3
Earth Systems: Atmosphere and Oceans deals with the atmosphere, and oceans, as well as the important role they play within Earth’s vital systems. These interactions will address atmospheric structure, processes, and pollution. It will also address ocean-atmosphere exchange, ocean structure, processes, pollution, and coastal and deep sea sedimentation processes.

ENVI.2030L Earth Systems: Geosphere Laboratory (Formerly Credits: 1)
The Laboratory component Earth Systems: Geosphere requires the student to make measurements, analyze and plot data, draw conclusions from the data plots, characterize and identify earth materials, and interpret geospatial representations. These skills will follow lecture material and increase understanding through active learning.

ENVI.2040L Earth Systems: Atmosphere and Oceans Laboratory (Formerly 87.204) - Credits: 1
Earth Systems: Atmosphere and Oceans Lab is designed to complement the lecture material from ENVI.2020 - Earth Systems Atmosphere and Oceans. This course, along with the other Earth Systems courses and corresponding labs use a systems-based approach for the topic of Earth and Environmental Science. This laboratory will concentrate on the Atmosphere and Oceanography.
EXER.2170 Research Methods in Exercise Science - Credits: 3

This course involves an in-depth study of current research methods and topics with specific applications to the field of Exercise Physiology. The content includes the sources of data acquisition, research design, testing procedures, and treatment of data. Each student must participate in a senior research project utilizing information gained from the lecture portion of the class. All 1st 2nd and 3rd year course work in the exercise physiology major. All exercise physiology undergraduate courses (number 38) are restricted to EP majors only. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Quantitative Literacy (QL).

EXER.4170 Research Methods in Exercise Physiology (Formerly 38.417) - Credits: 3

This course involves an in-depth study of current research methods and topics with specific applications to the field of Exercise Physiology. The content includes the sources of data acquisition, research design, testing procedures, and treatment of data. Each student must participate in a senior research project utilizing information gained from the lecture portion of the class. All 1st 2nd and 3rd year course work in the exercise physiology major. All exercise physiology undergraduate courses (number 38) are restricted to EP majors only. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Quantitative Literacy (QL).

FINA.3010 Financial Management (Formerly FINA/61.301) - Credits: 3

Principles of financial management, including working and fixed capital, sources of funds, financial statements, financial planning and capital structure.

GEOL.2150 Forensic Geology (Formerly 89.215) - Credits: 3

This course deals with the application of geological and related principles to the solution of various types of crimes. The course will explore the use of evidence (rocks and minerals, soils, geochemistry, etc.) to identify the source and hence the potential perpetrator of the crime. Meets Core Curriculum Essential Learning Outcome for Critical Thinking &Problem Solving (CTPS) and Quantitative Literacy (QL).

MATH.1110 Quantitative Reasoning (Formerly 92.111) - Credits: 3

An introduction to the mathematics concepts and skills important in modern society, even for non-technical pursuits. The course will emphasize conceptual understanding as well as a facility in performing elementary computations. Topics to be examined will include types of reasoning, problem-solving methods, techniques of estimation, algebraic essentials, and the nature of probability and statistics. No credit in Science or Engineering.

MATH.1510 Explorations in Mathematics (Formerly 92.151) - Credits: 3

This course is not so much about the mathematics of formulas, equations, rules and errors, as about mathematics that can be experienced: counted, drawn, seen, created; quite simply: played with. Officially, we will encounter concepts of combinatorics, geometry, number theory and Boolean logic. Unofficially, we will experiment with puzzles and patterns and develop as much mathematics from them as we can. Prerequisites: high school mathematics and willingness to explore. No credit in science or engineering. This course satisfies the Quantitative Reasoning requirement.

MATH.2340 Differential Equations (Formerly 92.234) - Credits: 3


MATH.2360 Engineering Differential Equations (Formerly 92.236) - Credits: 3

Introduction to differential equations with an emphasis on engineering applications. Topics include first-order equations, higher-order linear equations with constant coefficients, and systems of first-order equations. Applications of each topic are introduced and qualitative, analytical, and numerical solution techniques are studied. Laplace transform methods are discussed. The software package MATLAB is used throughout the course for both analytical and numerical calculations.

MATH.2830 Introduction to Statistics (Formerly 92.283) - Credits: 3

An introduction to descriptive statistics, graphing and data analysis, probability laws, discrete and continuous probability distributions, correlation and regression, inferential statistics. No credit in Sciences (except Biology and EEAS) or Engineering. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

MECH.4030 Thermal Fluids Laboratory (Formerly 22.403) - Credits: 3
Continuation of Mechanical Engineering Lab I. Focuses on digital data acquisition systems used on mechanical engineering equipment. Students design measurement systems composed of various transducers, their associated signal conditioners and digital data acquisition and recording devices. Statistical methods are emphasized. Experiments require the students to provide calibration and to select appropriate sampling rates and test durations. Systems under test range from simple multisensor laboratory apparatus to actual operating mechanical systems. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

MIST.3040 Data Communications and Networks  
(Formerly 63.404, MIST 304) - Credits: 3

A comprehensive overview of concepts and practice in Business Data Communications and Networking. Explores the principles and applications of data communications in organizations from familiar applications into the more technical aspects of telecom architecture. Analyzes the various types of telecom networks, and how they are designed and configured, including issues involving the management and decision-making process within the telecom department. Students provided with hands-on network administration and configuration experience with a LAN administrator. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

MKTG.4110 Marketing Analytics  
(Formerly MKTG 411/62.411/62.312) - Credits: 3

Course number was formerly 62.312. Focuses on marketing strategies and tactics. Emphasis is given on research methods and applications for strategy building and implementation. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Quantitative Literacy (QL).

MLSC.3610 Clinical Laboratory Instrumentation  
(Formerly 36.361) - Credits: 3

This course is designed to provide an in-depth knowledge of clinical chemistry laboratory instrumentation. Emphasis is placed on theoretical concepts, instrument components and design, calibration and troubleshooting of modern instrumentation, and analytical methodologies in the clinical laboratory. Additionally, qualitative and quantitative applications of instrumental techniques are covered. Computer applications are included where appropriate. The following spectroscopic instruments are studied: ultraviolet, visible and infra red absorption, fluorescence, turbidimetry and nephelometry, reflectance, flame emission and atomic absorption spectroscopy. Electrochemical methods of analysis are reviewed, including potentiometric techniques, voltammetry and coulometry. Chromatographic instrumentation and methods are discussed, such as column and thin layer chromatography, high pressure liquid chromatography, gas chromatography, and ion exchange chromatography.

NURS.3200 Community-Focused Health and Policy  
(Formerly 33.320) - Credits: 3

This course provides a foundation to community health nursing with the community, family and individual as Client. This course presents an overview of the US health care delivery system with an emphasis on the role of government in healthcare, Medicaid, and current efforts at healthcare reform.

NURS.4120 Community Health and Health Policy  
(Formerly 33.412) - Credits: 4

This course analyzes the development of policy and its impact on the health of populations. Students apply epidemiology and community health science to population-based nursing practice. Students identify a community health problem that can be addressed through health promotion activities.

PHIL.2020 Introduction to Logic and Critical Reasoning  
(Formerly 45.202) - Credits: 3

Studies the methods used to distinguish correct from incorrect reasoning. This course will aim at developing (1) an ability to express one's ideas clearly and concisely; (2) an increased skill in defining one's terms; and (3) a capacity to formulate arguments vigorously and to scrutinize them critically. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Quantitative Literacy (QL).

PHYS.1210 Exploring the Universe  
(Formerly 95.121) - Credits: 3

Addresses topics that include: Planet Earth, its structure, plate tectonics, greenhouse effect, ozone layer, craters and dinosaurs; our satellite Moon; other planets; our star Sun and its energy source; other stars, the HR diagram and stellar evolution, white dwarfs, neutron stars, supernovae, black holes; our galaxy, the Milky Way, its structure; other galaxies; the universe, its structures and expansion; evolution of galaxies, quasars, cosmology, the Big Bang and Unification of the forces of nature. Satisfies Gen Ed science requirements for non-science majors. Does not satisfy science requirements for Science majors but may be used as a free elective by Science majors.

PHYS.3930L Advanced Experimental Physics Laboratory I  
(Formerly 96.393) - Credits: 2

Some of the most significant experiments in the history of physics are revisited. Form measuring the universal gravity
constant to observing the quantization of light and matter, this laboratory course challenges students’ experimental skills and tests their understanding of fundamental concepts. Preparing high quality lab reports and presentations is emphasized.

PHYS.4060 Nuclear Instrumentation (Formerly 96.406) - Credits: 3

This course provides the operating principles and applications of nuclear radiation detection systems, including detector theory, electronic signal processing, and measurement and data reduction techniques. The systems covered include gas-filled detectors (ion chambers, proportional counters, and Geiger-Mueller counters), inorganic and organic scintillators, and high-purity germanium detectors, for the detection of alpha, beta, gamma, and neutron radiation. This course also covers hypothesis testing, detection limits, and detector dead time (offered as 98.506 for graduate credit).

PLAS.2470 Thermodynamics (Formerly 26.247) - Credits: 3

This course introduces the concepts of system definition, pure substance properties, phase behavior and engine cycles. The laws of Thermodynamics are introduced and used to determine equilibrium states of systems, conservation of energy and directionality of energy transformation. Mathematical analysis of closed and flowing systems and engineering devices used in polymer processing is reviewed. It concludes with a discussion of introductory level polymer thermodynamics. Meets Core Curriculum Essential Learning Outcomes for Quantitative Literacy (QL).

PLAS.3060 Methods of Experimental Analysis (Formerly 26.306) - Credits: 3

Methods for design and analysis of experiments provided in three course modules: (1) descriptive and inferential statistics for hypothesis testing; (2) analysis of variance and linear regression for model building; and (3) factorial, fractional factorial, and response surface design of experiments for decision support and optimization. Course incorporates project work with modern statistical programming. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL) and Critical thinking and problem solving (CTPS).

PLAS.3810 Polymer Science for Engineers I (Formerly 26.381) - Credits: 3

An introduction to polymer science with a focus on making polymers. Topics covered include the chemistry, kinetics, and statistics of step and chain polymerizations and copolymerizations, polymerization processes. Industrially relevant polymers and commercial polymerization processes will be highlighted, with coverage of the health and safety aspects of various approaches to the preparation of various polymers given. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

POLI.3010 Quantitative Methods in Political Science (Formerly 46.301) - Credits: 3

This is a course in designing Quantitative Research and applying statistics for Political Scientific. Meets Core Curriculum Essential Learning Outcome for Critical Thinking &Problem Solving (CTPS) and Quantitative Literacy (QL).

POMS.4030 Service Management (Formerly POMS 403/63.470) - Credits: 3

This course is intended to provide students with the necessary tools and understanding for managing service operations. Service firms represent the fastest-growing sector of the economy. This course will focus on the various aspects involved in the management of service operations. The service operations are managed differently to their intangibility, time-sensitivity, high levels of customer involvement and lack of engineering standards. This course will explore topics such as design and delivery of services, the measurement of productivity and quality, managing capacity and demand, redesign of service delivery processes, management of technology, and others.

PSYC.3690 Research II: Statistics (Formerly 47.369) - Credits: 3

An intermediate level course building on competence in quantitative reasoning skills and the fundamentals of research methods, and focusing on descriptive and inferential statistics and their application and interpretation. The course will include basic computational approaches; the primary goal is for students to develop the ability to articulate and apply statistical concepts, and communicate statistical results. The course includes topics in basic inferential statistics from z-scores up to and including chi-square and factorial ANOVA. Students will learn to use a database and conduct statistical analyses using standard software packages. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL).

PUBH.3050 Introduction to Epidemiology (Formerly 31.305) - Credits: 3

This course is designed to introduce basic epidemiological methods used in the study of current major health problems. Content includes explanation of the scope and focus of epidemiology, simple measures of disease frequency and
association used in the study of the distribution and
determinants of disease, types of epidemiological study designs,
and practical applications. Emphasis on interpretation of
epidemiological information and application of findings
Prerequisite: Community Health and an elementary statistics
course. Required for seniors in Community Health Education;
open by permission to other upper division students in Health
Professions. Meets Core Curriculum Essential Learning
Outcome for Information Literacy (IL) and Quantitative
Literacy (QL).

SOCL.4020 Quantitative Methods for Social Research
(Formerly 48.402) - Credits: 3

An introduction to methods of social research, with emphasis
on quantitative research methods. Presents basic statistical
techniques used in social research as well as the computer
software used for analyzing social science data. For majors
only.
AMST.2480 Perspectives American Culture (Formerly 40/42.248) - Credits: 3

The goal of this class is to enhance students' ability to read and interpret American texts by learning how to see them in context, to understand the way readers approach texts from interpretative lenses, and to express their insights about American culture in a variety of forms and genres. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ARCH.3160 Architectural Utopias - Credits: 3

can we build a better world? Many people from various eras and geographical locations have argued we can. The idea of utopia -- a place of harmony free from want and strife -- has shaped both imagined and real places. So has its opposite: dystopia. This course will focus on architectural visions and solutions for utopias from the ancient world to the present: from myths of long-lost cities to projected colonies on the moon and Mars.

ARCH.3550 The City and the Environment - Credits: 3

This course examines the many ways that communities, architects, and developers have responded (or not responded) to the American landscape and environment. It will begin with the earliest settlements established by the colonists, such as Havana, Cuba, and New York City and progress to the present with a special emphasis on Lowell and Boston. The course will not only examine specific cities but also architectural utopias, city planning, the national park system, sustainable design, and contemporary efforts to merge the needs of the city with environmental awareness.

ARHI.3530 History of Public Art in the Modern Era (Formerly 58.353) - Credits: 3

This course serves as an introduction to the history of public art in the modern and contemporary world. The history of public art is examined in relation to such concerns as the definition of public space, community involvement in the creative process, the institutional and economic support system for the arts, the modern understanding of memorial sculpture, and the use of the visual arts to foster public dialogue and cultural exchange.

ARHI.3600 Museum Issues (Formerly 58.360) - Credits: 3

The art museum in the United States is a unique social institution because of its blend of public and private support and its intricate involvement with artists, art historians, collectors, the art market, and the government. This course will study the art museums history and status in our society today. Special consideration will be given to financial, legal and ethical issues that face art museums in our time. Short papers, oral reports and visits with directors, curators and other museum officials in nearby museums will be included along with a detailed study of a topic of one's choice.

ARHI.3650 Art and Environment (Formerly ARHI.2300) - Credits: 3

This course surveys developments in land, environmental, and ecological art. Some of the most compelling artists today engage with the politics of land use, including the conditions of the global economy, climate change, environmental justice, sustainability, sovereignty and land claims, uneven geographies and expanding megacities, and the privatization of public space.

ARTS.2010 Form And Content (formerly 70.201) - Credits: 3

Form and Content is considered the capstone course of the Art Foundations Requirement. Through a variety of studio assignments and individual projects students will explore the integration of humanities related concepts and develop an understanding of how visual artists think, live and function in the twenty first century. As part of the course requirements students will participate in the foundations exhibition at the end of the semester. Art majors only. Fall and Spring.

ASAM.2120 Introduction to Asian American Studies - Credits: 3

This course provides students with an overview of the multidisciplinary field of Asian American Studies from two distinct disciplines. The course begins with the history of Asian American Studies and the methods used to advance the field. Next, various aspects of the Asian American experience, such as gender and sexuality, are examined. Students also participate in service learning in partnership with Asian-serving community organizations in and around Lowell, MA. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

BMSC.1010 Biomedical Sciences Freshman Seminar - Credits: 1

This course is intended to provide the student with an introduction to the professions available within the field of biomedical sciences. Topics include history of the profession, state and federal laboratory regulations, professional organizations, ethics and professionalism, and an overview of each laboratory discipline. The role of the biomedical scientist
in the clinical setting will be explored further through laboratory and industry tours.

**BMSC.2100 Introduction to Applied Biomedical Sciences (Formerly 36.273 and MLSC.2730) - Credits: 1**

This course is intended to give the student an overview of the various applied biomedical sciences and the career paths they can provide within the health professions. Topics presented will focus on medical diagnostics and therapeutics, including careers with professional certification/licensure opportunities, graduate and professional programs, as well as biomedical research and industry settings. The importance of professional organizations, state and federal regulations, and consideration of ethical principles in the health professions will also be introduced. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

**CHEM.3600 The Responsible Chemist (Formerly 84.360) - Credits: 3**

This course is required of chemistry majors and addresses ethical, regulatory, and environmental aspects of their profession. Students are exposed to a wide range of research integrity issues that include TSCA (Toxic Substance Control Act), SOPs (Standard Operating Procedures) and quality management. Compliance issues include an overview of OSHA (Occupational Safety and Health Administration) and EPA (Environmental Protection Agency), as well as an introduction to patent law. The importance of maintaining integrity in their discipline is emphasized, and case studies are presented for study and discussion. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE) and Essential Learning Outcome for Written & Oral Communication (WOC).

**CRIM.3900 Criminal Justice Research Methods (Formerly 44.390) - Credits: 3**

An introduction to research methods for the criminal justice professional including terminology, standard methodologies, and elementary statistics. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

**DGMD.2310 Media, Law and Ethics (Formerly 41.237/DGMD 231) - Credits: 3**

This course explores key legal issues likely to confront journalists, mass media professionals or students interested in learning more about the relationships between law, media and ethics in this global community. Nonetheless, students are challenged to think critically about the applicability of those issues to individuals and to media institutions that transmit information via spoken communications, writing, traditional media, mobile messages, social network sites, or e-mail messages.

**ECON.3450 Health Economics (Formerly 49.345) - Credits: 3**

An introduction to the economic analysis of health care market. The course presents microeconomic models, empirical findings and public policies referring to the following topics: the production and demand for health (the investment/consumption aspects of health and the relationship between socio economic status and health status), the issues of moral hazard and adverse selection in the insurance market, the role of information in the physician-patient relationship, the different regulation and payment systems for providers, the Medicare and Medicaid programs, and the comparisons between the US system and the health systems of other western economies and developing countries. This class aims to help students becoming more informed future citizens and consumers or producers of healthcare. Prerequisites: 49.201 or instructor’s approval. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Social Responsibility & Ethics (SRE).

**ENGL.2160 Monsters, Apes & Nightmares (Formerly 42.216) - Credits: 3**

This course examines literary responses to science in England and the United States from the early Nineteenth Century to the present. Readings include novels--Frankenstein, The Island of Doctor Moreau, Dr. Jekyll and Mr. Hyde, Jurassic Park--essays, and poems. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

**ENGL.2490 Literature on Technology and Human Values (Formerly 42.249) - Credits: 3**

A study of the relationship between works of fiction, cultural attitudes toward technology, and social values. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

**ENGL.2510 War in Literature (Formerly 42.251) - Credits: 3**

In “War in Literature” we will study conflict and human values in times of war, focusing on the literature of World War I, World War II, Vietnam, and the Gulf War. Content covered includes a selection of representative (and divergent) literary texts written throughout the 20th century in a variety of genres (poetry, essays, memoir, short story, novel, and hybrid forms like the “graphic novel”). Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).
ENGL.2580 Disability in Literature (Formerly 42.258) - Credits: 3
This course explores how texts -- including novels, short stories, poems, memoirs, essays, plays, and videos -- portray people with disabilities. We will consider the problematic stereotypes about disabilities that sometimes appear in popular culture and literary depictions, and read texts that provide insight into a diverse community of people with a range of disabilities.

ENGL.3330 American Autobiography (Formerly 42.333) - Credits: 3
A Study of autobiographical writing from Colonial America to the present. Works from the 17th to the 21st century will allow students to explore the genre of autobiography and related sub-genres, including the captivity narrative, the slave narrative, and the immigration narrative. Readings will also explore literary and political autobiographies. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3350 American Women Novelists (Formerly 42.335) - Credits: 3
A study of selected novels by American women. Focus on the female voice within the American tradition. Treatment of such issues as domesticity, education, and authorship. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3420 Women Writers and the Past (Formerly 42.342) - Credits: 3
Women Writers and the Past. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3440 Women in Theatre (Formerly 42.344) - Credits: 3
A study of the significant contributions of women to the literature and art of the theatre in various periods and cultures. Topics may include: plays written by women, the progress of women in theater, the evolution of female roles, and the portrayal of feminism on the stage.

ENGL.3450 British Women Novelists (Formerly 42.345) - Credits: 3
Selected novels by writers such as Austen, the Brontes, Eliot, Woolf, Bowen, and Drabble. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3640 African American Drama (Formerly 42.364) - Credits: 3
A study of the history and development of African American drama, with emphasis on major aesthetic, political, and social movements in African American culture. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3760 African-American Literature (Formerly 42.376) - Credits: 3
A study of selected works by black American writers, such as Toomer, Wright, Ellison, Walker, and Morrison. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3780 Asian American Literature (Formerly 42.378) - Credits: 3
Asian Americans hold an intriguing place in the cultural imagination: as perpetual foreigners, as so-called 'model minorities' that serve to maintain hegemonic power relations, and as living embodiments of America's memory of its involvement in recent wars. As artists, however, Asian Americans have contributed and impressive body of literary work, and we'll examine some of the most enduring and provocative of these texts. We'll explore themes such as trauma and the immigrant experience, issues of exile and dislocation, Asian Americans' embattled place in our country's history, and the intersections of race and ethnicity with gender and sexuality. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3820 Theatre History I: Ancient Greece through the 18th Century (Formerly 42.382) - Credits: 3
A survey of ancient to early modern theatre in its historical and social contexts, tracing changes and developments in acting styles, theatre architecture, scenic practices, dramatic literature, and the audience. The course examines how theatre both reflects and shapes the changing beliefs and priorities of a culture.

ENGL.3830 Theatre History II: Nineteenth Century to the Present (Formerly 42.383) - Credits: 3
A survey of theatre in its historical and social contexts from the 19th century to the present, focusing on innovations in design and technology, the advent of the director, the emergence of modern schools of acting, and the creation of new forms of theatre to suit the changing needs of a modern world.

**ENVI.4160 Climate Change: Science, Communication, and Solutions (Formerly 81.416/Biol.4160) - Credits: 3**

Like many of the ‘grand challenges’ currently facing society, climate change is a complex problem that cuts across academic disciplines, including the physical sciences, biology, engineering, economics, political sciences, and behavioral psychology. In this course, we integrate recent research from many of these disciplines to explore the scientific basis of climate change, its impacts on the natural world and human society, and societal responses to it. Through interactive simulations, class discussions, lectures, current scientific literature, and student-led projects (such as video production and dynamic modeling), the goal of this course is to empower students to come to their own decisions about how society can address the climate change challenge.

**EXER.4120 Clinical Practicum I and II (Formerly 38.412) - Credits: 4**

This course is an off-campus experience in either a cardiac/pulmonary rehab clinical facility or in a fitness setting. Students experience practical applications of the concepts and theories learned in the classroom settings. Strength and conditioning, research or industry related setting, or other setting appropriate to the particular student’s interests.

**FAHS.2130 Foundations in Liberal Studies (Formerly 59.213) - Credits: 3**

Foundations of Liberal Studies is a required course for all BLA majors. This course examines the value and importance of drawing on several academic disciplines to understand issues that are too complex to be addressed effectively using any single discipline. Using a case study approach, we will examine how the elements of various disciplines can be integrated and synthesized to understand and give voice to complex issues dealing with health, environment, governance, peace and conflict, etc. Upon completing the course, students will be able to view the courses in their two BLA concentrations from an interdisciplinary perspective by observing how elements of each discipline can contribute to the understanding of global problems. These skills will be applied in the BLA Capstone Course.

**FAHS.2200 Designing the Future World (Formerly 57.220) - Credits: 3**

All purposeful human activity involves design. Every day we are surrounded by the products of design processes—buildings, cars, entertainment, corporations, schools, even laws and regulations. They make our lives easier in many ways, but they may also create significant social and environmental problems. In the past, designers often did not consider the impact of their designs on society, or ignored the negative consequences. Our culture and legal system usually permitted, or even encouraged, this irresponsibility. Today, a small group of scholars, businessmen and women, and activists are rethinking how we design the things around us, with the goal of addressing the most pressing social and environmental issues. This class will introduce students to some of these issues, the people who are confronting them, and the ways in which all of us can contribute to designing a better Future World. With a series of hands on projects, coupled with readings and other resources, students will work to design aspects of the future. In the process you will learn about possible solutions to complex, important problems, but also learn valuable life skills such as problem framing, problem solving, critical thinking, active learning, communication, and simple construction methods. No previous experience is required-only curiosity and eagerness to learn.

**GNDR.2400 Introduction to Gender Studies (Formerly GNDR 240) - Credits: 3**

This course is an interdisciplinary introduction to the field of Gender Studies that examines both commonalities and differences among diverse groups of women. A variety of topics are presented such as past and present stratification in work and family, sexual identities, medial representations of women, and violence against women. Social movements for women’s equality and feminist theories and methods are also introduced.

**HIST.2980 Introduction to Historical Methods (Formerly 43.298) - Credits: 3**

An introduction for the undergraduate student to the nature and principles of history. The course takes up methodology, historiography, research methods, electronic resources, bibliography, and the technical and stylistic problems involved in the presentation of research in scholarly form. Required of all history majors in the sophomore year. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Social Responsibility & Ethics (SRE).

**MGMT.3800 Business Ethics (Formerly BUSI 380/3800) - Credits: 3**

This course will explore the intersection between business leadership and ethics in various context. It provides the opportunity for students to explore complex issues in societal and professional contexts while engaging in probing conversations with classmates.
MUBU.3010 Music Business 1 (Formerly 77.301) - Credits: 3
A systematic look at career options in the Music Industry. Topics discussed include: songwriting, music publishing, national and international copyright law, music licensing, artist management, and concert promotion.

MUSR.4500 The Recording Industry (Formerly 78.450) - Credits: 3
A detailed survey of the many career options of the audio-recording industry: position duties and responsibilities. Guest lecturers from diverse careers in the industry share their experiences, disciplines, and backgrounds. Permission of Coordinator and Chair.

NURS.3070 Concepts for Baccalaureate Nursing (Formerly 33.307) - Credits: 3
This course is designated as a transition course for registered nurse students pursuing a baccalaureate degree with a major in nursing. This course aims to refine critical thinking skills and analyze nursing's unique contribution to health care. Consideration is given to the interrelationships of theory, research, and practice. Special emphasis is placed on the concepts of health promotion and risk reduction as they relate to individuals and families who are at risk for or experiencing health problems. This course includes a practicum component that focuses on the development of interventions to promote the health of individuals and families at risk.

NURS.3150 Health Promotion and Risk Reduction of Families II Practicum (Formerly 33.315) - Credits: 4
In this clinical course, students provide nursing care to adult clients and their families. The focus is the development of specifically tailored therapeutic interventions to promote the health of these clients and assist with potential or actual health problems. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

NUTR.3450 Community Nutrition (Formerly 36.345) - Credits: 3
This course explores the role of the nutrition professional in community needs assessment, intervention development and evaluation, and in forming domestic nutrition policy. Nutrition problems in contemporary communities and of selected target groups in the United States and in developing countries are examined. Programs and strategies to meet nutrition needs outside the acute care setting, such as nutrition education and food assistance are explored. Local, state, and national nutrition policy and initiatives in nutrition will also be examined. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

PHIL.2030 Introduction to Ethics (Formerly 45.203) - Credits: 3
Examines the basic issues and problems of ethics and values and a survey of some important alternative answers to the questions raised, on both an individual and a social level, by our necessity to act and to live in a rational and human way. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.2060 Introduction to Political Philosophy (Formerly 45.206) - Credits: 3
Political philosophy is concerned with basic questions about community, public life, and social organization. This course will address issues such as the rights of the individual in relation to the power of the state and society; the nature and legitimacy of political authority and democracy; the significance of power, economics, justice and equality in social life; and the duties and responsibilities of citizens. We will also consider the philosophical meaning of communitarianism, liberalism, and republicanism, individualism, capitalism, and socialism, as well as the role of class, race, and gender in politics.

PHIL.3105 Philosophy of Disability - Credits: 3
Examines the basic issues and problems in the philosophical study of disability, including engagement with the interdisciplinary field of disability studies. Provides a survey of issues relating to the lived experience of disability, disability and well-being, theories of disability, and the concepts of normality, fitness and ableism as they relate to the practice and institutions of medicine, politics, religion, and society more generally.

PHIL.3210 Theories of Ethics (Formerly 45.321) - Credits: 3
This course examines theories of Philosophical ethics. Possible topics include metaethics (which asks questions such as "What do we mean when we call things 'right' or 'wrong'?", "Are there universal ethical truths or is morality fundamentally relative?", and "What is the relationship between morality and religion?"), normative ethics (which asks whether the right thing to do is determined by considerations such as rights, duties, intentions, consequences, character, or something else) and applied ethics (which applies normative ethical theories to particular concrete problems).

PHIL.3230 PhilosophyClassics: Nietzsche (Formerly
45.323) - Credits: 3
A detailed introduction to Nietzsche’s thought and its reception. This course will examine Nietzsche’s most important works and central concepts such as the Dionysian and Apollonian, the last man, overman, eternal recurrence, genealogy, and will to power.

PHIL.3340 Engineering and Ethics (Formerly 45.334) - Credits: 3
A philosophical analysis of the ethical dimensions and responsibilities of the engineering profession. Specific case studies and ethical issues are analyzed through the application of some of the basic concepts and principles of traditional and contemporary ethical theories. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.3350 Ethical Issues in Technology (Formerly 45.335) - Credits: 3
This course will examine important ethical issues and value conflicts emerging in contemporary science and technology. Through readings and class discussions students will not only have an opportunity to explore the manner in which ethical and technical problems are related, but to develop insight into areas of ethical philosophy and modes of reasoning essential to an intelligent understanding of such issues. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.3520 Existence & Anxiety (Formerly 45.352) - Credits: 3
Explores basic questions of human existence in 19th and 20th Century philosophy and literature. Topics include anxiety and alienation; freedom and responsibility; authenticity and bad faith; individuality and mass society; rationality and the absurd; values and nihilism; and God and meaningfulness. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.3510 Equality, Justice and the Law (Formerly 45.361) - Credits: 3
This class investigates the American fascination with the "rule of law." Questions to be considered include the following: What do we mean by the rule of law? What is the relation between law and morality? How does the rule of law promote justice, and what is its connection with the ideal of equality? What is the role of a written Constitution in protecting the rule of law? Special emphasis will be given to the Equal Protection clause of the Constitution and its role in prohibiting discrimination against disadvantaged groups, including racial minorities, women, and the handicapped. We will also consider in detail some theories of constitutional interpretation, including the Original Intent theory.

PHIL.3620 Democracy and Its Critics (Formerly 45.362) - Credits: 3
Explores the diverse roots of the democratic ideal and the opportunities and dangers associated with democratic politics. The arguments for and against democracy will be analyzed. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.3690 History of Moral Philosophy (Formerly 45.369) - Credits: 3
This course explores the history of moral philosophy by examining the writings of key thinkers in the Western philosophical canon, including Leibniz, Hume, Kant and Hegel. We will focus on four basic types of moral reasoning: perfectionism, utilitarianism, intuitionism, and Kantian constructivism. Our goal will be to understand how these thinkers from the modern period of moral philosophy have influenced the way contemporary philosophers think about morality. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.3830 Philosophy of Death and Dying (Formerly 45.383) - Credits: 3
This course is a philosophical and interdisciplinary examination of prominent issues concerning the meaning of life and death and the ethical concerns involved with life, death and end of life issues. Topics in the course include: definitions of death, metaphysics and death, cultural meanings of death, the ethics of killing vs. letting die, euthanasia and suicide, and rights of the dying. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.3890 Immigration and Global Justice - Credits: 3
This course addresses the question of justice in regards to immigration policy. We consider a variety of views including Communitarianism, Liberalism, Nationalism, Cosmopolitanism, and Democratic Theory. We will look at how these different positions have answered the following sorts of questions: Do we have duties to strangers of foreigners that are of equal weight to the duties we owe to members of our family, our circle of friends or our nation? Does part of the definition of "self-determined state" include the right to unilaterally reject petitions of inclusion from non-citizens? Does a commitment to equality demand that borders be open?

PHIL.4010 Bioethics and Genetics Research (Formerly
45.401) - Credits: 3
This course addresses ethical issues that arise in biomedical research and practice including autonomy in the doctor-patient relationship, the duty of confidentiality, the right to refuse treatment, the right to death with dignity, the ethics of experimentation with human subjects, the ethics of genetic enhancement, and justice in health care distribution. The course will combine theoretical perspectives and concrete case studies that illustrate actual dilemmas that the health care profession has in fact encountered over the years.

POLI.1010 Introduction to American Politics (Formerly 46.101) - Credits: 3

POLI.1100 Introduction to Politics (Formerly 46.110) - Credits: 3
An introductory exploration of basic political concepts, ideologies, and themes. Stresses the importance of understanding politics for everyday life.

PSYC.2600 Child and Adolescent Development (Formerly 47.260) - Credits: 3
The developmental science of childhood and adolescence. Major theoretical perspectives, research methods, and ethical issues are presented with respect to prenatal development, infancy, childhood, adolescence, and the transition to adulthood. Empirical evidence for development in relevant contexts across biological, psychological, and social domains is examined.

PSYC.4710 Seminar in Community Psychology - Credits: 3
An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is racism. In this course we will investigate roots of racism, kinds of racism, reasons for perpetuation of racism, possible solutions to ending racism. Many believe that racism is a thing of the past. Yet, research shows that many of us are unconsciously racist and hurt communities of color without any malicious intent. We will explore our own posting in terms of racism. This is a writing-intensive course.

PSYC.4712 Seminar in Community Psychology: Immigration - Credits: 3
An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is immigration, a very important issue in the United States and around the world. In this seminar we will study the complex process of migration from a community social psychological point of view. Motivations, expectations, acculturation, immigrant status, deportations, policy and more will be covered. This is a writing-intensive course.

PSYC.4713 Seminar in Community Psychology: Prevent Youth Violence - Credits: 3
An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is youth violence, which continues to be a major public health concern in the United States. Preventing youth violence is an important component of creating peaceful and safe neighborhoods and just communities. In this course, we will use ecological and multicultural perspectives to understand different types of youth violence, the contexts in which they occur, and intervention strategies to address the violence. This is a writing-intensive course.

PSYC.4714 Seminar in Community Psychology: Bridging Differences - Credits: 3
An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course explores dilemmas that can emerge when working to bridge diverse groups in community-based work. The seminar will be organized around
narratives that address multiple dimensions of diversity including race, ethnicity, gender, class, sexual orientation, disability, and religion. Too often, guidelines for addressing very complex diversity dynamics are presented as neatly packaged lists of recommendations. However, it is within the stories of the challenges and dilemmas that the complexity of the political, historical, social, and psychological dynamics of diversity are most evident. Students will explore examples of everyday diversity challenges and utilize psychological theories to better understand how the challenges can be shaped by struggles over limited resources, deep historical conflicts between groups, privilege dynamics, intragroup dynamics, organizational cultural norms, and/or other issues. This is a writing-intensive course.

PSYC.4730 Seminar in Social Psychology (Formerly 47.473) - Credits: 3
An advanced seminar to consider special topics in social psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as social aspects of health and illness; inequalities in education; the impact of globalization; attitude formation and prejudice; and psychology of sex roles. This is a writing intensive course.

PSYC.4731 Seminar in Social Psychology: Social (In)justice - Credits: 3
An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is social injustice, its causes, manifestations, explanations, and social psychological theories that help us understand them. We will explore how and why social injustice prevails in today’s world full of resources; why small number of people own majority of world’s wealth; why some countries are poorer than others. We will study our own standpoints and where they come from and we will work on possible remedies that could lead to a more just world.

PSYC.4732 Seminar in Social Psychology: Achievement Motivation - Credits: 3
An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course will cover psychological theory and research on the various factors that explain people's motivation to achieve and their performance in different domains. These factors include emotions, needs, personality, efficiency, group membership, identity, goal type, and context. Course goals include honing students’ ability to understand, critique, write about, and discuss theoretical and empirical papers within psychology. Students will also develop their skills in generating testable hypotheses. This is a writing-intensive course.

PSYC.4733 Seminar in Social Psychology: the Mind-Body Perspective in Communication - Credits: 3
An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on the role communication processes (including Intra-Personal, interpersonal, and Mediated-Communication) play in a variety of health related contexts, effects, and processes. Included will be: Self-regulation theories; placebo and nocebo effects; unconscious processes; biofeedback effects and mechanisms; hypnosis; imagery; pain management; emotion regulation; well-being; and the ability to consciously influence autonomic processes such as the immune and endocrine systems. This is a writing-intensive course.

PSYC.4734 Seminar in Social Psychology: Health Campaigns - Credits: 3
An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will review the state of the science and art of effective medial health campaigns in light of how they are developed, delivered, and evaluated. Seminar participants will discuss and critically analyze campaigns relative to their effects on health-related awareness, knowledge, attitudes, and behaviors. This is a writing-intensive course.

PSYC.4735 Seminar in Social Psychology: Workplace Diversity - Credits: 3
An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Over the course of our lives, many of us will be working in organizations that include diverse workers, and thus it is important to understand the issues that shape interpersonal and system dynamics within such settings. In this seminar, we review theories and research relevant to how race, ethnicity, class, gender, sexual orientation, and disability dynamics affect workplace systems. Classes will be highly interactive and discussion-oriented as students learn
about the challenges diverse organizations face in fostering positive working relationships and about strategies adopted to enhance the effectiveness of the diverse workplace. This is a writing-intensive course.

PSYC.4742 Seminar in Developmental Psychology: Psychology of Education - Credits: 3

An advanced seminar to consider special topics in developmental psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar takes an intensive look at the psychology of education and of learning. We will read about theories of education, research on learning, and study some historical and current trends in both formal education (school) and informal learning environments (hobby subcultures, museums, camps, etc). Readings will include both historical examples (John Dewey, Jane Addams, Paolo Freire) and schooling systems, and policymakers in higher education. In addition to reading, class discussion, and engaging hands on exercises, students will plan and deliver a term-length creative project on the psychology of learning and education. This is a writing-intensive course.

PSYC.4743 Seminar in Developmental Psychology: Trauma in Child Development - Credits: 3

An advanced seminar to consider special topics in developmental psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Trauma is a relatively common experience of childhood. Far too many children and youth in the US are witnesses to domestic violence and victims of abuse, neglect, and other violent crimes. Worldwide, millions of children have been disabled, injured, orphaned, or recruited as child soldiers in armed conflicts. When natural disasters strike, children are often among those affected most severely. How do these experiences influence subsequent growth and development? This seminar examines the role of trauma in child development form an ecological perspective with a focus on neurophysiological, affective, and relational systems. This is a writing-intensive course.

PSYC.4750 Seminar in Clinical Psychology (Formerly 47.475) - Credits: 3

An advanced seminar to consider special topics in clinical psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as health psychology and behavioral medicine; the nature and causes of or interventions for specific psychological disorders (e.g., autism spectrum disorder, schizophrenia); the community mental health movement; clinical methods of assessment. This is a writing intensive course.
PSYC.4751 Seminar in Clinical Psychology: Women's Health - Credits: 3
An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on the causes and consequences of sexual aggression. It is designed to provide students with a working knowledge of behavioral language assessments and empirically validated interventions to improve language and communication for young children with autism and related disabilities. Successful completion of the course will help prepare students for a position as a behavior technician. Students will participate in class discussions, presentations, and application activities throughout the semester. This is a writing-intensive course.

PSYC.4752 Seminar in Clinical Psychology: Autism - Credits: 3
An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Autism spectrum disorder (ASD) is a complex neurological disorder that typically appears before the age of three and immediately and profoundly affects a young child's ability to communicate, develop language, form social relationships and respond appropriately to environmental cues. Over the last 15-20 years, autism has received an increasing level of attention in both scientific arenas and the popular press. Most recent estimates are that about 1 in 50 children are affected. This seminar will examine issues in the etiology, characteristics and treatment of autism and related developmental disabilities. The seminar will also explore some of the more prominent theories and controversies surrounding these disorders. Much of the seminar will be focused on a behavioral approach to understanding and treating children with autism and significant intellectual challenges. This is a writing-intensive course.

PSYC.4753 Seminar in Clinical Psychology & Behavioral Medicine - Credits: 3
An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course examines physical health and illness by integrating information about biological processes, psychological characteristics, and social contexts. We will discuss the following topics throughout the course: the roles of personality, emotion, mental health, and human development in physical well-being; the relationship between health psychology and other disciplines such as nursing, anthropology and genetics; the significance of prevention and public policy in physical health; and the ways in which health psychology is important in a variety of health problems, such as heart disease, cancer, and obesity. This is a writing-intensive course.

PSYC.4754 Seminar in Clinical Psychology: Language Assessment and Intervention in Autism - Credits: 3
An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course is designed to provide students with a working knowledge of behavioral language assessments and empirically validated interventions to improve language and communication for young children with autism and related disabilities. Successful completion of the course will help prepare students for a position as a behavior technician. Students will participate in class discussions, presentations, and application activities throughout the semester. This is a writing-intensive course.

PSYC.4755 Seminar in Clinical Psychology: Autism in Adolescents & Young Adults - Credits: 3
An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on adolescents and young adults on the "high-functioning" end of the autism spectrum. Students will learn the behavioral and psychological characteristics associated with this population, diagnostic procedures, etiology, consider various interventions for this population, and discuss current controversies in the field. We will also consider the impact of autism spectrum disorders (ASD) on individual and their families. This is a writing-intensive course.

PSYC.4756 Seminar in Clinical Psychology: Sexual Offending - Credits: 3
An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The purpose of this course is to examine current psychological theory and research relating to the causes and consequences of sexual aggression. It is designed to acquaint you with some of the key issues, questions, and findings in this field, as well as to allow you to develop some of
the critical skills needed by research psychologists. The course is organized topically. We begin by reading and thinking about the social construction of masculinity and femininity (especially through representations in the media) and how these constructions might contribute to sexual aggression. The bulk of the course is devoted to an examination of psychological processes related to victimization and perpetration. The course concludes with a discussion of several special topics and an examination of rape prevention and education. Special topics may include a focus on juvenile and female offenders, specific risk factors for perpetration, campus sexual assault, pedophilia, child maltreatment, pornography, recidivism rates, offender laws, and victim testimonies. This is a writing-intensive course.

PSYC.4770 Seminar in Contemporary Trends (Formerly 47.477) - Credits: 3
An advanced seminar to consider current trends in psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as contemporary models of addictive behavior; the interaction of psychology and law; existential psychology; psychology of technological change. This is a writing intensive course.

PSYC.4771 Seminar in Contemporary Trends: Addictions - Credits: 3
An advanced seminar to consider special current topics in psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The focus of this seminar is on the psychology of addictions. Drawing upon current theory and research, we will look at the nature and causes of the problem behaviors associated with alcohol and drug use. We will also consider whether problems in such areas as shopping, eating, gambling, sex, video games, and the Internet can be understood as forms of addictions. In addition, we will examine the implications of whether or not such addictions should be viewed as diseases, and we will evaluate the relative importance of biological, psychological and socio-cultural factors. This is a writing-intensive course.

PSYC.4772 Seminar in Contemporary Trends: Psychology & Law - Credits: 3
An advanced seminar to consider special current topics in psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course is an introduction to many topics representing major fields of study within psychology and law. Topics may include: eyewitness testimony, lie detection, jury selection, child protection, forensic interviews, and the death penalty. In this course, students will learn about the diversity of interests among legal findings. The main goal is to provide students with an understanding of relevant theory, empirical findings, and research methodology. Guest speakers will enhance learning. This is a writing-intensive course.

PSYC.4773 Seminar in Contemporary Trends: Generational Identities and Relations - Credits: 3
An advanced seminar to consider special current topics in psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on generational identities and intergenerational relations. Generation is an important dimension of human experience in modern societies and a key aspect of self-identity, but it is also linked to tensions and misunderstandings between people of different ages. Specific topics to be addressed include: cultural and historical differences in ideas about generation and cohort; the development of generational identities: generation, mass marketing, and consumerism; the politics of generation and intergenerational tensions; bilateral socialization and positive intergenerational exchange; similarities and differences between Baby Boomers, Gen-X’ers, and Millennials; ageism and age segregation, and; generativity and the future of our planet. This is a writing-intensive course.

PSYC.4774 Seminar in Contemporary Trends: Psychology of Globalization - Credits: 3
An advanced seminar to consider special current topics in psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on the social and psychological effects of globalization. Specifically, we will address how processes of globalization impact psychological functioning and development (including in the areas of identity, personality, mental health, and aging), social relations, and organizational and community dynamics. We will also explore the implications of global economic and environmental change for human rights and social and economic justice. This is a writing-intensive course.

PSYC.4780 Seminar in Cognitive Psychology (Formerly 47.478) - Credits: 3
An advanced seminar to consider special topics in cognitive psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration
of ethics and social responsibility. Specific topics will vary and may include such topics as attention and memory; mental imagery; decision-making; language; applications of cognitive psychology to education. This is a writing-intensive course.

**PSYC.4781 Seminar in Cognitive Psychology: Educational Applications - Credits: 3**

An advanced seminar to consider special topics in cognitive psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar is designed to give you an in-depth look into the impact of cognitive psychology on education. We will look at basic processes, including those of attention, memory, and motivation, starting first from basic theoretical principles. We will then read papers that have taken these theoretical principles as a starting point and applied them to real-life issues in education, such as exam performance and students’ self-evaluations of their own performance. This is a writing-intensive course.

**PSYC.4790 Seminar in Behavioral Psychology - Credits: 3**

An advanced seminar to consider special topics in behavioral psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as conceptual issues in behavioral psychology; applied behavior analysis; and the applications of behavioral psychology to education, language, symbolic behavior, and attention. This is a writing-intensive course.

**PSYC.5780 Students' Research and Ethics - Credits: 3**

An advanced seminar to consider special topics in cognitive psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as conceptual issues in behavioral psychology; applied behavior analysis; and the applications of behavioral psychology to education, language, symbolic behavior, and attention. This is a writing-intensive course.

**PSYC.4790 Seminar in Behavioral Psychology - Educational Applications - Credits: 3**

This entry level course uses the core concept of social problems to introduce basic social science reasoning-how social scientist define research questions, develop systematic methods to study them, gather evidence, search for pattern, in link findings to existent knowledge,. Cases provide opportunities to discuss how private problems develop into public issue, illustrating sociology as a discipline that evolves in response to social conflicts and inequalities. The course also meets General Education requirements for Ethics and Diversity.

**PSOC.3040 Science, Technology and Society (Formerly SOCI.2220) - Credits: 3**

The complex relationships between science, technology, and society are commonly obscured by a popular belief in the value-neutrality and objectivity of science and technology. Being able to analyze that belief as a myth is necessary in order to engage in critical analysis of the ways in which science, technology and society are mutually constituted. Social inequalities are both built into and perpetuated by science, technology, and engineering. Likewise, science, technology, and engineering shape and are shaped by various societal power relations. This course will provide the analytical tools necessary to understand science, technology, and engineering as fundamentally social enterprises and to understand how they shape society.

**PSOC.3140 Classical Social Theory (Formerly 48.321) - Credits: 3**

This course offers a critical examination of major classical sociological theories. It emphasizes the relationship between the individual and society and the competing pressures for social order and social conflict.

**PSOC.3220 Contemporary Social Theory (Formerly 48.322) - Credits: 3**

This course offers a critical examination of major contemporary sociological theories, including critical theory, neo-Marxism, critical race theory, feminist theory, and...
The Living Learning Community Seminar in SRE forges a link between the LLC and the academic programs that individual students are pursuing, and invites the student to develop and launch a plan for personal and professional development, with a particular focus on the Social Responsibility and Ethics Essential Learning Outcome of the UML Core Curriculum. In this one-credit course, students draw intentional connections between their coursework, the practice of independent research, and the resources and learning opportunities available to them on campus and in their communities. Student projects serve to integrate curricular, co-curricular, and extra-curricular learning experiences. Sections of this course will vary in topic, and are open only to students residing in the relevant LLC.

This course examines the organization of instructional settings that maximize learning for all. Students will examine gender issues, cultural issues, bilingual education and learning disabilities as they impact learner success. A major portion of the course is a field experience in which students interview high school teachers, observe a high school classroom, then teach three lessons. The purpose of these experiences is to ensure that students recognize the diversity of students and their specific learning needs. This course is required for STEM TEACHING MINOR.

A study of the waning of the Middle Ages and the dawning of the Renaissance as seen through the work of Petrarch and Boccaccio. Emphasis is on the study of sources and the influence of Petrarch and Boccaccio upon the literatures of western Europe. Conducted in English.

A guide to contemporary Italian studies through literary and cultural approaches. The works of central figures in contemporary Italian letters are examined in view of their impact on Italian life. Emphasis is given to poets, novelists, the new cinema, the influences of existentialism, and the impact of America on Italian literature. Conducted in Italian/English.
AEST.2210 20th Century Art (Formerly 79.221) - Credits: 3
A study of American and European movements in painting, sculpture, and architecture from 1900 to the present. Emphasis is placed on Fauvism, Cubism, Expressionism, Surrealism, International Style, Pop, Op Art, Minimal Art, Photorealism, and Post-Modernism.

AEST.2410 Art Serving Political, Religious, & Social Needs (Formerly 79.241) - Credits: 3
The objectives are to study the production of meaning in paintings and frescos, sculpture, stained glass, architecture and other art forms that were commissioned through the church and state patronage system; to analyze how these images are used to represent and define social order; how these images support the patron's interpretation of history while appealing to aesthetic needs; and ways in which art supported the educational and evangelical aims of church and state. The course will introduce students to the visual and critical language of art produced at this time and analyze works in the context of contemporary history. The thematic focus of this class is designed for Italian cultural studies. No knowledge of Italian is required.

AEST.3620 Post-digital Aesthetics - Credits: 3
Post-digital Aesthetics explores art after the digital revolution focusing on critical analysis of digital images and environments. We will study how digital technology has transformed art making and also how it impacts the very definition of art. The blurring of boundaries between art, life and design is more than ever evident as human experiences are increasingly mediated through technological devices and high-quality design. The internet has dramatically altered how and why we make art while virtual presence and embodiment in VR bring unprecedented questions about the role of artists and designers in our understanding of the world. This course will be taught as a face-to-face seminar. However, we will also travel beyond the classroom walls into virtual worlds and environments.

AMST.4010 American Studies Seminar (Formerly 40.401) - Credits: 3
A required seminar for American studies majors normally taken during the second semester of the junior year or during the senior year. Students undertake a research project leading to the writing of a major paper with a theme that combines more than one discipline.

AMST.4910 Directed Studies in American Studies (Formerly 40.491) - Credits: 1-3
An investigation of a topic using an interdisciplinary approach and leading to the writing of a major paper. The course provides an opportunity for a student to work closely with an instructor on a topic of special interest.

ARHI.2210 Twentieth Century Art (Formerly 58.221) - Credits: 3
A study of developments in painting, sculpture, performance, media arts, conceptual art, architecture, and design after 1900. This course encompasses modernisms in Europe, the Americas, Asia and the global south.

ATMO.4930 Internship: Atmospheric Science (Formerly 85.493) - Credits: 1-3
Work experience with private or public employer. Written report and supervisor evaluation required.

ATMO.4950 Honors Research: Atmospheric Science (Formerly 85.495) - Credits: 3
An individual or team research project carried out by qualified students with the approval of and supervision by a faculty member.

ATMO.4970 Research: Atmospheric Science - Credits: 3
An independent scientific research project carried out by a qualified senior under the supervision of a faculty member.

BIOL.2330L Experimental Methods in Biology (Formerly 81.233) - Credits: 2
This is a project-based course designed to introduce students to the methods of general biological laboratory research. Techniques will be introduced in the context of interrelated experiments during a semester-long project. Techniques will include, but are not limited to: making solutions, pipetting, using sterile technique, gel electrophoresis, DNA transformations, minipreps, and other molecular and microscopic methods.

BIOL.4210L Biochemistry Techniques (Formerly 81.421) - Credits: 2
A series of discussions and "hands on" laboratory exercises emphasizing techniques and use of equipment most commonly employed in biochemical-biomedical research laboratories. Techniques to be mastered include: cell culture, cell fractionation, enzyme purification, ultracentrifugation, UV-visible spectrophotometry, spectrofluorometry, various types of
Biol.4510 Senior Seminar in Biology (Formerly 81.451) - Credits: 2

This course instructs students in developing effective writing and speaking skills required for preparation of scientific manuscripts and presentations, and communicating in the scientific world. Students will be required to prepare and present oral presentations and to submit written reports.

BMSc.3310 Clinical Immunology (Formerly 36.331 and MLSc.3310) - Credits: 3

This course introduces the fundamental concepts of human immunology, focusing on the molecules, cells, and tissues associated with the recognition of entities that can elicit an immune response, the various mechanisms via which immune responses are initiated and executed upon recognition of these entities, and the biochemical and physiological regulatory pathways of immune responses. The applications of immunological biotechnology in clinical and laboratory diagnostics will be presented, as well as examples of how the activation of the immune system can lead to disease. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Written & Oral Communication (WOC).

Chem.3600 The Responsible Chemist (Formerly 84.360) - Credits: 3

This course is required of chemistry majors and addresses ethical, regulatory, and environmental aspects of their profession. Students are exposed to a wide range of research integrity issues that include TSCA (Toxic Substance Control Act), SOPs (Standard Operating Procedures) and quality management. Compliance issues include an overview of OSHA (Occupational Safety and Health Administration) and EPA (Environmental Protection Agency), as well as an introduction to patent law. The importance of maintaining integrity in their discipline is emphasized, and case studies are presented for study and discussion. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE) and Essential Learning Outcome for Written & Oral Communication (WOC).

Chem.3150 Unit Operations Laboratory (Formerly 10.315) - Credits: 3

Students perform laboratory base experimental analyses in fluid flow and heat transfer and fluid flow and heat transfer unit operations processes common in Chemical Engineering practice. The course is team based and students are expected to develop and improve in their ability to work and interact in a group environment. Written and oral reports are required. Safety in both lab and industrial practice are emphasized. Meets Core Curriculum Essential Learning Outcome for Quantitative Literacy (QL) and Written & Oral Communication (WOC).

CRIM.4890 Capstone Seminar in Criminology & Criminal Justice (Formerly 44.489) - Credits: 3

This course is designed to provide criminal justice majors with a capstone experience emphasizing integration of knowledge acquired in previous courses on the causes of criminal behavior and responses to it, particularly the institutions, policies and practices of the criminal justice system. Students engage in the development and production of a senior level research paper grounded in relevant criminology and criminal justice literature.

DGMD.4980 Digital Media Capstone I - Credits: 3

The first section of the capstone course is designed for guided self-designated projects by seniors in the Digital Media BA program. The course is a part of a sequence of two courses and is designed to be intense engagement that should manifest in the significant project taken from concept through production. Students can work individually and collaboratively under the close supervision of the faculty. The students are required to submit an application that includes a sound project proposal to be eligible for enrollment into the course. The sequential section DGMD.4991 needs to be completed by the BA students to graduate.

DGMD.4991 Digital Media Capstone II - Credits: 3

This is the second part of capstone course sequence and is designed for guided self-designated projects by seniors in the Digital Media BA program. The course is a part of a sequence of two courses and is designed to be intense engagement that should manifest in a significant project taken from concept through production. Students work individually and collaboratively under the close supervision of the faculty. The end result of the course should be the completion of a significant project; the final step should result in a public screening. DGMD.4980 needs to be completed for student to qualify for the course.

ECON.2120 Statistics for Business and Economics II (Formerly 49.212) - Credits: 3

Discusses interval estimation, hypothesis testing, analysis of variance, applied regression theory, correlation analysis, and
other selected topics.

**ECON.3180 Financial Markets and Monetary Policy**  
(Formerly 49.318) - Credits: 3

This course studies the formal role of money, interest rates, interest rate determination, and financial markets within the context of aggregate economic activity. These topics are related to central banks, with a focus on the Federal Reserve, and linked to money supply and the tools of monetary policy. Formal theories and practical implementation of strategies and tactics of monetary policy are addressed, as well as their implications for aggregate economic activity. This course meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Written & Oral Communication (WOC).

**EDUC.3600 Teaching Science through Inquiry in the inclusive - Credits: 3**

In this course, students will do what scientists do: have a chance to ask and answer questions about the world around us, collect data in a variety of ways and use data to help investigate the world. Students will explore how carefully coaching children to learn the skills that scientists use can build their developing science literacy. Students will work in pairs and, with a mentor teacher in a local school, plan, implement, and assess a science unit. Using high-quality science kits, teaching pairs will focus on a different set of science teaching skills each week. The course instructor and mentor teacher will observe and provide verbal and written feedback each week. Must take 1 undergraduate laboratory science course.

**ENGL.2200 Oral & Written Communication for Computer Science (Formerly 42.220) - Credits: 3**

The main goal of this course is to enhance the student’s understanding of the elements of effective communication, and to put that knowledge into practice in a supportive, cooperative, workshop environment. Limited to Computer Science majors.

**ENGL.4010 Selected Authors (Formerly 42.401) - Credits: 3**

A study of selected works. Authors to be announced each semester.

**ENGL.4230 Shakespeare I (Formerly 42.423) - Credits: 3**

A study of selected histories, comedies, and tragedies. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Written & Oral Communication (WOC).

**ENGL.4240 Shakespeare II (Formerly 42.424) - Credits: 3**

A study of selected histories, comedies, and tragedies not covered in 42.243. Shakespeare I is not a prerequisite.

**ENGL.4270 Virginia Woolf - Credits: 3**

The purpose of this course is to explore a range of works by Virginia Woolf (1882-1941), one of Britain's most innovative writers of fiction and criticism, who also significantly shaped the contours of twentieth- and twenty-first-century English feminism. We will read selections from Woolf's writings in several genres, as well as one important recent example of Wool-centric biofiction.

**ENGL.4280 The Harlem Renaissance - Credits: 3**

This course will introduce students to African-American fiction, drama, poetry, nonfiction, art, music, and film of the Harlem Renaissance. The Harlem Renaissance marks a seminal historical moment in which writers, musicians, and artists of the African Diaspora (particularly African-Americans, West Indians, and Africans) produced a complex body of written and visual text that drew upon the complexities of black life.

**ENGL.4290 Introduction to Literary Theory (Formerly 42.429) - Credits: 3**

A solid introduction to major trends in contemporary critical theory. Emphasis on producing a sample critical paper treating one or more current critical approaches to reading a literary text.

**ENGL.4320 Introduction to Digital Humanities - Credits: 3**

This course is an introduction to the field of digital humanities, which explores interpretive questions about history, culture, and meaning using computational analysis, data visualization, and the critical analysis of technology. We will focus on how computers and digital technologies are used to preserve, analyze, and create works of literature. Students will learn how to use different digital methods and will design and complete a digital project related to their own interests. No programming experience is required.

**ENGL.4790 Literature Seminar (Formerly 42.479) - Credits: 3**

An advanced course that explores a variety of issues and topics in literature, literary history, and related fields. The topic or issue for a specific seminar will be announced in advance.
ENGL.4910 Directed Study in Literature (Formerly 42.491) - Credits: 1-3

The student develops a plan of directed reading, defines a problem for individual research, and prepares a paper or papers.

ENGL.4960 Internship I (Formerly 42.496) - Credits: 3

Internship experience (usually off-campus) gives English majors the opportunity to apply their skills in actual business, technical, educational, or professional situations. Classroom time supports student professionalization and career development. Topics include resumes, cover letters, networking, LinkedIn profiles, portfolios, and professional behavior and expectations.

ENGL.4970 Practicum (Formerly 42.497) - Credits: 1-3

An off-campus professional experience for English Majors, Minors, and BLA English Concentrators. The Practicum is intended to provide students with the opportunity of applying their writing skills in actual business, technical, educational, or professional situations. By permission only.

ENGN.4010 Engineering Capstone Design Project (Formerly 25.401) - Credits: 3

Integrative design experience in engineering. Students work on multi-disciplinary teams and apply their engineering problem-solving skills on open-ended, real-world projects. Projects may be service-oriented in concept and teams may include members from other Departments and Colleges. Emphasis on communication, team-work, report-writing, oral presentations. This course may be used as a substitute for the culminating capstone course in Electrical and Computer Engineering (EECE.4491), Plastics Engineering (PLAS.4160) and Mechanical Engineering (MECH.4230). Prerequisite: senior status & permission of instructor.

ENGN.4020 Engineering Capstone Design Project - Credits: 3

This is the second of a two course capstone sequence. This course provides an integrative design experience in engineering. Students work of multi-disciplinary teams and apply their engineering problem solving skills on open-ended, real-world projects. Projects may include members form other departments and colleges. This course has an emphasis on team work, Communication, report writing, oral presentations, design, analysis, test and fabrication. This course may be used as a substitute for the culminating capstone course in Electrical and Computer Engineering (EECE.4491), Plastics Engineering (PLAS.4160) and Mechanical Engineering (MECH.4230).

ENTR.3000 Principles of Innovation and Entrepreneurship (Formerly ENTR/64.300) - Credits: 3

Course number was formerly 64.300. This course is designed to help non-business students understand the importance of innovation and entrepreneurship in today’s global economy and cultivate an entrepreneurial mindset among students in the Manning School of Business entrepreneurship concentration. It will cover different forms of entrepreneurship such as small businesses, growth ventures, corporate entrepreneurship and social entrepreneurship. The course will focus on the types of innovation, turning innovation into an ongoing new venture and on the entrepreneurial process. Innovation and entrepreneurship theories and concepts will be discussed with real life examples and cases.

ENVI.4930 Internship: Environmental Studies (Formerly 87.493) - Credits: 1-3

Work experience with private or public employer. Written report and supervisor evaluation required. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Written & Oral Communication (WOC).

ENVI.4950 Honors Research: Environmental Studies (Formerly 87.495) - Credits: 3

An individual or team research project carried out by qualified students with the approval of and supervision by a faculty member. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL) and Written & Oral Communication (WOC).

ENVI.4970 Research: Environmental Studies - Credits: 3

An independent scientific research project carried out by a qualified senior under the supervision of a faculty member.

EXER.3050 Exercise Physiology (Formerly 38.305) - Credits: 4

This course will examine the short and long term effects of exercise of the oxygen transport systems, including understanding the concepts of physiological and metabolic functioning of the human body during aerobic physical activity, exercise, sports performance and training. Students
taking this course and its lab co-requisite are advised that the capability to exercise moderately and maximally will be necessary.

**EXER.4060 Foundations of Strength and Conditioning** *(Formerly 38.406)* - Credits: 4

This course is the second of a two-part series in exercise physiology designed to study the physiological effects of exercise on the human body. It will call upon the knowledge gained in Anatomy and Physiology, Biochemistry, Kinesiology, and Exercise Physiology. The course covers a variety of topics including: physiological adaptations to resistance training, resistance training concepts and methods to include periodization and principles of test selection and administration, concepts of flexibility, dynamic warm-ups, plyometrics, speed, agility and speed-endurance development, basic concepts of rehabilitation and reconditioning, exercise prescription and programming for healthy populations, and the effect of performance-enhancing drugs on performance. This course will cover (cont’d).

**FAHS.4130 BLA Capstone** *(Formerly 59.413)* - Credits: 3

Student enrolled in the BLA program complete the BLA Capstone course during their senior year. This course features a semester-long interdisciplinary project, using knowledge gained from the students’ two BLA concentrations, as well as any minors, as applicable. Students enrolled on-campus may choose to complete an original research study, creative art project (i.e., writing, film, music, drawing, etc.), or a problem-focused community action project. Online students choose to do either an original research project or a creative art project. Projects are completed in consultation with the instructor of the BLA Capstone course.

**GEOL.3150 Environmental Geochemistry** *(Formerly 89.315)* - Credits: 3

Application of geochemical principles to environmental problems including air pollution and atmospheric processes, climate change, water chemistry and water-rock interactions, and the transport and dispersal of organic and inorganic pollutants. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Written &Oral Communication (WOC).

**GEOL.4930 Internship: Environmental Geoscience** *(Formerly 89.493)* - Credits: 1-3

Work experience with private or public employer. Written report and supervisor evaluation required. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Written &Oral Communication (WOC).

**GEOL.4950 Honors Research: Geoscience** *(Formerly 89.495)* - Credits: 3

An independent scientific research project carried out by a qualified senior under the supervision of a faculty member. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Written &Oral Communication (WOC).

**GEOL.4970 Research: Geoscience** - Credits: 3

An independent scientific research project carried out by a qualified senior under the supervision of a faculty member.

**HIST.4320 Research Seminar** *(Formerly 43.432)* - Credits: 3

Systematic research in primary and secondary sources culminating in the writing of an original research paper using proper methodological and stylistic techniques. Weekly meetings and written and oral progress reports. Students must be acquainted with word-processing techniques. Required of all History majors. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL), Critical Thinking &Problem Solving (CTPS), and Written &Oral Communication (WOC).

**MATH.4750 Senior Seminar II** *(Formerly 92.475)* - Credits: 3

Undergraduate seminar on advanced mathematical topics. Students are required to develop an understanding of an advanced subject beyond the scope of an existing course or synthesize two or more different areas form their curriculum. Students are required to participate in the seminar, present their results to the Department and write a substantial thesis in their topic area. Essential course elements include library research, original research, and both verbal and written exposition. The first semester is a graduation requirement for majors in mathematics.

**MECH.4230 Capstone Design** *(Formerly 22.423)* - Credits: 3

Students perform independent design work and participate in team efforts to develop conceptual designs from functional requirements. Perform design analysis and synthesis, modeling, fabrication, testing, cost estimating, and documenting the essential elements of the system design. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL), Information Literacy (IL), and Written &Oral
Communication (WOC).

**MKTG.2100 Professional Communications (Formerly MKTG 210/66.210)** - Credits: 3

This course provides students with the theory and practice of successful oral and written communication in business. Emphasis is on the development and improvement of communication skills needed for today's fast-paced organizations. Such skills include written communication in short memos and reports, including the use of conferencing technology to convey information. Additionally, the course focuses on oral communication through presentations and discussions as well as the use of current presentation software.

**MTEC.2260 Technical Communications for Engineering Technology (Formerly 23.226)** - Credits: 3

This course introduces students to presenting ideas, data, and proposals in clear concise formats to maximize understanding and impact. Both written and presentation skills are stressed and familiarity with MS Word, Excel and PowerPoint is preferred but not a prerequisite. The end-product is a complete understanding of the elements which blend together to create effective communication in a technical environment.

**MUHI.2620 Music History 2 (Formerly 74.262)** - Credits: 3

Analyzes musical forms and styles from 1750 to present.

**NURS.4130 Role Transition (Formerly 33.413)** - Credits: 4

This capstone course focuses on the transition to the professional nursing role. Content includes professional issues, trends, and leadership and management principles which impact on nursing practice. Students analyze nursing practice in relation to the standards of professional performance. Meets Core Curriculum Essential Learning Outcome for Written &Oral Communication (WOC).

**NURS.4200 Leadership in Nursing (Formerly 33.420)** - Credits: 3

This course focuses on leadership roles, responsibilities, and opportunities for the professional nurse. Course content includes professional issues, trends, and leadership and managerial principles pertinent to healthcare and nursing practice. Students explore professional perspectives, norms, and ethical standards essential in values-driven management and leadership.

**NUTR.4960 Senior Research in Nutrition (Formerly 36.496)** - Credits: 3

Continuation of 36.494. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL), Information Literacy (IL), and Written &Oral Communication (WOC).

**PCST.4530 Integrative Seminar in Peace and Conflict Studies (Formerly PCS 453/553)** - Credits: 3

The purpose of the integrative seminar is to assist students in developing a robust and mature understanding of the three PCS core questions as they relate to PCS coursework. With a strong evidence focus, students identify patterns, principles, questions, and dilemmas relevant to the core questions emerge from multiple courses they have taken within the PCS program. Students develop a reflective journal, a series of essays, a portfolio of their accumulated work, and a culminating portfolio presentation. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Written &Oral Communication (WOC).

**PCST.5530 Integrative Seminar in Peace and Conflict Studies (Formerly PCS 453/553)** - Credits: 3

The purpose of the integrative seminar is to assist students in developing a robust and mature understanding of the three PCS core questions as they relate to PCS coursework. With a strong evidence focus, students identify patterns, principles, questions, and dilemmas relevant to the core questions emerge from multiple courses they have taken within the PCS program. Students develop a reflective journal, a series of essays, a portfolio of their accumulated work, and a culminating portfolio presentation. Meets Core Curriculum Essential Learning Outcome for Applied &Integrative Learning (AIL) and Written &Oral Communication (WOC).

**PHIL.4951 Senior Capstone** - Credits: 3

This course is designed to provide philosophy majors with a capstone project involving integration of their coursework in philosophy in the form of an independent research project under the supervision of a faculty member. The capstone will be taken during the senior year (students in the Communications program may take the Practicum instead of the Capstone). The class is designed to meet the Essential Learning Outcomes of Written and Oral Communication, Applied and Integrative Learning, and Information Literacy.

**PHIL.4960 Practicum (Formerly 45.496)** - Credits: 3

The practicum is a 3-credit internship at a professional site relevant to the student’s course of study. Students are required to write a term paper at the end of their internship.
PHRM.3200 Molecular Pharmacology - Credits: 3
This course is designed to give students an understanding of the molecular basis of drug action. Upon completion of this course, students will be able to describe receptor-ligand interactions, signal transduction pathways, the different classes of target biomolecules for drugs and how genetic variability influences drug action.

PHYS.4530L Health Physics Capstone (Formerly 95.453) - Credits: 3
This course will provide the B.S. candidate in Physics (Radiological Health Physics option) with an undergraduate capstone experience through basic independent research, including critical thinking, problem solving, report writing, and presentation skills.

PHYS.4540 Physics Capstone (Formerly 95.454) - Credits: 3
This course will provide the graduating physics major with a capstone experience through an exposure to the rudiments of independent research; incorporating critical thinking, problem solving, report-writing, and presentation skills learnt in the course of the undergraduate curriculum. Prerequisite: Senior Status.

PLAS.4040 Process Control (Formerly 26.404) - Credits: 3
Basic principles of control systems used with plastics processing equipment. Included are instrumentation, signal conditioning, data acquisition, feedback control, process monitoring, data reduction, and SPC/SQC. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Written & Oral Communication (WOC).

PLAS.4150 Capstone Project I (Formerly 26.415) - Credits: 1
First half of a two-semester capstone experience. Students, working in teams under the supervision of faculty members, select a project related to the field of plastics engineering, prepare a project charter considering constraints and mitigations, conduct experimental research, and propose potential project solutions.

POLI.3700 Latin American Politics (Formerly 46.370) - Credits: 3
The context, background and forces shaping the contemporary politics of the Latin American region.

POLI.3980 The War on Drugs (Formerly 46.398) - Credits: 3
The war against drugs stands as both a major foreign policy priority for the US and the International community in general, and as a constant source of debate and contention. The aim of this course is to provide students with analytical tools, concepts, and information, which will enable them to critically evaluate the war on drugs beyond the common myths and misconceptions that often surround this highly controversial topic. By analyzing a wide range of countries around the world, students would gain an in depth and nuanced perspective of the relation between drug trade, violence, corruption, development, and democracy. Students will also gauge arguments and possible impacts on different drug policy options.

POLI.4020 Women in Islam (Formerly 46.402) - Credits: 3
Focusing upon one of the most important topics in Islam, this course will go beyond conventional stereotypes and explore woman’s many and varied roles within Islamic cultures and societies.

POLI.4060 The Politics of Identity in the Middle East (Formerly 46.406) - Credits: 3
The course will examine the ethnic, political, religious and social changes in the modern Middle East. The course will start with an introduction to the diverse identities all over the Middle East and then it will comparatively examine a number of those identities.

POLI.4110 Dynamics Power and Authority (Formerly 46.411/57.511) - Credits: 3
This course surveys theories of power, authority, participation, and politics. Building on these theories, students will examine changing social, political, and economic patterns of inequality based on class, race (and related divisions of ethnicity, religion, caste, nationality), and gender. Reviews various approaches to altering these dynamics (business strategy, public policy, community and social movements). Cuts across units of firm, community, region, and nation, along with corresponding governmental institutions, and links theoretical analysis with study of practical problem solving. Instructor-initiated cases drawn from a variety of national experiences. Students will learn techniques of power analysis and prepare a power analysis project.

POLI.4220 SMR: Political communication and Media Studies (Formerly 46.422) - Credits: 3
Advanced study in contemporary issues in Political Communication and Media Studies.

POLI.4390 Justice and Trade in the Global Economy (Formerly 46.439) - Credits: 3
We know that we are part of a global economy and that many of the things we buy and consume are produced in other countries. But what do we know of how they are made? Do we understand that there may be hidden costs in the price we pay for goods at the supermarket, in a department store? Understanding the nature of global trade is critical for us to be effective citizens in the world. Perhaps more important is that we understand how goods are produced and traded - what many think of as “fair” trade. The subject of Fair Trade isn’t simply limited to the production and sale of coffee and chocolate. Fair Trade principles encompass environmental issues, human rights, and politics. Once aware of the ramifications of consumerism on all parts of the world, including the United States, people can make informed choices about the products they buy, the companies that employ them, and the political views they support. By the end of this course students should understand the major ideas and tools used to comprehend complex international and global trade relations. Students will understand the way in which goods are produced for global markets and the possible human and environmental costs such production entails.

POLI.4400 Comparative National Security - Credits: 3
The central goals of this course are two fold. The first is to explore the national security concerns and perspectives for the major countries and regions of the world. The second is to understand the connection between alternative constructions of national security and the security policies of nation-states. This is a heavily analytical course; critical thinking is required equipment. Students are expected to take the concepts and theories discussed in class and use them to analyze issues confronting societies and the policy responses mounted by political leaders.

POLI.4450 Politics of Repression and Dissent (Formerly 46.445) - Credits: 3
A focus on the dark side of politics - political repression, including politically motivated imprisonment, torture, murder, and disappearance- and the struggle of critics to bring about change through non-violent and violent demonstrations, general strikes and armed resistance.

POLI.4460 The Politics of Discord between the Arab East and The West (Formerly 46.446) - Credits: 3
The course examines the roots of political discord in the Arab East starting with colonialism and progressing to the contemporary state of dissension. Throughout the course the stress on the effect of this discord on comparative domestic politics and international relations in the region will be examined.

POLI.4470 Theories of Political and Criminal Violence (Formerly 46.447) - Credits: 3
The study of violence has been a central piece of debates in comparative politics that range from the causes of revolution to the analysis of civil wars. This course aims to provide a broad overview of different bodies of research on violence. The class will also revisit crucial debates in the study of violence, such as the problems of separating criminal and political violence (such as interstate wars). By the end of the class, students will be able to identify major theoretical and methodological approaches to violence, major debates and concepts, as well as key cases across the world.

POLI.5110 Dynamics Power and Authority (Formerly 46.411/57.511) - Credits: 3
This course surveys theories of power, authority, participation, and politics. Building on these theories, students will examine changing social, political, and economic patterns of inequality based on class, race (and related divisions of ethnicity, religion, caste, nationality), and gender. Reviews various approaches to altering these dynamics (business strategy, public policy, community and social movements). Cuts across units of firm, community, region, and nation, along with corresponding governmental institutions, and links theoretical analysis with study of practical problem solving. Instructor-initiated cases drawn from a variety of national experiences. Students will learn techniques of power analysis and prepare a power analysis project.

PSYC.4710 Seminar in Community Psychology - Credits: 3
An advanced seminar to consider special topics in community psychology with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as racism, diversity, empowerment, and social change in the context of social and community life. This is a writing intensive course.

PSYC.4711 Seminar in Community Psychology: Racism - Credits: 3
An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways,
and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is racism. In this course we will investigate roots of racism, kinds of racism, reasons for perpetuation of racism, possible solutions to ending racism. Many believer that racism is a thing of the past. Yet, research shows that many of us are unconsciously racist and hurt communities of color without any malicious intent. We will explore our own posting in terms of racism. This is a writing-intensive course.

**PSYC.4712 Seminar in Community Psychology: Immigration - Credits: 3**

An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is immigration, a very important issue in the United States and around the world. In this seminar we will study the complex process of migration from a community social psychological point of view. Motivations, expectations, acculturation, immigrant status, deportations, policy and more will be covered. This is a writing-intensive course.

**PSYC.4713 Seminar in Community Psychology: Prevent Youth Violence - Credits: 3**

An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is youth violence, which continues to be a major public health concern in the United States. Preventing youth violence is an important component of creating peaceful and safe neighborhoods and just communities. In this course, we will use ecological and multicultural perspectives to understand different types of youth violence, the contexts in which they occur, and intervention strategies to address the violence. This is a writing-intensive course.

**PSYC.4714 Seminar in Community Psychology: Bridging Differences - Credits: 3**

An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course explores dilemmas that can emerge when working to bridge diverse groups in community-based work. The seminar will be organized around narratives that address multiple dimensions of diversity including race, ethnicity, gender, class, sexual orientation, disability, and religion. Too often, guidelines for addressing very complex diversity dynamics are presented as neatly packaged lists of recommendations. However, it is within the stories of the challenges and dilemmas that the complexity of the political, historical, social, and psychological dynamics of diversity are most evident. Students will explore examples of everyday diversity challenges and utilize psychological theories to better understand how the challenges can be shaped by struggles over limited resources, deep historical conflicts between groups, privilege dynamics, ingroup dynamics, organizational cultural norms, and/or other issues. This is a writing-intensive course.

**PSYC.4730 Seminar in Social Psychology (Formerly 47.473) - Credits: 3**

An advanced seminar to consider special topics in social psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as social aspects of health and illness; inequalities in education; the impact of globalization; attitude formation and prejudice; and psychology of sex roles. This is a writing intensive course.

**PSYC.4731 Seminar in Social Psychology: Social (In)justice - Credits: 3**

An advances seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is social injustice, its causes, manifestations, explanations, and social psychological theories that help us understand them. We will explore how and why social injustice prevails in today’s world full of resources; why small number of people own majority of world’s wealth; why some countries are poorer than others. We will study our own standpoints and where they come from and we will work on possible remedies that could lead to a more just world.

**PSYC.4732 Seminar in Social Psychology: Achievement Motivation - Credits: 3**

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course will cover psychological theory and research on the various factors that explain people’s motivation to achieve and their performance in different domains. These factors include emotions, needs, personality, efficiency, group membership, identity, goal type, and context. Course goals include honing students’ ability to understand,
critique, write about, and discuss theoretical and empirical papers within psychology. Students will also develop their skills in generating testable hypotheses. This is a writing-intensive course.

**PSYC.4733 Seminar in Social Psychology: the Mind-Body Perspective in Communication - Credits: 3**

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on the role communication processes (including Intra-Personal, interpersonal, and Mediated-Communication) play in a variety of health related contexts, effects, and processes. Included will be: Self-regulation theories; placebo and nocebo effects; unconscious processes; biofeedback effects and mechanisms; hypnosis; imagery; pain management; emotion regulation; well-being; and the ability to consciously influence autonomic processes such as the immune and endocrine systems. This is a writing-intensive course.

**PSYC.4734 Seminar in Social Psychology: Health Campaigns - Credits: 3**

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will review the state of the science and art of effective medial health campaigns in light of how they are developed, delivered, and evaluated. Seminar participants will discuss and critically analyze campaigns relative to their effects on health-related awareness, knowledge, attitudes, and behaviors. This is a writing-intensive course.

**PSYC.4735 Seminar in Social Psychology: Workplace Diversity - Credits: 3**

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Over the course of our lives, many of us will be working in organizations that include diverse workers, and thus it is important to understand the issues that shape interpersonal and system dynamics within such settings. In this seminar, we review theories and research relevant to how race, ethnicity, class, gender, sexual orientation, and disability dynamics affect workplace systems. Classes will be highly interactive and discussion-oriented as students learn about the challenges diverse organizations face in fostering positive working relationships and about strategies adopted to enhance the effectiveness of the diverse workplace. This is a writing-intensive course.

**PSYC.4736 Seminar in Social Psychology: Psychology of Sustainability - Credits: 3**

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. In this course we will explore unequal distribution of resources and power and the culture of consumerism in all parts of the world, including the United States. Once people are aware can make informed choices about what and why and how much they buy, about the companies that produce and sell the products and the political views they support. This is a writing-intensive course.

**PSYC.4740 Seminar in Developmental Psychology (Formerly 47.474) - Credits: 3**

An advanced seminar to consider special topics in developmental psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as psychology of the family and parent-child relations; infant development; adjustment during adulthood; and death and dying. This is a writing intensive course.

**PSYC.4741 Seminar in Developmental Psychology: Adolescent Identity - Credits: 3**

An advanced seminar to consider special topics in developmental psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will explore the phenomenon of adolescent identity development, beginning with Erik Erikson’s seminal work on the subject and continuing through contemporary treatments. We will examine development of identity from extended consciousness, a sense of autobiographical self (1-2 years), to a theory of mind (4-5 years), conception of a personal fable (10-14 years), and the emergence of full life stories (17-25 years). Specific issues of focus will include ethnic, social class, and gender role identity development, identity crises and resolutions, and representations of relationships with family, friends, school, and work. Students will write and analyze their own life stories, as well as lead discussions, and prepare a research paper. This is a writing-intensive course.

**PSYC.4742 Seminar in Developmental Psychology: Psychology of Education - Credits: 3**
An advanced seminar to consider special topics in developmental psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar takes an intensive look at the psychology of education and of learning. We will read about theories of education, research on learning, and study some historical and current trends in both formal education (school) and informal learning environments (hobby subcultures, museums, camps, etc). Readings will include both historical examples (John Dewey, Jane Addams, Paolo Freire) and schooling systems, and policymakers in higher education. In addition to reading, class discussion, and engaging hands on exercises, students will plan and deliver a term-length creative project on the psychology of learning and education. This is a writing-intensive course.

**PSYC.4743 Seminar in Developmental Psychology: Trauma in Child Development - Credits: 3**

An advanced seminar to consider special topics in developmental psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Trauma is a relatively common experience of childhood. Far too many children and youth in the US are witnesses to domestic violence and victims of abuse, neglect, and other violent crimes. Worldwide, millions of children have been disabled, injured, orphaned, or recruited as child soldiers in armed conflicts. When natural disasters strike, children are often among those affected most severely. How do these experiences influence subsequent growth and development? This seminar examines the role of trauma in child development form an ecological perspective with a focus on neurophysiological, affective, and relational systems. This is a writing-intensive course.

**PSYC.4750 Seminar in Clinical Psychology (Formerly 47.475) - Credits: 3**

An advanced seminar to consider special topics in clinical psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as health psychology and behavioral medicine; the nature and causes of or interventions for specific psychological disorders (e.g., autism spectrum disorder, schizophrenia); the community mental health movement; clinical methods of assessment. This is a writing-intensive course.

**PSYC.4751 Seminar in Clinical Psychology: Women’s Health - Credits: 3**

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Physical health and illness do not occur in a vacuum. Rather, they are embedded in a complex and dynamic system. This biological (e.g., disease process), psychological (e.g., mental health status) and social (e.g., culture) factors. Topics will include reproductive health, cardiovascular illness, substance use, and eating behaviors. Sexual orientation, race, socioeconomic status and other issues of diversity will be integrated throughout the semester. Students will learn from reading and discussing scholarly articles and book chapters, critically watching relevant videos, and writing individual literature review papers. This is a writing-intensive course.

**PSYC.4752 Seminar in Clinical Psychology: Autism - Credits: 3**

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Autism spectrum disorder (ASD) is a complex neurological disorder that typically appears before the age of three and immediately and profoundly affects a young child’s ability to communicate, develop language, form social relationships and respond appropriately to environmental cues. Over the last 15-20 years, autism has received an increasing level of attention in both scientific arenas and the popular press. Most recent estimates are that about 1 in 50 children are affected. This seminar will examine issues in the etiology, characteristics and treatment of autism and related developmental disabilities. The seminar will also explore some of the more prominent theories and controversies surrounding these disorders. Much of the seminar will be focused on a behavioral approach to understanding and treating children with autism and significant intellectual challenges. This is a writing-intensive course.

**PSYC.4753 Seminar in Clinical Psychology & Behavioral Medicine - Credits: 3**

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course examines physical health and illness by integrating information about biological processes, psychological characteristics, and social contexts. We will discuss the following topics throughout the course: the roles of personality, emotion, mental health, and human development in physical well-being; the relationship between health psychology and other disciplines such as nursing, anthropology and genetics; the significance of prevention and
public policy in physical health; and the ways in which health psychology is important in a variety of health problems, such as heart disease, cancer, and obesity. This is a writing-intensive course.

PSYC.4754 Seminar in Clinical Psychology: Language Assessment and Intervention in Autism - Credits: 3

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course is designed to provide students with a working knowledge of behavioral language assessments and empirically validated interventions to improve language and communication for young children with autism and related disabilities. Successful completion of the course will help prepare students for a position as a behavior technician. Students will participate in class discussions, presentations, and application activities throughout the semester. This is a writing-intensive course.

PSYC.4755 Seminar in Clinical Psychology: Autism in Adolescents & Young Adults - Credits: 3

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on adolescents and young adults on the "high-functioning" end of the autism spectrum. Students will learn the behavioral and psychological characteristics associated with this population, diagnostic procedures, etiology, consider various interventions for this population, and discuss current controversies in the field. We will also consider the impact of autism spectrum disorders (ASD) on individual and their families. This is a writing-intensive course.

PSYC.4756 Seminar in Clinical Psychology: Sexual Offending - Credits: 3

An advanced seminar to consider special topics in clinical psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The purpose of this course is to examine current psychological theory and research relating to the causes and consequences of sexual aggression. It is designed to acquaint you with some of the key issues, questions, and findings in this field, as well as to allow you to develop some of the critical skills needed by research psychologists. The course is organized topically. We begin by reading and thinking about the social construction of masculinity and femininity (especially through representations in the media) and how these constructions might contribute to sexual aggression. The bulk of the course is devoted to an examination of psychological processes related to victimization and perpetration. The course concludes with a discussion of several special topics and an examination of rape prevention and education. Special topics may include a focus on juvenile and female offenders, specific risk factors for perpetration, campus sexual assault, pedophilia, child maltreatment, pornography, recidivism rates, offender laws, and victim testimonies. This is a writing-intensive course.

PSYC.4770 Seminar in Contemporary Trends (Formerly 47.477) - Credits: 3

An advanced seminar to consider current trends in psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as contemporary models of addictive behavior; the interaction of psychology and law; existential psychology; psychology of technological change. This is a writing intensive course.

PSYC.4771 Seminar in Contemporary Trends: Addictions - Credits: 3

An advanced seminar to consider special current topics in psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The focus of this seminar is on the psychology of addictions. Drawing upon current theory and research, we will look at the nature and causes of the problem behaviors associated with alcohol and drug use. We will also consider whether problems in such areas as shopping, eating, gambling, sex, video games, and the Internet can be understood as forms of addictions. In addition, we will examine the implications of whether or not such addictions should be viewed as diseases, and we will evaluate the relative importance of biological, psychological and socio-cultural factors. This is a writing-intensive course.

PSYC.4772 Seminar in Contemporary Trends: Psychology & Law - Credits: 3

An advanced seminar to consider special current topics in psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This course is an introduction to many topics representing major fields of study within psychology and law. Topics may include: eyewitness testimony, lie detection, jury selection, child protection, forensic interviews, and the death penalty. In this course, students will learn about the diversity of interests among legal findings. The
main goal is to provide students with an understanding of relevant theory, empirical findings, and research methodology. Guest speakers will enhance learning. This is a writing-intensive course.

**PSYC.4773 Seminar in Contemporary Trends:**
**Generational Identities and Relations - Credits: 3**

An advanced seminar to consider special current topics in psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on generational identities and intergenerational relations.

Generation is an important dimension of human experience in modern societies and a key aspect of self-identity, but it is also linked to tensions and misunderstandings between people of different ages. Specific topics to be addressed include: cultural and historical differences in ideas about generation and cohort; the development of generational identities: generation, mass marketing, and consumerism; the politics of generation and intergenerational tensions; bilateral socialization and positive intergenerational exchange; similarities and differences between Baby Boomers, Gen-X’ers, and Millennials; ageism and age segregation, and; generativity and the future of our planet. This is a writing-intensive course.

**PSYC.4774 Seminar in Contemporary Trends:**
**Psychology of Globalization - Credits: 3**

An advanced seminar to consider special current topics in psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar will focus on the social and psychological effects of globalization. Specifically, we will address how processes of globalization impact psychological functioning and development (including in the areas of identity, personality, mental health, and aging), social relations, and organizational and community dynamics. We will also explore the implications of global economic and environmental change for human rights and social and economic justice. This is a writing-intensive course.

**PSYC.4780 Seminar in Cognitive Psychology**  
(Formerly 47.478) - Credits: 3

An advanced seminar to consider special topics in cognitive psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as attention and memory; mental imagery; decision-making; language; applications of cognitive psychology to education. This is a writing intensive course.

**PSYC.4781 Seminar in Cognitive Psychology:**
**Educational Applications - Credits: 3**

An advanced seminar to consider special topics in cognitive psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. This seminar is designed to give you an in-depth look into the impact of cognitive psychology on education. We will look at basic processes, including those of attention, memory, and motivation, starting first from basic theoretical principles. We will then read papers that have taken these theoretical principles as a starting point and applied them to real-life issues in education, such as exam performance and students’ self-evaluations of their own performance. This is a writing-intensive course.

**PSYC.4790 Seminar in Behavioral Psychology - Credits: 3**

An advanced seminar to consider special topics in behavioral psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as conceptual issues in behavioral psychology; applied behavior analysis; and the applications of behavioral psychology to education, language, symbolic behavior, and attention. This is a writing intensive course.

**PUBH.3020 Health Communication (Formerly 31.302) - Credits: 3**

This course explores the uses of a variety of established and emerging health communications strategies, techniques, and modalities. Students will consider the ethical considerations pertinent to the use of assorted health communications approaches in health promotion. The course discusses the concepts of health literacy and eHealth literacy. Awareness and sensitivity toward cultural, ethnic, and religious diversity will be particularly emphasized when discussing various communication techniques in relation to particular health issues. Meets Core Curriculum Essential Learning Outcome for Written and Oral Communication (WOC).

**PUBH.3710 Chemicals and Health (Formerly 31.371) - Credits: 3**

Provides a broad overview of how the design, manufacture, use and disposal of chemicals and chemical products affect health and ecosystems. Provides an in-depth overview of how chemicals are monitored in the environment (including biomonitoring), how their risks are characterized, and the prevention of chemical risks through safer chemical design.
Meets Core Curriculum Essential Learning Outcome for Written & Oral Communication (WOC).

PUBH.4050 Communication Techniques in Health Promotion (Formerly 31.405) - Credits: 3

This course focuses upon the communication techniques and mass media approaches necessary to promote and implement effective health promotion programs and activities. Awareness and sensitivity toward cultural, ethnic, and religious diversity will be particularly emphasized when discussing various communication techniques in relation to particular health issues. Meets Core Curriculum Essential Learning Outcome for Written & Oral Communication (WOC).

SOCI.2010 Foundations of Social Analysis (Formerly 48.201) - Credits: 3

This intermediate-level class deepens students' analytical skills beyond intro level preparing for more abstract work in Theory and Methods courses. It also prepares students for more complex integration of theory, methods and issue content in 300 level courses. This course will attend to developing students' ability to recognize, and write social science research papers.

WLFR.3000 Quebec Literature and Culture - Credits: 3

This course explores the culture and literature of French-speaking Quebec. Through essays, literary readings, songs, works of art, and film, students will follow the development of this province of Canada from its origins as a French colony through the exodus of French-Canadians in the early twentieth century and the Revolution Tranquille of the 1960’s, up to the present day. Conducted entirely in French.

WLFR.3020 Survey of Francophone Literature (Formerly 50.302) - Credits: 3

A survey of contemporary Francophone Literature of African, European, and North American French speaking countries since 1960 until today.

WLFR.3030 Special Topics: in Francophone Studies (Formerly 50.303) - Credits: 3

An in-depth study of a specific topic in literature, culture, civilization or cinema from the French-speaking world. Class discussions, readings, oral and written work all in French. May be repeated once for credit, if content changes, and with written consent of the Instructor.

WLFR.3100 French Speaking World (Formerly 50.310) - Credits: 3

Designed for prospective majors and minors in French as well as for those who have completed four years of high school or two years of college French. The course examines similarities and differences in the ethos of nations of the French-speaking world and in the life-styles of the individuals and groups that make them up. Conducted in French.

WLFR.3150 Francophone Communities in North America (Formerly 50.315) - Credits: 3

This course introduces the concept of "Francophonie" and describes the origins of the main francophone communities left in North America: Quebec, Acadia and New-Fundland in Canada, and Louisiana and New England (including Lowell) in the U.S. The primary focus of this class is Culture, history and language (different varieties of French spoken by those communities). Class conducted in French.

WLFR.3200 Contemporary French Civilization and Culture (Formerly 50.320) - Credits: 3

In this course we look closely at some fundamental issues reflecting the rapidly changing parameters of French culture and society today; the question of national identity and cultural hybridite, the relationship between the evolving types of family relations and new forms of social and political contracts; the crucial personal problems faced by the young, the poor, the immigrant and the elderly in an increasingly multicultural Hexagone attempting to define its place, role and function within the recently defined Europe unit and the new global world order; the current status of women; the relationship between cities and ghettos, violence and crime; the nature of emerging forms of cultural production within new trends and styles of modernite.

WLFR.3400 Contemporary French Cinema (Formerly 50.340) - Credits: 3

Provides a critical appreciation of contemporary French cinema (1985-today) aiming at sorting out its eclecticism and focusing on the following aspects: 1) French cultural exception in the European Union: cultural integration and national identity; 2)
Representation of the ongoing social and moral changes in contemporary France; 3) The new generation of French filmmakers. Class taught in French.

WLFR.3800 Francophone Identity through Cinema  
(Formerly 50.380) - Credits: 3

Provides a critical appreciation of the notion of Francophone identity through modern and contemporary (1970-today) Francophone cinema from diverse places such as but not limited to North Africa, West Africa (especially Senegal), Canada (especially Quebec) the Caribbean, Belgium, and Switzerland. The course is aiming at showing the evolution of the Francophone identity in the postcolonial period until now and is focusing on the following aspects: 1) The emergence and importance of postcolonial Francophone cinema in the 1970s as a "cinema engage" (especially Sembene Ousmane in Senegal); 2) Contemporary issues of the postcolonial Francophone societies through films; 3) Representations of the cultural diversity in Francophone films; 4) Identity, race and immigration, women’s status issues.

WLSP.3500 Introduction to Literary Analysis  
(Formerly 54.350) - Credits: 3

In this course, students examine the various definitions and functions of literary language, and the formal aspects of diverse genre: narrative, poetry and essay. In this course, students also study the concept of literature as aesthetic phenomenon and its socio-cultural implications, through concepts such as author, reader, narrator and discourse, Major authors, themes, and genres from both Latin America and Spain are included, with basic concepts of contemporary literary criticism and theory. Taught in Spanish.
Aerospace Studies Minor

The Aerospace Studies minor allows students with a passion for aeronautics and/or space sciences to gain a deeper understanding and education in these fields. This minor is open for undergraduate degree programs and is particularly well suited to technical majors such as Mechanical Engineering and Physics.

The minor in Aerospace Studies consists of 24 credits.

**Required Courses (15 credits)**

- ENGN.2180
  (https://www.uml.edu/catalog/courses/ENGN/2180)
  Introduction to Aerospace
- ENGN.2180L
  (https://www.uml.edu/catalog/courses/ENGN/2180L)
  Introduction to Aerospace Lab
- MATH.2340
  (https://www.uml.edu/catalog/courses/MATH/2340)
  Differential Equations
- MECH.5315
  (https://www.uml.edu/catalog/courses/MECH/5315) /
  MECH.5540
  (https://www.uml.edu/catalog/courses/MECH/5540)
  Modern Control Systems / Dynamic Systems and Controls
- PHYS.1410
  (https://www.uml.edu/catalog/courses/PHYS/1410)
  Physics I
- PHYS.4170
  (https://www.uml.edu/catalog/courses/PHYS/4170) /
  MECH.4991
  (https://www.uml.edu/catalog/courses/MECH/4991)
  Space Science Mission Design / Directed Studies in Mechanical Engineering (AIAA DBF, Drones, UAVs or Rocketry)

**Electives (9 credits)**

Students must successfully complete three of the following elective courses in consultation with their minor advisor:

- ATMO.4840
  (https://www.uml.edu/catalog/courses/ATMO/4840)
  Space Weather
- EECE.4310
  (https://www.uml.edu/catalog/courses/EECE/4310)
  RF Design
- EECE.5710
  (https://www.uml.edu/catalog/courses/EECE/5710)
  Radar Systems
- ENGN.2060
  (https://www.uml.edu/catalog/courses/ENGN/2060)
  Strengths of Materials3
- MECH.4230
  (https://www.uml.edu/catalog/courses/MECH/4230)
  Capstone Design AIAA-DBF CapstoneCubeSat
  CapstoneAerospace Related Capstone
- MECH.4830
  (https://www.uml.edu/catalog/courses/MECH/4830)
  Aerodynamics and Flight Mechanics
- MECH.5120
  (https://www.uml.edu/catalog/courses/MECH/5120)
  Applied Finite Element Analysis
- MECH.5140
  (https://www.uml.edu/catalog/courses/MECH/5140)
  Finite Element Analysis of Composites
- MECH.5300
  (https://www.uml.edu/catalog/courses/MECH/5300)
  Autonomous Robotic Systems
- MECH.5340
  (https://www.uml.edu/catalog/courses/MECH/5340)
  Green Combustion & Biofuels
- MECH.5450
  (https://www.uml.edu/catalog/courses/MECH/5450)
  Adv. Industrial Heat and Mass Transfer
- MECH.5580
  (https://www.uml.edu/catalog/courses/MECH/5580)
  Aero/Wind Engineering
- MECH.5620
  (https://www.uml.edu/catalog/courses/MECH/5620)
Solid Mechanics I

- **MECH.5760** (https://www.uml.edu/catalog/courses/MECH/5760)
  Engineering Project Management

- **MECH.5810** (https://www.uml.edu/catalog/courses/MECH/5810)
  Advanced Fluid Mechanics

- **MECH.5830** (https://www.uml.edu/catalog/courses/MECH/5830)
  Advanced Aerodynamics

- **MECH.5960** (https://www.uml.edu/catalog/courses/MECH/5960)
  Mechanics of Composite Materials

- **MECH.5970** (https://www.uml.edu/catalog/courses/MECH/5970)
  Processing of Composite Materials

- **MECH.5980** (https://www.uml.edu/catalog/courses/MECH/5980)
  Experimental Characterization of Composite Materials

- **PHYS.3370** (https://www.uml.edu/catalog/courses/PHYS/3370)
  Geometric Optics

- **PHYS.3380** (https://www.uml.edu/catalog/courses/PHYS/3380)
  Optics and Waves

- **PHYS.4400** (https://www.uml.edu/catalog/courses/PHYS/4400)
  Image Processing

- **PLAS.5730** (https://www.uml.edu/catalog/courses/PLAS/5730)
  Business Law for Engineers

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1. Sophomore level course, Freshmen may request instructor permission.

2. Students may only apply one of these courses to their Aerospace Studies minor and only if approved by their minor advisor.

3. This course may only be applied towards the minor by students for whom it is not required as part of their major.

**Note:** Additional courses may be added by each college to their list of elective courses.

For more information, contact David Willis (https://www.uml.edu/Engineering/makerspace/administration/willis-david.aspx), program coordinator.
AERO.0001 AF ROTC Leadership Lab (Formerly 29.001) - Credits: 0

LLAB is a dynamic grouping of developmental activities that provide the experiential component of the AFROTC academic curriculum. LLAB offers first-year cadets an informative and motivational program designed to recruit, retain, and familiarize cadets with the Air Force way of life and foster leadership, followership, teamwork, and esprit de corps. Second-year cadets receive the skill sets and confidence required to succeed at their summer field training. Third- and fourth-year cadets develop and demonstrate the leadership management skills needed to successfully function as active duty officers by leading the planning, organizing, and execution of the 35 distinct LLAB lesson objectives. NOTE: LLAB also incorporates a mandatory physical fitness training regimen.

AERO.1010 Heritage and Values of the U.S. Air Force Part I (Formerly 29.101) - Credits: 1

A survey course designed to introduce students to the United States Air Force and provides an overview of the basic characteristics, missions, and organization of the Air Force. In addition, students are introduced to leadership, team building, and ethical decision making principles. Finally, students enter into a comprehensive communications program whereby presentation and writing skills are developed and honed.

AERO.1020 Heritage and Values of the U.S. Air Force Part II (Formerly 29.102) - Credits: 1

A survey course designed to introduce students to the United States Air Force and provides an overview of the basic characteristics, missions, and organization of the Air Force. Part II focuses on the evolution of airpower and the principles of war and tenets of airpower through computer simulation. Students ultimately learn Air Force capabilities and contributions throughout the spectrum of conflict, from humanitarian aid and disaster response to major combat operations.

AERO.2010 Team and Leadership Fundamentals Part I (Formerly 29.201) - Credits: 1

This survey course focuses on laying the foundation students require to improve their leadership on a personal level and within a team. Students complete personality profile inventories to understand how the various personality types influence leadership and mission accomplishment. The full Range Leadership Model is presented and augmented with topics on effective listening, followership, problem solving, and more.

AERO.2020 Team and Leadership Fundamentals Part II (Formerly 29.202) - Credits: 1

This survey course focuses on laying the foundation students require to improve their leadership on a personal level and within a team. In Part II, students build upon their knowledge of how teams are formed, utilizing case studies to understand the various stages of team growth. Lessons in human relations, conflict management, resiliency, and ethical moral leadership prepare students for the course's leadership capstone.

AERO.3010 Leading People and Effective Communication Part I (Formerly 29.301) - Credits: 0-3

This course teaches student advanced skills and knowledge in management and leadership. Special emphasis is placed on understanding how biases, experiences, and perspectives can impact a leader's decision-making and leadership effectiveness. Through case studies and simulations, students gain knowledge of the 12 cultural domains and develop cross-cultural skills to enhance one's ability to relate, communicate, negotiate, and influence. Additional topics include change management, effective supervision, and leading and thriving with diversity.

AERO.3020 Leading People and Effective Communication Part II (Formerly 29.302) - Credits: 3

This course teaches students advanced skills and knowledge in management and leadership. Part II continues to hone students' cross-cultural competencies by enhancing self-awareness (to include biases) and enhanced negotiation strategies. Additionally, students learn the benefits and approaches towards personnel feedback, mentoring, and evaluations. Finally, students discuss several topics crucial in establishing positive organizational climates and the importance of vision in mission accomplishment.

AERO.4010 National Security Affairs/Active Duty Prep Part I (Formerly 29.401) - Credits: 3

This survey course ensures students understand the role of military officers in American society and provides an overview of the complex social and political issues facing the military profession. Students gain an understanding of air, space, nuclear, and cyber operations, Total Force contributions, and the force packaging required to serve the Joint Force and Combatant Commanders. Learning objectives on National Security Strategy, resulting defense policies, and military strategies underscore our nation’s civilian control of the military and need for integrated diplomatic, information, military, and economic approaches in serving U.S. interests.
AERO.4020 National Security Affairs/Active Duty
Prep Part II (Formerly 29.402) - Credits: 3

This survey course ensures students understand the role of military officers in American society and provides an overview of the complex social and political issues facing the military profession. In Part II, students learn the responsibility, authority, and functions of military officers and commanders. Students learn the necessity of the military justice system as well as ethical decision making via lecture, guest speakers, and case studies. Finally, students receive preparation to groom and evaluate personnel via the officer, enlisted, and civilian appraisal systems.
AEST.2210 20th Century Art (Formerly 79.221) - Credits: 3
A study of American and European movements in painting, sculpture, and architecture from 1900 to the present. Emphasis is placed on Fauvism, Cubism, Expressionism, Surrealism, International Style, Pop, Op Art, Minimal Art, Photorealism, and Post-Modernism.

AEST.2250 History of Photography (Formerly 79.225) - Credits: 3
Less than 200 years old, photography seems to span millennia. With 1839 as the invention’s launch date, there is no photograph of George Washington, but very soon we are flooded with the faces of composers, painters, and presidents: we know and are reminded of the ravages of civil and world wars, industrial progress and social injustice, or the beauty of pristine landscapes and their ecological demise. In this course, students will become familiar with some 100 notable photographers, from the beginning years of its invention to contemporary times with works by major artists and forgotten visionaries, all serving as a foundation for inspiration and understanding of the art worlds most visible medium. Grading in the course is based on a mid-term and final exam along with a major research paper.

AMST.2480 Perspectives American Culture (Formerly 40/42.248) - Credits: 3
The goal of this class is to enhance students’ ability to read and interpret American texts by learning how to see them in context, to understand the way readers approach texts from interpretative lenses, and to express their insights about American culture in a variety of forms and genres. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

AMST.4010 American Studies Seminar (Formerly 40.401) - Credits: 3
A required seminar for American studies majors normally taken during the second semester of the junior year or during the senior year. Students undertake a research project leading to the writing of a major paper with a theme that combines more than one discipline.

AMST.4910 Directed Studies in American Studies (Formerly 40.491) - Credits: 1-3
An investigation of a topic using an interdisciplinary approach and leading to the writing of a major paper. The course provides an opportunity for a student to work closely with an instructor on a topic of special interest.

ARCH.3140 American Architecture (Formerly 58.314) - Credits: 3
This course begins with a discussion of native American building traditions and proceeds chronologically from the 17th through the 20th centuries. Students will gain a familiarity with the major movements in American architecture (such as Colonial, Greek Revival, Victorian, Arts and Crafts, City Beautiful, International Style, Postmodern) as well as the leading architects such as Frank Lloyd Wright and Frank Gehry. The architecture is discussed in its historical context with attention to the inventions, materials and aesthetic assumptions that made it possible.

ARHI.2210 Twentieth Century Art (Formerly 58.221) - Credits: 3
A study of developments in painting, sculpture, performance, media arts, conceptual art, architecture, and design after 1900. This course encompasses modernisms in Europe, the Americas, Asia and the global south.

ARHI.3130 American Art (Formerly 58.313) - Credits: 3
This course centers on the study of American painting, sculpture, and decorative arts from the period of first contact up through the mid-twentieth century. One of the central questions of American art remains its definition: when does it start? What sources does it draw upon? In this class we will discuss American art through its ties to the peoples, events, institutions, and landscape that shaped it.

ARHI.3520 Contemporary Art and Culture (Formerly 58.352) - Credits: 3
Examination of issues of content, theory, and criticism in contemporary art. Current exhibitions and criticism are integral to the course. Topics vary from year to year. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

CRIM.1010 The Criminal Justice System (Formerly 44.101) - Credits: 3
This course presents a brief history of the Criminal Justice System and an analysis of its structure and function. This course required of all CJ majors and is a prerequisite for all other courses in criminal justice. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).
CRIM.1150 Introduction to Homeland Security  
(Formerly 44.115) - Credits: 3

This course will encompass the study and relationship between those entities and institutions necessary for the protection of the United States. Course instructional material will examine the components of Federal, State and Local Police Agencies, as well as the role of Private Security and Emergency Responders needed to facilitate the implementation of the Homeland Security Act. Particular attention will be focused on Policy, Plans and Procedures at governmental and community levels.

CRIM.1410 Introduction to Policing  
(Formerly 44.141) - Credits: 3

This course provides an examination of the historical development of police work with special emphasis on the conflicting role expectations facing police officers.

CRIM.1510 Introduction to Corrections  
(Formerly 44.151) - Credits: 3

This course provides an overview of the American correction system including the history of corrections, probation, incarceration, community corrections, the prison experience and release.

CRIM.2030 Technology and the Criminal Justice System  
(Formerly 44.203) - Credits: 3

This course is designed to introduce students to the latest innovations in the applications of new technological advances in the criminal justice system. Topic areas include an examination of the new technology of crime commission, and the corresponding new technology of crime control strategies. Our focus will be on the application of both "hard" technology (e.g. equipment, hardware, devices, etc.) and "soft" technology (e.g. computer software programs, information systems, classification devices, and other problem-solving applications) in each of the following areas: crime prevention, police, courts, institutional corrections, community corrections and the private sector.

CRIM.2120 Weapons of Mass Destruction  
(Formerly 44.212) - Credits: 3

This course will center on Weapons of Mass Destruction (WMD) and their potential use by terrorists to obtain their goals. We will explore the origins, development and weaponization of Chemical, Biological, Nuclear and Radiological Systems and Devices. The course content is designed particularly for the First Responder to such incidents of WMD. The class will focus on the preparation and execution of plans and policies to counter this threat.

CRIM.2210 Criminology  
(Formerly 44.221) - Credits: 3

The definition and nature of crime, criminal statistics, and theories of crime causation are included. Required of all CJ majors.

CRIM.2230 Crime and the Media  
(Formerly 44.223) - Credits: 3

This course provides an overview about how the media portrays crime and its impact on the general public, crime, and victims and offenders.

CRIM.2350 Introduction to the Law and Politics of Constitutional Development  
(Formerly 44.235) - Credits: 3

A course examining American constitutional doctrine as it has developed historically through the process of constitutional adjudication.

CRIM.2480 Terrorism (international and domestic)  
(Formerly 44.248) - Credits: 3

This course acquaints the Criminal Justice student with the concept of terrorism at both the international and domestic levels. Topics include the history of terrorism, terrorism today and terrorism in the future. Counter measures taken to respond to terrorist threats are also examined.

CRIM.2610 Juvenile Delinquency  
(Formerly 44.261) - Credits: 3

An examination of causative factors in the development of youthful offenders and the development and philosophy behind treatment and rehabilitative practices.

CRIM.2800 Criminal Justice Ethics  
(Formerly 44.280) - Credits: 3

CRIM.3230 White Collar and Elite Deviance  
(Formerly 44.323) - Credits: 3

This course will provide an overview of white collar crime including white collar, corporate, occupational, workplace, and organized crime.

CRIM.3260 Hate Crime  
(Formerly 44.326) - Credits: 3

This course examines prejudice as a motivation for criminal
behavior. The criminological theory for hate crime is reviewed, as well as historical perspectives of this crime category.

**CRIM.3270 Violence in America** (Formerly 44.327) - Credits: 3

This course provides students with an in-depth analysis of the courses, context, and control of a wide range of violent crimes.

**CRIM.3420 Criminal Profiling** (Formerly 44.342) - Credits: 3

This course provides an overview of the development and character of the many types of offenders who become criminal psychopaths. The course explores the various methods used in classifying and predicting criminal behavior derived from the field of Criminology, Psychology and Forensic Science.

**CRIM.3490 Intelligence & National Security** (Formerly 44.349) - Credits: 3

This course is designed to provide students with an understanding of how the U.S. intelligence community functions, where it fits in the policy making and law enforcement systems of U.S. democracy, and its role in the protection of national security.

**CRIM.3600 Gender, Race, and Crime** (Formerly 44.360) - Credits: 3

This course examines gender and racial implications of criminal laws, criminal justice practices and programs will be examined. The position of women and racial/ethnic minorities will be assessed from the different perspectives of victims, offenders, and criminal justice practitioners.

**CRIM.3650 Hate Crimes** (Formerly 44.365) - Credits: 3

Hate crimes illustrate bigotry plus criminal acts. This course examines prejudice as a motivation for criminal behavior. The criminological theory for hate crime is reviewed, as well as historical perspectives of this crime category. This is a rich and comprehensive exploration that begins with understanding the psychology of prejudice and ends with reviewing genocide as a mass hate crime.

**CRIM.3970 Crime Mapping** (Formerly 44.397) - Credits: 3

This course examines the use of new technologies to analyze crime patterns and develop crime prevention strategies. Students study theories that explain the geographic distribution of crime and learn how to use Geographic Information Systems to study crime in ways that draw upon theory as well as how to apply GIS techniques in the law enforcement and corrections fields.

**CRIM.4010 Substance Abuse and Crime** (Formerly 44.401) - Credits: 3

Covers the problems posed by substance use/abuse and examines the role and impact of the legal, criminal justice, and public health systems, as well as current treatment/intervention approaches.

**CRIM.4180 American Courts and Judicial Process** (Formerly CRIM.418) - Credits: 3

This course will study the organization of and the processes employed by American Courts in an intensive participation format. Traditional text lessons on the U.S. Court system will be supplemented by simulations and mock trial problems. Using this two track approach, students will learn about the courts and simultaneously develop the analytical, critical reasoning and public speaking skills used in the Judicial system.

**CRIM.4770 Intimate Partner Violence** (Formerly 44.477) - Credits: 3

This course examines the causes and consequences of domestic violence and the latest research regarding the responses of the criminal justice system.

**CRIM.4930 Issues in Technology and Security** (Formerly 44.493) - Credits: 3

An examination of the causes and consequences of computer crime as well as the criminal justice system’s response to the problem.

**DGMD.2310 Media, Law and Ethics** (Formerly 41.237/DGMD 231) - Credits: 3

This course explores key legal issues likely to confront journalists, mass media professionals or students interested in learning more about the relationships between law, media and ethics in this global community. Nonetheless, students are challenged to think critically about the applicability of those issues to individuals and to media institutions that transmit information via spoken communications, writing, traditional media, mobile messages, social network sites, or e-mail messages.

**ECON.1010 The Economics of Social Issues** (Formerly 49.101) - Credits: 3
Social Issues in Economics will take economic theory and apply it to public policy decisions. Topics that will be covered in the course are; Economics of crime, Should we legalize drugs, is it more economical to imprison someone for life or seek the death penalty and did the Supreme Court decision in Roe v Wade (the legalization of abortion) contribute to the declining crime rate that began in the 90’s: The economics of unintended consequences will explore how well meaning public policy sometimes backfires and has the reverse effect; health economics will look at the rising cost of healthcare and the effect of Obamacare; Taxes and poverty, is there a natural rate of poverty (does minimum wage increases actually contribute to a higher rate) and does taxing the rich less actually help the economy; Energy &Environmental economics, what is the effect of global warming, or is it global cooling, and what is the best energy mix for the 21st century and lastly, who has it right, New Keynesians or Neo-Classicals.

ECON.3020 Labor Economics (Formerly 49.302) - Credits: 3
An introduction to the economic analysis of behaviors and institutions in the labor market: labor supply and participation, labor demand by firms, wage determination under different institutional settings, and gender, race or ethnicity as determinants of different labor market outcomes. The course presents microeconomic models, empirical findings and their public policy implications on topics such as minimum wage, affirmative action, social insurance programs, workplace safety, and subsidized day care.

ECON.3250 United States Economic History (Formerly 49.325) - Credits: 3
The evolution of institutions and their functions, and sources of economic development. The contributions of railroads, agricultural population growth, immigration, capital formation and technological progress to economic development. Other areas addressed: rapid industrialization and antitrust laws; evolution of financial institutions, the creation of the Federal Reserve System, crash of 1929, the depression of the 1930s, the New Deal and various banking acts, the labor movement, the growth of international trade.

ECON.4150 Introduction to Environmental Economics (Formerly 49.315/415) - Credits: 3
This course provides an introduction to the field of environmental and natural resource economics. It is designed to give students an overview of how economic principles can be applied to environmental management and policy. Topic areas and applications include evaluation of environmental policies, valuation of environmental goods and services, climate change, and management of renewable and non-renewable resources. Students will learn to critique articles and other media and have intelligent discussions related to the topics listed above.

ENGL.2000 Critical Methods of Literary Inquiry (Formerly 42.200) - Credits: 3
Examination of diverse critical and theoretical approaches to literature in the development of literary analysis.

ENGL.2320 Turning Fiction into Film (Formerly 42.232) - Credits: 3
This course explores film adaptation by looking at how writing can be turned into the visual and auditory forms. Through reading novels and watching their film adaptations, students learn conventions of fiction and film, and draw on this knowledge to discover the implications of adapting a written story into a movie. By asking students to think about the different ways writers and filmmakers convey meaning to their audiences, this course attempts to answer the question of why the movie is never exactly like the book.

ENGL.2360 Science Fiction and Fantasy (Formerly 42.236) - Credits: 3
Designed to introduce students to understand science fiction and fantasy within the broader context of literature and literary theory. It attempts to develop and hone student’s skills of critical analysis as it supplies them with the tools to contextualize their reading experience - i.e., to understand the origins and politics of the books that they read.

ENGL.2400 Literature and Women (Formerly 42.240) - Credits: 3
A survey of literary attitudes toward women from the Judaic and Hellenic periods through the present.

ENGL.2490 Literature on Technology and Human Values (Formerly 42.249) - Credits: 3
A study of the relationship between works of fiction, cultural attitudes toward technology, and social values. Meets Core Curriculum Essential Learning Outcome for Social Responsibility &Ethics (SRE).

ENGL.2510 War in Literature (Formerly 42.251) - Credits: 3
In "War in Literature" we will study conflict and human values in times of war, focusing on the literature of World War I, World War II, Vietnam, and the Gulf War. Content covered includes a selection of representative (and divergent) literary texts written throughout the 20th century in a variety of genres.

ENGL.2530 The Culture of American Sport (Formerly 42.253) - Credits: 3

An examination of the history, literature, sociology, and aesthetics of sport. Attention to corollary issues and values including racism, sexism, and violence.

ENGL.2570 The Family in American Literature (Formerly 42.257) - Credits: 3

A study of literary selections dealing with traditions of family life, the individual, and social change. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2580 Disability in Literature (Formerly 42.258) - Credits: 3

This course explores how texts -- including novels, short stories, poems, memoirs, essays, plays, and videos -- portray people with disabilities. We will consider the problematic stereotypes about disabilities that sometimes appear in popular culture and literary depictions, and read texts that provide insight into a diverse community of people with a range of disabilities.

ENGL.2770 American Ethnic Literature (Formerly 42.277) - Credits: 3

The course addresses the literature of America’s immigrant and cultural groups and how it contributes to defining our national character. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2820 American Literary Traditions (Formerly 42.282) - Credits: 3

A survey of American Literary history from early contact between Native American populations and European colonists through contemporary American writing.

ENGL.2850 Crime in Literature (Formerly 42.285) - Credits: 3

A study of how various authors use crime as a plotting device to study character, reveal social order, and critique social institutions. This course will focus particularly on detective and mystery fiction, sketching the history and development of these genres. Students might also study fiction and film outside these genres that explore significant questions of crime or criminality. Ultimately, students will think about how fictional representations of criminals, victims, policing, gender, and race relate to cultural assumptions and expectations. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2860 The Graphic Narrative: Comics in Context (Formerly 42.286) - Credits: 3

While picture-images date as far back as the Egyptian tombs, or the caves of Lascaux, this course will consider the development of the modern comic in twentieth-and twenty-first century America. Readings will include not just comics, but also the history of comics, art and literary theory, a novel about comics, and articles that consider the legal, political, and social issues surrounding comics. We will also look at traditional and contemporary comic strips and graphic novels to explore what we can learn from them about American Popular Culture. Comics are on the cutting edge of contemporary literature, and there are many avenues to pursue in the study of this narrative form. This course will include intensive reading and writing, and will ask students to engage with demanding theoretical works, in addition to incorporating a considerable amount of research. While the subject matter can be lighthearted the course takes these texts seriously, and asks for intellectual engagement with the issues and concerns of culture depicted in these words and pictures. (Full proposal and supplemental material available).

ENGL.2940 History of American Literature I (Formerly 42.294) - Credits: 3

Studies the historical development of American literature from the Colonial period to the Civil War. Selected works by representative authors from each period are studied.

ENGL.2950 History of American Literature II (Formerly 42.295) - Credits: 3

Studies the historical development of American literature from the Civil War to World War I.

ENGL.2980 Children's Literature (Formerly 42.298) - Credits: 3

A survey course covering traditional and contemporary children's literature. Texts are selected to represent different historical periods and a diversity of authorial perspectives. Attention is given to changing views of children and childhood as reflected in selected texts.

ENGL.3050 Reviewing the Arts (Formerly 42.305) - Credits: 3
Theory and practice of writing short, critical essays in a journalistic mode on the visual and performing arts. Special attention to theater, movie, and television criticism. Conducted as a workshop with close analysis of student work.

ENGL.3110 The South in American Literature
(Formerly 42.311) - Credits: 3
A study of the writers, movements, and social culture of the South, from both the nineteenth- and twentieth-centuries.

ENGL.3120 Literature of Colonial America (Formerly 42.312) - Credits: 3
This course will explore the literatures (including some selections in translation) written during America’s colonial era. The periods of exploration, first encounters, settlement, the rise of Anglo-America, the emergence of a national sensibility, and the years of transition in the new republic will be considered. The course will also treat a small selection of nineteenth century texts that present visions and re-visions of the colonial past.

ENGL.3130 Realism and Naturalism American Fiction
(Formerly 42.313) - Credits: 3
A study of realism and naturalism in fiction from the end of the Civil War to World War I.

ENGL.3200 Personal and Reflective Writing (Formerly 42.320) - Credits: 3
A workshop format encourages peer criticism of individual writings and discussion of models from various texts.

ENGL.3210 Community Writing I (Formerly 42.321) - Credits: 3
Students work on various writing projects the professor brings into the classroom on behalf of local non-profit organizations. This service learning course provides opportunities for students to learn through thoughtful engagement with the community, applying knowledge of writing gained in the classroom to real world problems. The course will be held in a workshop format with strong emphasis on revision.

ENGL.3240 Writing About Place (Formerly 42.324) - Credits: 3
Writers throughout time have been thoroughly grounded in place. Students in this course will read and write on a variety of topics: travel, cities, suburbs, dwelling places, nature, environmental issues, etc., in a variety of genres: creative non-fiction, essays, journalism, short stories, poetry, journals. This course will be held in a workshop format with strong emphasis on revision.

ENGL.3280 Writing About Women (Formerly 42.328) - Credits: 3
Writing About Women

ENGL.3310 American Novels to 1900 (Formerly 42.331) - Credits: 3
with the emergence of novels labeled “American,” novelists explored the role of the frontier, the shift from an agricultural to an industrial society, the rise of social reform movements, the impact and legacy of slavery, the influence of science and technology, the debate over gender roles and expectations, and the role of the artist/writer within American culture. The novels in this course, all written before 1900, allow us to explore the issues that a selection of American novelists treat within their fiction as well as to consider the debates that occurred over the nature of narrative.

ENGL.3320 Twentieth Century American Novel - Credits: 3
A study of the American novel from 1900 to the present.

ENGL.3330 American Autobiography (Formerly 42.333) - Credits: 3
A Study of autobiographical writing from Colonial America to the present. Works from the 17th to the 21st century will allow students to explore the genre of autobiography and related sub-genres, including the captivity narrative, the slave narrative, and the immigration narrative. Readings will also explore literary and political autobiographies. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3350 American Women Novelists (Formerly 42.335) - Credits: 3
A study of selected novels by American women. Focus on the female voice within the American tradition. Treatment of such issues as domesticity, education, and authorship. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3420 Women Writers and the Past (Formerly 42.342) - Credits: 3
Women Writers and the Past. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

**ENGL.3480 Modern American Drama (Formerly 42.348)** - Credits: 3

A study of such playwrights as O'Neill, Odets, Wilder, Williams, and Miller.

**ENGL.3640 African American Drama (Formerly 42.364)** - Credits: 3

A study of the history and development of African American drama, with emphasis on major aesthetic, political, and social movements in African American culture. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

**ENGL.3700 Contemporary American Fiction (Formerly 42.370)** - Credits: 3

Discusses novels and short fiction from World War II to the present.

**ENGL.3710 The Literature of the Beat Movement (Formerly 42.274/ENGL.2740)** - Credits: 3

Explores both the writings and the personal lives of a loose confederation of poets, novelists, and essayist who emerged onto the American literary and cultural scene following World War II and who came to be known as the -Beat Generation+. The primary focus will be on the life and writings of Lowell native Jack Kerouac (1922-1969) with others of the -beat circle+ included as well, i.e., Allen Ginsberg, William Burroughs, Diana DiPrima, etc.

**ENGL.3740 Contemporary Poetry (Formerly 42.374)** - Credits: 3

A study of selected British and American Poets since World War II.

**ENGL.3760 African-American Literature (Formerly 42.376)** - Credits: 3

A study of selected works by black American writers, such as Toomer, Wright, Ellison, Walker, and Morrison. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

**ENGL.3830 Theatre History II: Nineteenth Century to the Present (Formerly 42.383)** - Credits: 3

A survey of theatre in its historical and social contexts from the 19th century to the present, focusing on innovations in design and technology, the advent of the director, the emergence of modern schools of acting, and the creation of new forms of theatre to suit the changing needs of a modern world.

**ENGL.4010 Selected Authors (Formerly 42.401)** - Credits: 3

A study of selected works. Authors to be announced each semester.

**ENGL.5060 Writing in the Community (Formerly 42.506)** - Credits: 3

Students learn advanced writing techniques in the classroom and apply them to real writing tasks in the community. Assignments include a writing project designed to meet the needs of a local organization, along with research and reflective pieces.

**ENGL.5200 Experiencing Poetry: Sound and Sense (Formerly 42.520)** - Credits: 3

The class offers seminar-style discussions on specific aspects of poetry, considering a range of excellent poems from various eras. Through hands-on writing exercises, we will examine the art from the vantage point of the practitioner, using imitation and exploration of technique as a kind of close reading. Assignments include analytical essays as well as creative work.

**FAHS.2200 Designing the Future World (Formerly 57.220)** - Credits: 3

All purposeful human activity involves design. Every day we are surrounded by the products of design processes–buildings, cars, entertainment, corporations, schools, even laws and regulations. They make our lives easier in many ways, but they may also create significant social and environmental problems. In the past, designers often did not consider the impact of their designs on society, or ignored the negative consequences. Our culture and legal system usually permitted, or even encouraged, this irresponsibility. Today, a small group of scholars, businessmen and women, and activists are rethinking how we design the things around us, with the goal of addressing the most pressing social and environmental issues. This class will introduce students to some of these issues, the people who are confronting them, and the ways in which all of us can contribute to designing a better Future World. With a series of hands on projects, coupled with readings and other resources, students will work to design aspects of the future. In the
process you will learn about possible solutions to complex, important problems, but also learn valuable life skills such as problem framing, problem solving, critical thinking, active learning, communication, and simple construction methods. No previous experience is required—only curiosity and eagerness to learn.

GNDR.2000 Special Topics in Gender Studies (200-level) (Formerly GNDR 200)(Never Offered) - Credits: 3

“Special Topics in Gender Studies” (200-level) offers students the opportunity to study a topic of special interest in the field of Gender Studies from an interdisciplinary perspective. The content and approach will vary depending upon the research and teaching interests of the faculty member teaching the course.

GNDR.2400 Introduction to Gender Studies (Formerly GNDR 240) - Credits: 3

This course is an interdisciplinary introduction to the field of Gender Studies that examines both commonalities and differences among diverse groups of women. A variety of topics are presented such as past and present stratification in work and family, sexual identities, medial representations of women, and violence against women. Social movements for women’s equality and feminist theories and methods are also introduced.

HIST.1110 United States History to 1877 (Formerly 43.111) - Credits: 3

This course surveys United States history from the early settlement of North America through the Civil War and Reconstruction. It considers the role of the political and economic leadership in the building of the nation as well as actions of ordinary people whose energies and aspirations constitute the fabric of United States society. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA)

HIST.1120 United States History since 1877 - Credits: 3

This course surveys the history of the United States from the end of Reconstruction to the present. It covers significant developments in the politics, economy, culture, and other aspects of American life during that period. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA)

HIST.2110 Historical Dimensions of Globalization (Formerly 43.211) - Credits: 3

This course explores the impact of globalization on the development of world societies in the late 20th-early 21st century. Using historical analysis of contemporary realities, it develops an appropriate frame of reference to address questions about the nature and cause of globalization.

HIST.2140 Early America Through Material Culture - Credits: 3

This class examines American history from the period before European contact to the early stages of the Industrial Revolution in the nineteenth century through the lens of material objects. Comparisons will be drawn between the objects and cultures used by European, Native American, and African American peoples, as well as over time.

HIST.2250 Ancient Greek History (Formerly 43.225) - Credits: 3

A study of Greek history, institutions and culture from Minoan times through the Hellenistic period.

HIST.2400 World War I (Formerly 43.240) - Credits: 3

The course will cover the wide range of causes of this major conflict, the difficulties and changing dynamics of waging this massive war and the effects of all this on both the internal political and social conditions and external consequences for the combatants with the peace settlement.

HIST.2410 Colonial Survival: Case Studies in Early American Legal and Political History (Formerly 43.241) - Credits: 3

This class contrasts the dominant monoculture colonies of Massachusetts Bay and Virginia with the lesser known multicultural colonies of Maine, Plymouth, New Amsterdam, Maryland and Rhode Island. While some of the multicultural colonies foundered, others flourished by utilizing a wide range of political and legal methods which allowed for their survival alongside much larger rival colonies. The class finishes by examining similar political and legal methods employed by Native American tribes for their own survival, in particular the Cherokee, whose carefully negotiated accommodations to Anglo-American culture allowed them to live side by side with the growing United States until the 1830's. Close analysis of both primary and secondary source material will provide students with an intensive look at rarely examined issues in early American history.

HIST.2420 World War II (Formerly 43.242) - Credits: 3
The Second World War transformed states and people from East Asia to the United States to Europe. We examine diplomatic and military aspects of the war and how it affected the lives of people in the countries involved. Topics include the prelude to the war, military campaigns in Europe and the Pacific, collaboration and resistance, the home front, the Holocaust, science and the atom bomb, and the consequences of the war.

HIST.2490 The Vietnam War (Formerly 43.249) - Credits: 3
Covers the U.S. war in Vietnam from its origins in the French colonial era to its impact on contemporary culture and foreign policy.

HIST.2700 Women in American History (Formerly 43.270) - Credits: 3
This course surveys the history of women in the British North American colonies and United States with a special focus on social and economic change. It examines women as a distinct group but also attends to divisions among them, particularly those based on class, ethnicity/race, and regional diversity. Course themes include concepts of womanhood, the development and transgression of gender roles, unpaid work and wage labor, social reform and women’s rights activism, as well as changing ideas and practices with respect to the female body.

HIST.2740 Native American History (Formerly 43.274) - Credits: 3
A comprehensive study of the Native Americans through historical and first-hand accounts of their lives. Designed to enlighten students and to represent fairly the Native Americans, dispelling some of the existing myths about them.

HIST.2745 History of the U.S. South - Credits: 3
The history of the southern United States from the colonial period to the present. Topics include the development of plantation slavery, the Civil War and Reconstruction, industrialization and the "New South," segregation and disenfranchisement, the Civil Rights Movement, and conservatism.

HIST.2750 African-American History (Formerly 43.275) - Credits: 3
This course surveys African American history in the United States from colonization to the present. It begins with a study of life in West Africa and traces the forced migration of Africans to the Americas. It explores West African transmissions, the freedom struggle, the great migrations from the South, the Harlem Renaissance, the modern Civil Rights movement, and the continuing impact of African Americans on life in the 21st century.

HIST.2790 History of Lowell (Formerly 43.279) - Credits: 3
This course will provide an overview of the growth, decline, and rebirth of the city of Lowell, Massachusetts. Topics will include the Industrial Revolution, role of women and unions in the workplace, immigration and the formation of ethnic neighborhoods, urban renewal, and historic preservation. The survey will also discuss notable personalities such as labor activist Sarah Bagley, Civil War general Benjamin Butler, writer Jack Kerouac, Senator Paul Tsongas and boxer Micky Ward. The foregoing names may differ over time.

HIST.2860 United States History Through Film (Formerly 43.286) - Credits: 3
This course explores selected moments in United States history - such as slavery, the Great Depression, World War II, the Vietnam War, and the feminist movement - through the lens of film. Using written historical sources as well as film, students will investigate how particular films have depicted the past and shaped the way that Americans remember their history.

HIST.2960 United States Diplomatic History (Formerly 43.296) - Credits: 3
Although the course takes the entire United States diplomatic history as its field of historical study, its focus is on the American foreign policy in the twentieth century. The course first explores domestic and international factors that made the United States a world power by 1898. It will then consider the goals, the practices, and the results of the twentieth century American foreign policy. The course challenges students to view American diplomacy in a global context.

HIST.2980 Introduction to Historical Methods (Formerly 43.298) - Credits: 3
An introduction for the undergraduate student to the nature and principles of history. The course takes up methodology, historiography, research methods, electronic resources, bibliography, and the technical and stylistic problems involved in the presentation of research in scholarly form. Required of all history majors in the sophomore year. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Social Responsibility & Ethics (SRE).

HIST.3010 The World of Things: Consumer Cultures in the Modern West (Formerly 43.301) - Credits: 3
This course will examine the emergence and historical impact of consumer cultures in the modern West, from the eighteenth century through the present. Topics to be covered will include the emergence of spaces of consumption (the home, the commercial/spectacular metropolis, the department store, the shopping mall, the tourist site), changing attitudes toward shopping and spending, the construction of modern social identities of class, gender, generation and race through consumption, and political struggles over consumption.

HIST.3080 History of Crime and Social Control (Formerly 43.308) - Credits: 3

Analyzes the causes and development of attempts to control crime, ethnic conflict, radical protest movements, urban disorders, and attitude and role conflicts.

HIST.3100 History of New England (Formerly 43.310) - Credits: 3

Explores the evolution of New England society from pre-Columbian to the Post-Industrial, emphasizing the ways succeeding generations of New Englanders have confronted social and economic change. Topics include: white-Indian relations, ecological change, Puritanism, the New England town, the industrial revolution, the rise of cities, immigration, ethnic and class conflict, and the distinctiveness of the region.

HIST.3140 American Social History II (Formerly 43.314) - Credits: 3

This course explores various aspects of common peoples' lives in the United States since 1880. Primary areas of investigation include work and leisure, family and community, as well as culture and values.

HIST.3160 American Environmental History (Formerly 43.316) - Credits: 3

This course explores the environmental history of early America and the United States from the end of the last ice age (c. 12,500 years ago) to the present. It examines the role played by nature as an historical agent as well as the relationship between human communities and the physical and organic environment. Course themes include evolving land use, the environmental significance of industrial capitalism, urban public health, resource conservation and wilderness protection, the impact of ecology on public consciousness, as well as environmentalism.

HIST.3200 American East Asian Relations (Formerly 43.320) - Credits: 3

The course examines relations between the United States on one hand and Japan, Korea, China, Vietnam, and the Philippines on the other in the 19th and 20th centuries. Besides political, trade, and cultural relations, there is also emphasis on American laws and practices regarding immigrants from these East Asian countries. The aim of the course is for students to gain a basic knowledge of American relations with East Asia and to develop analytical skills for sophisticated inter-national relations.

HIST.3449 American Slavery: History, Fiction, and Film - Credits: 3

This course examines the history of slavery in the United States. It explores topics such as the role of slavery in the economy, the culture of enslaved Americans, resistance to slavery, and the abolition of slavery, often making comparisons to slavery in other parts of the Western Hemisphere. The course also investigates how the institution of slavery has been represented by different generations of historians and in American popular culture from the 1830’s through the present.

HIST.3450 Slavery and Abolition (Formerly 43.345) - Credits: 3

This course takes a comparative approach to the study of plantation slavery in the Americas with special attention to developments in Virginia and Cuba. It surveys the structure of slavery in the nineteenth century United States South; slavery’s legacy in the United States; and its twenty-first century reincarnation in human trafficking and forced labor around the world.

HIST.3480 Making an Historical Documentary (Formerly 43.348) - Credits: 3

This course provides students with the basic conceptual and technical skills for developing and completing an historical documentary, including instruction about subject choice, narrative structure, camera work, and editing.

HIST.3490 The Cuban Revolution (Formerly 43.349) - Credits: 3

The Cuban Revolution has been surrounded by controversy since it took power in 1959. Through readings, films, and discussions, we will examine not only the events that have occurred in Cuba over the last four decades but also the ways that they have been presented to audiences in Cuba, the United States, and elsewhere. We will carefully consider the role of perspective in academic writing and the media and how it has shaped understandings of the Castro era.

HIST.3500 Colonial North America, 1550-1750 (Formerly 43.350) - Credits: 3
This class explores societal groups across the North American continent from 1550 to 1750 by comparing the approaches and responses to colonization taken by different European and Native American groups alongside the emergence of African slavery in North America. The semester concludes with the escalating colonial wars in the early eighteenth century, which would lead to both the French and Indian, and Revolutionary Wars.

HIST.3510 Captivity Narratives and Colonial Societies (Formerly 43.351) - Credits: 3

The long sequence of military conflicts in New England at the turn of the eighteenth century led to an equally long sequence of accounts describing the experiences of English colonists taken captive by Native American or French military forces. While these narratives remain the best known examples of this particular literary genre in the United States, this class will explore the multitude of ways in which the captivity narrative was used in colonial North America by people of different races and cultures.

HIST.3520 British Colonization in the Eighteenth Century (Formerly 43.352) - Credits: 3

This class provides a thematic examination of the British North American colonies. Topics include colonies founded in the long eighteenth century, material culture, the multi-racial British empire, the Enlightenment, and the rise of individualism's impact on society and religion, and shifting political relationships between Britain and its colonies.

HIST.3530 The French and Indian and Revolutionary Wars (Formerly 43.353) - Credits: 3

The years between 1754 and 1784 saw drastic change on the North American continent and around the world for Britain and its colonies. Colonists in North America went from being devout British subjects during the French and Indian War to rebelling and founding their own new country during the American Revolution. In turn, the British Empire went from spending millions of pounds on North America in the 1750’s to barely committing the resources necessary for fighting the Revolution. This class examines these cultural and political transitions in context with discussions on the varied populations of North America who experienced them.

HIST.3550 Jacksonian America (Formerly 43.355) - Credits: 3

An investigation of the social, political, and economic developments in the United States from 1815 to 1848. Special emphasis is placed on the spread of capitalism, the growth of reform movements, the development of cities, and the conflict over slavery.

HIST.3560 Civil War and Reconstruction (Formerly 43.356) - Credits: 3

This course surveys the increasing political, social, and economic tensions between the North and the South during the first half of the nineteenth century; the explosion of those tensions into secession and conflict; the four years of war; and the postwar struggle to reconstruc the South and forge a new union.

HIST.3570 American Civil War in Memory (Formerly 43.357) - Credits: 3

Students analyze how Americans have remembered the American Civil War in the years after the war ended in 1865. By looking at novels, memoir films, National Park Service Battlefields, and monuments, students discover how remembrances are influenced by views of race, gender, patriotism, regionalism, and economic forces.

HIST.3580 Amazing American Lives (Formerly 43.358) - Credits: 3

Biography often has been used by historians as source material for representing the nature of the American experience. An examination of outstanding biographies of the lives of various Americans can yield insights into all levels and ranks of American society from colonial days to the late twentieth century.

HIST.3590 Democracy in the United States 1800-1860 (Formerly 43.359) - Credits: 3

The course examines what is often referred to as the Golden Age of American Democracy. How much power did ordinary Americans have in the political system? What motivated people to participate in politics? What roles did women and racial minorities play in American politics despite not being able to vote?

HIST.3620 The Twenties and the Thirties (Formerly 43.362) - Credits: 3

An examination of the emergence of the corporate and governmental institutions of modern America set in two turbulent decades of cultural and political ferment that involved both booming prosperity and the economic collapse of the Great Depression.

HIST.3650 United States History since 1960 (Formerly 43.365) - Credits: 3
Discusses Cold War politics and civil rights upheavals during the 1960's and 1970's, the decline of American economic and political power, and the resurgence of conservative politics in the 1980's.

HIST.3790 United States Industry Twentieth Century (Formerly 43.379) - Credits: 3
An exploration of the rapid growth of the American economy in the 20th century, including the evolution of the large corporation and the mass production assembly line. Particular attention is devoted to the ways in which immigrants, women, and the African Americans were affected by the rise of big business. The course also traces the decline of the traditional U.S. manufacturing base following the Second World War and the impact this had on the working class and their unions.

HIST.3800 Work and Society (Formerly 43.380) - Credits: 3
Provides a survey of labor history from the colonial period to the present focusing on the interrelationship between culture and work in American society and on the dynamics of technical and economic changes on the organization of work processes.

HIST.3810 United States in the 1960s - Credits: 3
This course examines the United States during the 1960s. General themes include the stifling and freeing of dissent, the "rights revolution", liberal social and economic policy, foreign policy in a bipolar world, redefinition of values and morals, changing relations between women and men, increasing concern with environmental pollution, the growing credibility gap between citizens and their government, and rise of the "New Right".

HIST.3840 Radicalism in American History (Formerly 43.384) - Credits: 3
A biographical approach to the influence of radicalism on American history with emphasis on significant and representative personalities and their contributions.

HIST.3900 Topics in History (Formerly 43.390) - Credits: 3
An advanced course of study and examination of a variety of issues and topics in history. Students without a sufficient background in history courses should not attempt this course. Subject matter to be announced in advance.

HIST.3910 America and the World (Formerly 43.391) - Credits: 3
In an age of increasing globalization, historians realize the need for putting the American national narrative in a wider historical context. This course will help students locate the study of the United States in a global, comparative and transnational perspective. This course will be used as one of the courses needed by History majors in the global, comparative and under-represented areas of the major.

HIST.3920 United States Immigration History (Formerly 43.392) - Credits: 3
The course focuses on the experiences of women, men, and children who came to the U.S. from the colonial era through the 21st century. Their emigrations will be examined in a global context. Irish migration, the mass European migrations during the mid and late 19th /early 20th centuries, and post-Second World War immigration particularly from Asian and African countries are discussed. The Lawrence, Lowell, and Boston immigration stories are also considered.

HIST.3960 Alcohol In American History (Formerly 43.396) - Credits: 3
This course uses the production, distribution, consumption, and prohibition of alcoholic drinks as a lens for studying cultural, political, and economic change in American life from the colonial era to the present.

HIST.4010 History Writing and Community (Formerly 43.401) - Credits: 3
Restricted to upper-level students and available only with permission of the instructor, this course offers a select number of students the opportunity to work for non-profit and governmental organizations within Lowell. Such organizations might include the National Park Service; Community Teamwork Inc.; Girls Club of Lowell; St. Athanasius Church; American Textile History Museum, and so forth. The course is primarily intended for History majors. Students will utilize their skills in research, writing, and analysis to assist an organization with its documented needs (e.g., conduct research on history of the organization; write a pamphlet or short article; organize oral history interviews; analyze the urban context in which the organization has developed). Students receive academic credit, along with invaluable work-related experience.

HIST.4100 Olympic Games and World's Fairs (Formerly 43.410) - Credits: 3
The course studies Olympic Games and World’s Fairs from the mid-nineteenth century to the present. We examine how these international festivals participate in and contribute to six themes in the history of that period: nationalism and
internationalism, mechanization of industry, modern architecture and urban planning, consumer culture, racial politics, and the Cold War. Students write brief papers connection these themes and one or more game or fair and a research paper on a relevant topic. Special attention is given to certain icons, like the Crystal Palace, the Eiffel Tower, the Nazi Olympics, and the Mexico City games.

LGST.2100 Restorative Justice (Formerly PCS.205/41.210) - Credits: 3
This course will introduce students to the fundamental principles and practices of restorative justice as a method of building positive peace. Students develop a working knowledge of the general theories of restorative justice, as well as practical hands-on experience with peacemaking techniques. Traditional assumptions about justice and the adversarial legal process will be explored and challenged. The relationship between restorative justice, restorative practices, and other conflict resolution methods such as mediation will be discussed. Practical challenges in implementing restorative justice on the ground will also be examined.

LGST.2340 Criminal Law (Formerly 41.234) - Credits: 3
This course studies substantive criminal law, with emphasis on general principles of criminal culpability, such as the act requirement, the mens rea requirement, and causation. Topics include detailed coverage of the elements of personal and property crimes, such as homicide, rape, assault, battery, robbery, burglary, theft, arson, and fraud. The course will also cover the law of attempted crimes, accomplice liability, and defenses.

LGST.2500 Disability and the Law: Legal Rights of People with Disabilities (Formerly 41.250) - Credits: 3
This course examines the history and progress of the disability rights movement in America, the current state of the law, trends, and prospects for the future, with particular focus on those laws designed specifically to address the needs of people with disabilities.

LGST.2610 Introduction to Legal Concepts (Formerly 41.261) - Credits: 3
This course serves as an introductory legal course. It is a survey of many specific topics, such as constitutional law, contracts, intellectual property law, and current legal topics of interest. More importantly, the course emphasizes critical legal thinking, legal ethics, and human values.

LGST.2620 Introduction to Business Law (Formerly 41.262) - Credits: 3
This course introduces students to the fundamentals of business law. The main emphasis is on key aspects of contract law, including the agreement, consideration, writings, third-party rights, illegality, performance, breach, defenses, and remedies. The course also covers agency law, employment law, sections of the Uniform Commercial Code, and a variety of other legal issues and topics that influence and intersect with modern business practices. This course is highly recommended for pre-law students, CPA students, and paralegal students.

LGST.2870 Legal Writing (Formerly 41.287) - Credits: 3
This course trains students to produce effective legal work product as drafters of client letters, memoranda of law, pleadings, briefs, and other legal documents.

LGST.3600 Legal Issues in Racism (Formerly 41.360) - Credits: 3
This course presents a study of racial discrimination in the United States. Emphasis is placed on relevant constitutional provisions, statutory provisions, and on United States Supreme Court cases.

LGST.3630 Corporate and Property Law (Formerly 41.363) - Credits: 3
This course studies the law pertaining to business entities and structures. Partnerships, limited partnerships, and joint ventures are studied at the outset of the course. The main emphasis is on elements of the corporate structure. The last part of the course deals with personal and real property with coverage of wills and trusts. This course is highly recommended for pre-law students, CPA students, and paralegal students.

LGST.3650 The Legal Environment of Business (Formerly 41.365) - Credits: 3
This class explores the intersection of business and the law in modern American society. This class builds on the concepts covered in Business Law and explores current legal topics that affect doing business in the United States and abroad. Topics covered may include the U.S. Constitution and the courts system, white collar crime, cyber law, the laws of intellectual property, international trade, consumer protection, bankruptcy, product liability, administrative law, and labor and employment law, amongst others.

LGST.3670 Environmental Law (Formerly 41.367) -
This course examines the legal and administrative problems of protecting the quality of the human environment. Federal and state legislation on environmental policy is studied. Public interest litigation as a supplement to the enforcement of environmental law is discussed. The course also focuses on the practical problems of balancing the needs of business, the global competitiveness of the United States, the increasing demand for natural resources, and the need to protect, preserve, and restore the environment. The importance of sustainable development and environmental ethics are discussed.

LGST.3700 Real Estate Law (Formerly 41.370) - Credits: 3
This course examines contracts for the sale of real estate, deeds, title examinations, security for real estate transactions, methods and problems of co-ownership, zoning ordinances, brokerage contracts, leases and landlord, and tenant rights and liabilities.

LGST.3720 Sports, Entertainment and Art Law (Formerly 41.372) - Credits: 3
This course challenges students to engage in analytic reading, critical thinking and problem solving related to the legal issues facing the sports, entertainment and art worlds. Topics may include contracts, intellectual property rights, employment law, labor law, and other areas of interest.

LGST.3760 Family Law (Formerly 41.376) - Credits: 3
This course studies the critical family law issues facing society today. Subject matter examined may include the law of marriage, custody, adoption, divorce, child support, juveniles, right to die, fetal tissue transfer to prolong the life of another, reproduction control, and surrogate parenting. This course is taught from a legal and human values perspective.

LGST.3770 Elder Law (Formerly 41.377) - Credits: 3
This course introduces students to the major architectural components of the legal environment of the elderly, including Medicare, Medicaid, SSI, pensions, nursing homes, assisted living, estate management, and related issues.

LGST.3810 Women and the Law (Formerly 41.381) - Credits: 3
This course presents legal issues that often or particularly affect women. Topics may include sex discrimination, sexual harassment, rape, marriage, divorce, reproductive control, surrogate motherhood, and custody.

LGST.3830 Alternative Dispute Resolution (Formerly 41.383) - Credits: 3
The traditional trial is becoming increasingly rare in modern civil litigation; the large majority of disputes are resolved by other techniques. This course will examine alternative methods of dispute resolution such as negotiation, mediation, arbitration, and the mini trial.

LGST.3850 Immigration Law (Formerly 41.385) - Credits: 3
Studies the immigration, nationality, and naturalization laws of the United States. The topics discussed are: the immigrant selection system, the issuance of immigrant and nonimmigrant visas; grounds of excludability of aliens and waiver of excludability; grounds for deportation of aliens and relief from deportation; and change of status within the United States including legalization, refugee, and asylum status.

LGST.3860 Intellectual Property (Formerly 41.386) - Credits: 3
This course surveys the law of the protection of ideas, trade secrets, inventions, artistic creations, and reputation. The course will briefly review the law of patent, trademark, copyright, trade secret, and geographical indication. The course will cover the distinction between the various forms of intellectual property, and the statutory and common law methods of enforcing rights.

LGST.4900 Legal Aspects of Cyberspace (Formerly 41.490) - Credits: 3
This course introduces students to the law of the Internet and regulation of lawful and unlawful computer activities. Traditional notions about privacy, defamation, contracts, freedom of expression, pornography, stalking, jurisdiction and intellectual property are challenged by the latest cyberspace technology. Much of the debate about control, which leads to questions about rights and responsibilities, centers around who, if anyone, should design the legal architecture of cyberspace. These and other topical subjects serve as the focus on the study of legal issues in cyberspace.

LGST.4970 Legal Studies Practicum (Formerly 41.497) - Credits: 3
This course consists of assigned fieldwork under the supervision and with the permission of the coordinator. The course is designed to broaden the educational experience of legal studies students by providing exposure to selected legal
environments such as corporate legal departments, financial institutions, law firms, real estate departments, banks and government offices and agencies. This provides a correlation of theoretical knowledge with practical experience in an area of interest to students.

**MSIT.5610 Computer Network Security (Formerly 94.561) - Credits: 3**

This course is aimed to provide students with a solid understanding of key concepts of computer network security and practical solutions to network security threats. Topics to be covered include common network security attacks, basic security models, data encryption algorithms, public-key cryptography and key management, data authentication, network security protocols in practice, wireless network security, network perimeter security and firewall technology, the art of anti-malicious software, and the art of intrusion detection. Pre-Req: BS in IT or Equivalent. Cannot be used toward MS or D.Sc. in Computer Science.

**MUHI.3010 American Music (Formerly 74.301) - Credits: 3**

An historical, cultural and contextual survey of diverse styles of concert and vernacular music in the United States from the colonial era to the present. Open to music and non-music majors.

**MUHI.3110 American Musical Theatre (Formerly 74.311) - Credits: 3**

An intensive study of the position of the American musical theater, this course examines contributions to musical thought, and traces the development of the musical style from its origins to the present through musical study and analysis, historical research, and critical interpretation.

**MUHI.3550 Jazz (Formerly 74.355) - Credits: 3**

An intense study of the history of jazz from its origins to the present, covering a wide selection of styles and schools of jazz in various ensemble configurations.

**MUHI.3860 History of Rock Music (Formerly 74.386) - Credits: 3**

Traces the roots of American popular music from its origins and influences from the earliest European song forms to American folk songs, Gospel, Country, Rhythm and Blues, Jazz, and other popular forms up through current trends as related to the development of the music industry and other socio-musical influences of the commercial song from the 1500s to the present.

**PHIL.3060 Feminist Theory Politics (Formerly 45.306) - Credits: 3**

What is sexist oppression? Is our culture still sexist, or is the need for feminism over? How should we respond to sexism in other cultures? Do men and women have different natures? Are our culture’s sexual representations of women necessarily degrading, and if so, why? We’ll consider these questions, and others, by examining the arguments and methodology of analytic feminism. We’ll start by tracing the historical development of feminism in the 18th, 19th, and 20th centuries, and then turn to several contemporary feminist analyses of sexist oppression. We’ll then use these feminist frameworks to examine more specific issues. Possible topics include: feminist analyses of sexual objectification in pornography, feminist arguments in ethics and social theory, feminist analyses of science, and feminist criticisms of gendered labour. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**PHIL.3080 Philosophy of Race and Gender (Formerly 45.308) - Credits: 3**

This course will focus on issues of identity and difference. We will discuss the ways in which group identities are formed and break down. We will discuss how differences are constituted and reconstituted. These issues are central to theories of race and gender, racism and sexism. Some of the questions which we will raise are these: What motivates forming group identities? How are they formed? How is identity used within oppressive social structures? How can it be used to transform society? Why do some differences make a difference and others don’t? Can we choose our group identities? Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

**PHIL.3100 Philosophy of Creative Imagination (Formerly 45.310) - Credits: 3**

Focuses first on imagination as a function of mind, placing it in relation to other functions such as perception, emotion, and conceptualization. Attention is then given to the difference between the reproductive and the creative imagination, with special emphasis on the psychological and social/political dimensions of creativity. Topics to be considered include poietical metaphor, theatrical performance, painting, architecture, or photography.

**PHIL.3101 Philosophy of Humor and Comedy - Credits: 3**

This course examines the phenomenon of humor, laughter, and comedy, inquiring into its nature and function in human life. We explore the leading theories of humor, in attempting to
explain what makes something "funny" and why we enjoy humor so much. We also attempt to relate the idea of humor to the related ideas of laughter and comedy. The course will include analysis of the various forms of humor, including the joke, the dramatic comedy, and stand-up comedy.

PHIL.3110 Philosophy and Literature (Formerly 45.311) - Credits: 3
This course examines the intersection between philosophy and literature. Course content includes detailed study of philosophical works of literature and works of philosophy about literature. Featured Topics include competing definitions of literature, silent and performative reading, models for acquiring literary status, literature and morality, censorship, the role of truth in literary experience, and the relationship between authors, works, fictional characters, readers, and critics.

PHIL.3130 American Philosophy (Formerly 45.313) - Credits: 3
American philosophy provides a historical approach to American intellectual history from 1830 to the present. American Transcendentalism and Pragmatism will be the two focal points in the course and students will be acquainted with authors such as Ralph Waldo Emerson, Margaret Fuller, Henry David Thoreau, C.S. Peirce, William James, Jane Addams and John Dewey. The ideas of freedom, self-reliance, community, and moral life are the abiding threads in this tradition and will be explored in the course of the term.

PHIL.3140 Philosophy of the Gothic Imagination (Formerly 45.314) - Credits: 3
A philosophical inquiry into science fiction, fantasy, and horror, with special emphasis on film. This course will attempt to provide interpretations of some classic examples from these genres, as well as to inquire into the philosophical significance of these literary categories and their relation to mythology and religion. Questions to be addressed will include the problem of knowledge and rationality and its limits, the nature of the human being, and the moral problem of the role of violence in the social order. The class will attempt to identify a continuous tradition between these modern genres and ancient Greek tragedy and mythology.

PHIL.3160 Philosophy and Film (Formerly 45.316) - Credits: 3
This course examines the political and philosophical values and ideas which constitute cinema. It analyzes film as an historical, cultural, commercial, and artistic endeavor. Students will develop the skills to watch film actively and critically.

PHIL.3270 Environmental Philosophy (Formerly 45.327) - Credits: 3
An examination of the philosophical foundations of environmentalism. Addresses both the question of ethical duties we owe to animals and to nature, and also the question of man's relation to the natural world.

PHIL.3350 Ethical Issues in Technology (Formerly 45.335) - Credits: 3
This course will examine important ethical issues and value conflicts emerging in contemporary science and technology. Through readings and class discussions students will not only have an opportunity to explore the manner in which ethical and technical problems are related, but to develop insight into areas of ethical philosophy and modes of reasoning essential to an intelligent understanding of such issues. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.3570 Science and Religion (Formerly 45.357) - Credits: 3
A study of the multiple relations between science and religion focusing on the theme of creativity. The problem of the various truth claims of the two systems will be subjected to a close analysis and principles developed to understand how conflicts between the them can be understood and resolved.

PHIL.3610 Equality, Justice and the Law (Formerly 45.361) - Credits: 3
This class investigates the American fascination with the "rule of law." Questions to be considered include the following: What do we mean by the rule of law? What is the relation between law and morality? How does the rule of law promote justice, and what is its connection with the ideal of equality? What is the role of a written Constitution in protecting the rule of law? Special emphasis will be given to the Equal Protection clause of the Constitution and its role in prohibiting discrimination against disadvantaged groups, including racial minorities, women, and the handicapped. We will also consider in detail some theories of constitutional interpretation, including the Original Intent theory.

PHIL.3620 Democracy and Its Critics (Formerly 45.362) - Credits: 3
Explores the diverse roots of the democratic ideal and the opportunities and dangers associated with democratic politics. The arguments for and against democracy will be analyzed. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).
PHIL.3650 Capitalism and Its Critics (Formerly 45.365) - Credits: 3

This course explores the historical evolution of capitalism, from its early beginnings in the Enlightenment to the most recent debates about the free market and globalization. The focus will be on the debate over the virtues and vices of capitalism as distinct from other modes of economic and political organization. Concepts to be discussed will include freedom, equality and the distribution of wealth. Readings include Adam Smith, Karl Marx, Max Weber, Joseph S, and others.

PHIL.3660 Globalization and Its Critics (Formerly 45.366) - Credits: 3

The course explores globalization as the process of transformation of regional and national phenomena into global ones, analyzing its social, economic, political, and cultural aspects. Supporters view it as the progress of liberalization and democratization that develop peaceful international cooperation; critics see globalization as the expansion of the profit-seeking global corporations that abuse the less developed and vulnerable regions. The course readings include the works of Amartya Sen, Samuel Huntington, Joseph Stiglitz, and other leading economists, sociologists, and philosophers.

PHIL.3670 Feminism and Liberalism (Formerly 45.367) - Credits: 3

Liberalism stresses the importance of protecting individual people's right to live their lives however they see fit. Feminism strives to show that women are subject to a variety of injustices that prevent them from being able to live lives that are as good as men’s. The aim of this course will be to consider whether liberalism and feminism are compatible, or whether the central ideals of liberalism--ideals like equality, autonomy, and individual rights--actually function to entrench not just sexism but also racism, classism, and other kinds of oppression. Readings will include both historical and contemporary writers such as Isaiah Berlin, Thomas Hobbes, John Locke, Catherine MacKinnon, John Stuart Mill, Martha Nussbaum.

PHIL.3680 The Politics of Food (Formerly 45.368) - Credits: 3

This class will examine the moral and political implications of the food we eat. Topics we'll cover include genetically modified organisms, factory farming, animal rights and welfare, agricultural pollution, agricultural subsidies, third world hunger, the obesity epidemic, and the industrial food system and its alternatives.

PHIL.3750 Philosophy of Sex and Love (Formerly 45.375) - Credits: 3

The aim of this course is to introduce students to both historical and contemporary discussions surrounding the topics of sex and love. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PHIL.3760 The Ethics of War and Peace (Formerly 45.376) - Credits: 3

This course examines theories about why human beings engage in mass killing, the history of moral deliberation about war in major religious traditions, and modern philosophical analyses of the diverse moral principles that those traditions have bequeathed to us. The course comprises three broad ethical questions. First when, if ever, is recourse to arms legitimate (jus ad bellum)? Second, what constraints should apply to military conduct (jus in bellos)? And third, how should wars end (jus post bellum)? These three questions will be systematically discussed by critically examining a selection of writings by historical and modern secular and religious thinkers.

PHIL.3780 Philosophy of Peace and Nonviolence (Formerly 45.378) - Credits: 3

This course examines philosophical theories of peace, pacifism, and nonviolence. We will study ancient and modern accounts, secular and religious traditions, as well as feminist perspectives in the philosophy of peace and nonviolence. We will explore philosophical applications of nonviolence toward nonhuman animals and the natural environment, along with specific cases of nonviolent resistance in contemporary global conflicts.

PHIL.3830 Philosophy of Death and Dying (Formerly 45.383) - Credits: 3

This course is a philosophical and interdisciplinary examination of prominent issues concerning the meaning of life and death and the ethical concerns involved with life, death and end of life issues. Topics in the course include: definitions of death, metaphysics and death, cultural meanings of death, the ethics of killing vs. letting die, euthanasia and suicide, and rights of the dying. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PHIL.3840 Philosophies of Art and Beauty (Formerly 45.384) - Credits: 3

Examines the views of major philosophers on the beautiful and the nature of artistic creativity. An attempt is made to correlate the views of the thinkers with the works of poets, artists, and composers and the statements the latter have made about their work.
PHIL.3850 Philosophy of Popular Culture (Formerly 45.385) - Credits: 3

This course analyzes those forms of art/entertainment commonly referred to under the umbrella term "popular culture" through a variety of philosophical lenses. After seeking to establish a categorization of "popular culture," students will examine the mediums of music, film, television, advertisements and sports. Throughout the course, students will read/listen/watch various examples of the mediums listed above and attempt to answer various questions about them such as: what societal values make these examples popular at a current moment? What cultural assumptions do these examples reflect? What is the artistic/aesthetic merit of these examples?

PHIL.3890 Immigration and Global Justice - Credits: 3

This course addresses the question of justice in regards to immigration policy. We consider a variety of views including Communitarianism, Liberalism, Nationalism, Cosmopolitanism, and Democratic Theory. We will look at how these different positions have answered the following sorts of questions: Do we have duties to strangers of foreigners that are of equal weight to the duties we owe to members of our family, our circle of friends or our nation? Does part of the definition of "self-determined state" include the right to unilaterally reject petitions of inclusion from non-citizens? Does a commitment to equality demand that borders be open?

PHIL.4010 Bioethics and Genetics Research (Formerly 45.401) - Credits: 3

This course addresses ethical issues that arise in biomedical research and practice including autonomy in the doctor-patient relationship, the duty of confidentiality, the right to refuse treatment, the right to death with dignity, the ethics of experimentation with human subjects, the ethics of genetic enhancement, and justice in health care distribution. The course will combine theoretical perspectives and concrete case studies that illustrate actual dilemmas that the health care profession has in fact encountered over the years.

POLI.1010 Introduction to American Politics (Formerly 46.101) - Credits: 3


POLI.1050 Introduction to Public Policy (Formerly 46.105) - Credits: 3

An introductory survey of the major forces and processes involved in the development of public policy; contemporary issues in public policy will also be considered.

POLI.1100 Introduction to Politics (Formerly 46.110) - Credits: 3

An introductory exploration of basic political concepts, ideologies, and themes. Stresses the importance of understanding politics for everyday life.

POLI.1110 Election of 2012 (Formerly 46.111) - Credits: 3

An examination of the American election process in this presidential election year. Attention especially is given to candidates, political issues, political parties, and financing, among other factors, within the process and their influence in the election outcome. Strengths and weaknesses of the election process and reform proposals and prospects will also be addressed.

POLI.1750 Introduction to Environmental Politics (Formerly 46.175) - Credits: 3

This course introduces major concepts in environmental politics to provide a comprehensive understanding of the formation of environmental policy in the United States. Throughout the course, particular attention is paid to the role of government and markets in creating environmental crises and shaping policy responses.

POLI.2120 American Media and Politics (Formerly 46.212) - Credits: 3

This course explores the role of the media in American politics and the role of politics in the American media. We focus first on the historical evolution of newspapers, radio, television, and the internet as vehicles of political news reporting. Next, we look at instances of journalistic bias and distortion in order to explore how corporate consolidation and commercial competition have affected the news industry. Finally, by studying a selection of major stories in depth, we will gain a better understanding of the factors involved in the conversion of political events and developments into seemingly significant news.

POLI.2180 Introduction to Politics and Sports (Formerly 46.218) - Credits: 3

Analyzes the growing importance of sports in American life. Examines the psychological, political and social impact of sports on society. Discusses how sports have been shaped by such monumental events as war, the civil rights movement, and the changing economy.
POLI.2220 Politics of the Internet (Formerly 46.222) - Credits: 3
This course will examine the influence social media and web connectivity have had on political campaigns, campaign fundraising, political mobilization, and the recent proliferation of democratic movements.

POLI.2300 Law and the Legal System (Formerly 46.230) - Credits: 3
Presents an introduction to the nature of the legal process and the operation of the American legal system. Also discusses considerations of its political and social functions.

POLI.2310 Introduction Political Thought (Formerly 46.231) - Credits: 3
A critical survey of the history of Western political thought from Plato to the present.

POLI.2510 Politics of Identity (Formerly 46.251) - Credits: 3
This interdisciplinary course considers the way we construct self-identity through our affiliation with various cultural and political groups- from the "Red Sox nation" to linguistic, economic, nationalistic and ethnic groups. It examines the central role of nationalism; its symbols, traditions and expectations; the role of the media; and the benefits and risks of our allegiance to these groups.

POLI.2530 Introduction to Public Administration and Policy (Formerly 46.253) - Credits: 3
An examination of the little studied fourth branch of government. Bureaucratic power in the American political system is reconsidered.

POLI.2650 State and Local Politics (Formerly 46.265) - Credits: 3
Examination and study of politics and government at the state and local levels, with emphasis on Massachusetts and New England. Practitioners from state and local government will meet with the class.

POLI.3010 Quantitative Methods in Political Science (Formerly 46.301) - Credits: 3
This is a course in designing Quantitative Research and applying statistics for Political Scientific. Meets Core Curriculum Essential Learning Outcome for Critical Thinking & Problem Solving (CTPS) and Quantitative Literacy (QL).

POLI.3020 Research and Writing for Political Science (Formerly 46.302) - Credits: 3
This course provides political science majors with opportunities to hone their research and writing skills. Students analyze representative scholarly and popular sources, explore writing for various venues; and practice editing and revising their work. With prior arrangements students may use this course to complete an honors thesis, pursue an independent research project, or revise and expand an especially promising research paper submitted in a previous course.

POLI.3070 American Political Thought (Formerly 46.307) - Credits: 3
A survey of the historical development of American political thought from the colonial era to the present.

POLI.3090 Political Psychology (Formerly 46.309) - Credits: 3
An in-depth examination of the acquisition and role of political attitudes, values, belief systems, and other psychological mechanisms in shaping political behavior and conflict.

POLI.3100 'Isms' in American Politics (Formerly 46.310) - Credits: 3
An examination of major ideological, philosophical and social currents.

POLI.3110 Foundations of Law: Process & Skills (Formerly 46.311) - Credits: 3
Foundations of Law, Process & Skills presents a comprehensive introduction to the skills, process, expectations, and substantive law presented in the first year of law school. Many students in the social sciences consider the idea of pursuing law school, but have no meaningful avenue to explore the true flavor of the experience, or the commitment they would be taking on. Law School can be immensely rewarding, yet requires a substantial investment of time, personal dedication and financial obligation. The course will provide everything students need to know about the law school experience, while gaining invaluable academic skills in the process, whether or not they choose the law school path.

POLI.3120 Campaign and Election law (Formerly 46.312) - Credits: 3
This course instructs students on campaign and election law; including all relevant cases, statutes and regulations. Students will gain knowledge and skills useful for both future political campaign activity and postgraduate study.

**POLI.3130 Electoral Politics (Formerly 46.313) - Credits: 3**

This course will examine voting behavior in American elections: how voters make decisions, the changing nature of campaigns, the influence of money, media, and polling, and related matters.

**POLI.3140 Parties and Interest Groups (Formerly 46.314) - Credits: 3**

An examination of party systems and coalitions in the US, their changing nature over time, the history of realignment, and the relationship of parties to interest groups.

**POLI.3160 Politics and Film (Formerly 46.316) - Credits: 3**

Analysis of the role of film in creating, expressing, revealing, and responding to social and political ideas and values. Examines a variety of film and film styles and introduces students to elements of film theory, the theory of popular culture and the role of film in forming our ideas about the world.

**POLI.3200 Gender Law and Politics (Formerly 46.320) - Credits: 3**

Explores legal constructions of gender by examining Supreme Court cases, federal legislation, historical documents, news stories, and scholarly essays on sexual inequality in the United States. Topics include the evolution of the family as a legal (and illegal) reality; political regulation of reproduction and sexual activity; feminist critiques of economic inequality; the rise and fall of affirmative action; the changing role of gender in class consolidation; and ongoing debates about the relationships between public and private life.

**POLI.3230 Politics and Baseball (Formerly 46.323) - Credits: 3**

Introductory look at the interaction between the world of baseball and the social and political structures which influence the sport.

**POLI.3240 Politics of Football (Formerly 46.324) - Credits: 3**

How the rise of pro football’s popularity reflects changes in American society during the 20th century. An examination of how politics, economics and television created a sport that has become an American obsession, and some argue, a new religion.

**POLI.3290 Politics of College Sports (Formerly 46.329) - Credits: 3**

Current controversies over the role of college sports within an academic environment with particular attention to Title IX, the pivotal law that altered gender in college sports.

**POLI.3310 Animal Rights and Animal Welfare (Formerly 46.331) - Credits: 3**

This course examines how the structure of the human/non-human animal relationship affects of determines the nature of public policy formation on issues with impacts on non-human animals, both nationally and internationally.

**POLI.3320 The Politics of Food (Formerly 46.332) - Credits: 3**

The course will examine current debates in food politics over: regulatory politics and the appropriate reach of the state in food labeling, safety, and oversight; genetically modified food, organic and sustainable agriculture, the effects of economic globalization of the food supply chain and the future of the world food system.

**POLI.3350 Constitutional Law: Powers & Principles (Formerly 46.335) - Credits: 3**

A study of constitutional law focused on the powers and principles of American government. We will discuss the Declaration of Independence and Revolution, separation of powers, federalism, natural rights, and ordered liberty, emphasizing the case law on the origins of judicial review, the Commerce Clause, war powers, executive privilege, elections, criminal procedure, and search under the Fourth Amendment. Political Science offers two courses in constitutional law for students from any major who are preparing for law school or seeking a background in how constitutional law influences American politics and culture. POLI.3350 or POLI.3370 can be taken alone or both courses in either sequence. On campus and online versions are identical, so student can take each course in either format.

**POLI.3370 Constitutional Law: Rights & Liberties (Formerly 46.337) - Credits: 3**

A study of constitutional law focused on rights and liberties. We will discuss the balance of liberty and authority under the
Constitution, the Bill of Rights, the Fourteenth Amendment, due process, and equal protection, emphasizing the case law on freedom of religion, speech, press, gun rights, LGBT rights, race, abortion, gender, and the death penalty. Political Science offers two courses in constitutional law for students form any major who are preparing for law school or seeking a background in how constitutional law influences American politics and culture. POLI.3350 or POLI.3370 can be taken alone or both courses in either sequence. On campus and online versions are identical, so students can take each course in either format.

POLI.3380 Political Participation (Formerly 46.338) - Credits: 3
Political movements; voting and elections, parties and interest groups; civil disobedience in American politics. Consideration of causes, fluctuations and trends.

POLI.3390 Judicial Review Seminar (Formerly 46.339) - Credits: 3
An advanced examination of the contemporary controversy over judicial activism and constitutional interpretation.

POLI.3400 American Politics And Law (Formerly 46.340) - Credits: 3
Perspectives on American Politics and Law. Advanced study involving extensive reading, writing and discussion seeking understanding of the major transformations impacting contemporary American Society, Politics, Law, Economics and Culture; consideration of different interpretations of these changes, and the ways in which they are manifested in shifting political attitudes and coalitions, and new problems and conflicts.

POLI.3430 Congress (Formerly 46.343) - Credits: 3
Legislative Politics. An advanced study of representation, campaigns and elections, and the functioning of the American national congress within the American political system.

POLI.3440 American Presidency (Formerly 46.344) - Credits: 3
An examination of the nature of the American presidency and its functioning within the American political system. Specific attention is given to the problems and evolution of the presidency since World War I.

POLI.3490 Politics of Race and Ethnicity (Formerly 46.349) - Credits: 3
A study of the politics of race and ethnicity, focusing primarily on American society, and the racial and ethnic groups of the region.

POLI.3500 Urban Politics and Policy (Formerly 46.350) - Credits: 3
A study of political power in, and the political structures of urban areas and the major issues and conflicts currently confronting them.

POLI.3530 Public Policy and Administration (Formerly 46.353) - Credits: 3
An examination of the little studied fourth branch of government. Bureaucratic power in the American political system is reconsidered.

POLI.3550 Government Fiscal Policy (Formerly 46.355) - Credits: 3
An examination of government's budgetary, taxation and expenditure decisions and activities.

POLI.3560 Public Policy Analysis (Formerly 46.356) - Credits: 3
This course examine issues in and techniques utilized in public policy analysis.

POLI.3570 Thoreau in Our Time (Formerly 46.357) - Credits: 3
This course traces Henry David Thoreau's influence on major social and political transformations in American history from the abolitionist movement to the present day. We will focus first on Thoreau's writings on slavery, commercial development, environmental history, and individual liberty. Then we will study his formative role in the civil rights and environmental movements of the twentieth century. Finally, through a mix of outside speakers and student presentations, we will explore how his writings continue to shape ongoing struggles to contend with climate change, advance social justice, and promote a greater sense of fairness in American life. The course will involve at least one trip to Walden Pond and a tour of Thoreau's birthplace in Concord, Massachusetts. Course page: http://faculty.uml.edu/sgallagher/Thoreau_in_Our_Time.html.

POLI.3800 American Foreign Policy (Formerly 46.380) - Credits: 3
A study of the processes of American foreign policy in the
understanding that there may be hidden costs in the price we pay for goods at the supermarket, in a department store? Students will understand the major ideas and tools used to comprehend complex international and global trade relations. Students will understand the way in which goods are produced for global markets and the possible human and environmental costs such production entails.

POLI.3980 The War on Drugs (Formerly 46.398) - Credits: 3
The war against drugs stands as both a major foreign policy priority for the United States, its allies and its adversaries; evaluation and analysis of the criticism of these policies and of the possibilities of achieving disarmament.

POLI.3900 Defense and Disarmament (Last Term 1994 Spring)(Formerly 46.390) - Credits: 3
An advanced study of the international security policies currently pursued by the United States, its allies and its adversaries; evaluation and analysis of the criticism of these policies and of the possibilities of achieving disarmament.

POLI.3980 The War on Drugs (Formerly 46.398) - Credits: 3
The war against drugs stands as both a major foreign policy priority for the United States, its allies and its adversaries; evaluation and analysis of the criticism of these policies and of the possibilities of achieving disarmament. By the end of this course students should understand the major ideas and tools used to comprehend complex international and global trade relations. Students will understand the way in which goods are produced for global markets and the possible human and environmental costs such production entails.

POLI.4470 Theories of Political and Criminal Violence (Formerly 46.447) - Credits: 3
The study of violence has been a central piece of debates in comparative politics that range from the causes of revolution to the analysis of civil wars. This course aims to provide a broad overview of different bodies of research on violence. The class will also revisit crucial debates in the study of violence, such as the problems of separating criminal and political violence (such as interstate wars). By the end of the class, students will be able to identify major theoretical and methodological approaches to violence, major debates and concepts, as well as key cases across the world.

POLI.4110 Dynamics Power and Authority (Formerly 46.411/57.511) - Credits: 3
This course surveys theories of power, authority, participation, and politics. Building on these theories, students will examine changing social, political, and economic patterns of inequality based on class, race (and related divisions of ethnicity, religion, caste, nationality), and gender. Reviews various approaches to altering these dynamics (business strategy, public policy, community and social movements). Cuts across units of firm, community, region, and nation, along with corresponding governmental institutions, and links theoretical analysis with study of practical problem solving. Instructor-initiated cases drawn from a variety of national experiences. Students will learn techniques of power analysis and prepare a power analysis project.

POLI.4390 Justice and Trade in the Global Economy (Formerly 46.439) - Credits: 3
We know that we are part of a global economy and that many of the things we buy and consume are produced in other countries. But what do we know of how they are made? Do we understand that there may be hidden costs in the price we pay for goods at the supermarket, in a department store? Understanding the nature of global trade is critical for us to be effective citizens in the world. Perhaps more important is that we understand how goods are produced and traded - what many think of as “fair” trade. The subject of Fair Trade isn’t simply limited to the production and sale of coffee and chocolate. Fair Trade principles encompass environmental issues, human rights, and politics. Once aware of the ramifications of consumerism on all parts of the world, including the United States, people can make informed choices about the products they buy, the companies that employ them, and the political views they support. By the end of this course students should understand the major ideas and tools used to comprehend complex international and global trade relations. Students will understand the way in which goods are produced for global markets and the possible human and environmental costs such production entails.

PSYC.2690 Research I: Methods (Formerly 47.269) - Credits: 3
An introductory course on the fundamentals of empirical research in psychological science. Instruction will promote understanding and competence in the basic vocabulary of psychological research, addressing information literacy, measurement, reliability, and validity in observed variables and unobserved constructs. Students will learn critical components
of experimental, quasi-experimental, and correlational designs, as well as the basics of descriptive statistics, hypothesis and statistical testing, and matching design to analysis strategies. Students will demonstrate this knowledge through the preparation of a research proposal. Finally, this course will provide students a strong basis from which to pursue advanced coursework in a variety of methodological approaches to psychological research. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

PSYC.3050 Psychology and Law (Formerly 47.305) - Credits: 3

This course is an introduction to many topics representing major fields of study within psychology and law. Topics may include: eyewitness testimony, lie detection, jury selection, child protection, forensic interviews, and the death penalty. In this course, students will be exposed to the diversity of interests among legal psychologists as well as innovative and important ideas, theories, and scientific research findings. Through readings, the study of actual cases, and presentations from guest speakers, students will gain more understanding of how psychologists study and contribute to the legal system.

PSYC.3080 Industrial/Organizational Psychology (Formerly 47.308) - Credits: 3

An introduction to the application of psychological principles and methods to the work domain. Students will develop an understanding of the individual, social, and environmental factors as they relate to organizational performance. Intended as an introduction to the field of Industrial/Organizational (I/O) Psychology, topics include personnel selection and evaluation, training and development, attitudes and motivation, leadership, group dynamics, diversity, organizational structure and climate, and job design and working conditions.

PSYC.3320 History of Psychology (Formerly 47.332) - Credits: 3

Examines the historical roots of psychology from the pre-scientific psychologies of the ancient Greeks to the twentieth century schools of the introspectionists, the Gestalt psychologists, and psychoanalysts. Historical resolutions of recurring issues are contrasted with modern resolutions.

PSYC.3350 Psychology and Women (Formerly 47.335) - Credits: 3

Considers such topics as: the psychology of sex differences; biological bases of psychological sex differences; the nature of female sexuality; clinical theory and practice concerning women; women as mental patients and mental health consumers; implications for psychology and for women's status.

PSYC.3360 Culture and Psychology (Formerly 47.336) - Credits: 3

Provides an analysis to the impact of culture, socio-historical, and social influences on psychological processes and outcomes. Students will also learn about techniques for studying the influence of culture including cross-cultural methods and population-specific methods. Through careful analysis of research literature, this class will examine a variety of contexts within the U.S. and internationally. Topics will include identity development, immigration, acculturation, socialization, and social interactions among groups.

PSYC.3550 Sport and Exercise Psychology (Formerly 47.355) - Credits: 3

The course will cover topics such as motivation, arousal and anxiety in performance, performance enhancement, youth sport and family interactions, leadership, cooperation and competition, team cohesion, gender issues, exercise and mental health, and psychological factors in injury prevention and rehabilitation.

PSYC.3600 Adult Development and Aging (Formerly 47.360) - Credits: 3

Begins with an overview of recent theoretical perspectives on adult development and aging. In chronological sequence, it presents the stages of adulthood and concludes with death and dying. Topics covered include personal, family, and vocational development through adulthood, gender pattern differences, and the impact of changing demographics, including the lengthening of the life span.

PSYC.3630 Introduction to Disability Studies (Formerly 47.363) - Credits: 3

This course provides students with a wide range of interests and backgrounds with the opportunity to examine their own mental model (attitudes/values/assumptions) of disability. It includes an overview of the nature of intellectual disability and other disabilities and it provides opportunities to explore and understand the historical social response to disability. Students will look at a range of strategies for supporting and intervention and they will learn about how to effect change through a variety of strategies, including advocacy.

PSYC.4730 Seminar in Social Psychology (Formerly 47.473) - Credits: 3

An advanced seminar to consider special topics in social...
psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as social aspects of health and illness; inequalities in education; the impact of globalization; attitude formation and prejudice; and psychology of sex roles. This is a writing intensive course.

SOCI.1010 Introduction to Sociology (Formerly 48.101) - Credits: 3
Serves as the basic course in sociology. Emphasis is directed at the ways in which social institutions such as government, schools, the economy, social class, and the family develop and influence our lives. It is concerned not only with presenting various ways to understand our relationship to society but also with ways to change it. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

SOCI.1110 A Novel Approach to Sociology (Formerly 48.111) - Credits: 3
Examines major sociological themes through analysis of literature, primarily major works of fiction.

SOCI.1120 Sociology Goes to the Movies (Formerly 48.112) - Credits: 3
This course is designed to give students the opportunity to survey primary sociological texts and view films, offer commentary on and analysis of social behavior.

SOCI.1150 Social Problems (Formerly 48.115) - Credits: 3
This entry level course uses the core concept of social problems to introduce basic social science reasoning-how social scientist define research questions, develop systematic methods to study them, gather evidence, search for pattern, in link findings to existent knowledge,. Cases provide opportunities to discuss how private problems develop into public issue, illustrating sociology as a discipline that evolves in response to social conflicts and inequalities. The course also meets General Education requirements for Ethics and Diversity.

SOCI.2050 Public Sociology (Formerly 48.205) - Credits: 3
Public sociology includes sociological initiatives targeting non-university audiences and serving the public good. This course will 1) introduce and critique the various conceptualizations of public sociology linking them to broad schools of sociological theory; 2) explore alternative field models and methods, preparing students for field projects in future semesters; and 3) expose students to sociological practitioners and practices compatible with the mission of the university and department. From a liberal arts perspective, the course stresses critical thinking and communication skills.

SOCI.2100 Sociology of Food (Formerly 48.210) - Credits: 3
This course is about Sociology of food exploring the connection between food, society and culture. Our food choices are influenced by age, gender, ethnicity, class and religion. History of food and methods of food production contribute to understanding of social relations among individuals and social changes in society. This course will examine 1. role of food in society, culture and change, 2. changes in food production from simple to complex societies and 3. problems associated with new systems of food production locally and globally.

SOCI.2110 Sociology of American Education (Formerly 48.303/SOCI.3030) - Credits: 3
Course introduces students to ongoing debates in the field of Sociology regarding the American educational system, its structures and functions and how it relates to issues of inequality by race, class and gender. Students are expected to explore, examine and evaluate the current issues relating to the system of education in the United States.

SOCI.2130 Sociology of Immigration (Formerly 48.307/SOCI.3070) - Credits: 3
The United States is frequently described as a country with a proud history of immigration. As a result, citizens and residents of the U.S. often identify their home as a nation of people who make up a melting pot country. While useful and insightful, the melting pot metaphor requires comparison with additional explanations of immigration and immigrant experiences. In order to provide deeper comprehension of the topic matter, this course offers sociological examination of immigration processes, laws, and debates. Three areas compose the main portion of class content: historical accounts and theories, legislation, and the social, economical, and political experiences of immigrants.

SOCI.2140 Sociology of Sports (Formerly 48.340/SOCI.3400) - Credits: 3
Examines the history of modern sports at the amateur and professional levels and international competition. The impact of race, sex, economics, and politics on the institution of sports will also be examined.
SOCI.2160 Sociology of War and Peace (Formerly 48.216) - Credits: 3

The purpose of this course is to examine critically the social forces that contribute to war, war's social consequences, and the possibilities for creating a more peaceful world.

SOCI.2170 Social Movements (Formerly 48.382/SO CI.3820) - Credits: 3

Considers organized action undertaken to alter the social position of a group. Organization, techniques of action, motivation of participants, and group ideologies are studied. Materials from historical, social, psychological, and sociological sources are used.

SOCI.2250 Sociology of Disability (Formerly 48.225) - Credits: 3

This course is organized around several key questions that are used to study the concepts of disability and ability from a variety of sociological and interdisciplinary perspectives. Specifically, the course explores representations of disability in popular culture and medical discourses to discuss disability and ability as social constructs. By looking at various literary and cultural representations, this course investigates constructions of the disabled and abled body, how this becomes politicized, and the implications of these constructions.

SOCI.2310 Sociology of Families (Formerly 48.231) - Credits: 3

This course uses a sociological approach to understand family forms, practices, and controversies in contemporary society, with particular emphasis on families in the United States. We will look closely at how family experiences and opportunities have changed over time, and also how they vary by gender, age, class, race/ethnicity and sexual orientation. What functions do families perform in modern society? How are they changing? How do these changes affect our lives?

SOCI.2340 Race and Ethnicity (Formerly 48.234) - Credits: 3

This course locates and studies the sociological dynamics of race and ethnic relations in the United States as it pertains to all groups. The course material presents theories and models that explain periods of conflict and cooperation between diverse sets of people. While providing some historical background, the course focuses primarily on recent and contemporary situations.

SOCI.2360 Climate Crisis and Society (Formerly 48.236) - Credits: 3

Focusing on case studies of recent and pending environmental disasters, this course will trace how political, social, economic and cultural arrangements and choices contribute to environmental catastrophes and their resolution. In order to identify possibilities for agency, students will play several environmental games in which they will assume roles in the global economy, governmental and civil society to identify possibilities for agency. As a final project, students will describe a recent disaster identifying both structures that create environmental stresses and the options that might exist for structural changes. The project is intended to develop both critical thinking and communication skills.

SOCI.2400 Sociology of Gender (Formerly 48.240) - Credits: 3

This course is an interdisciplinary introduction to the field of gender studies. A variety of topics are presented, such as gender stratification, work and family, sexual identities, media representations of women and men, women's movement, and violence against women. Feminist theories and methods are also introduced.

SOCI.2450 Introduction to Labor Studies (Formerly 48.245) - Credits: 3

This foundational course has two overarching learning objectives: (1) to give students basic empirical knowledge and analytical tools to understand the context of work in the United States at the dawn of the twenty-first century and (2) to give students an understanding of how labour unions work, what has been their impact historically, and what their role is in contemporary society. The course will be explicitly interdisciplinary, drawing on readings from history, sociology, economics, political science, and psychology to offer an introduction to understanding work and labor through a critical lens. In addition, the course will include a service-learning component in collaboration with the UML Labor Education Program.

SOCI.2550 Sociology of Deviance (Formerly 48.255) - Credits: 3

Analysis of how social institutions define and respond to various forms of social deviance, from individual mental illness to gang violence to illegal acts by governments and corporations. Attention will be paid to the construction and management of deviant identities, the role played by social status, and the social importance of institutions of social control.

SOCI.2560 Political Sociology (Formerly 48.256) -

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Credits: 3
Focuses on the development and use of power in modern society. Emphasis is placed on the relationship of American political institutions to economic institutions, to social class, and to supporting ideologies.

SOCI.2700 Self and Society (Formerly 48.270) - Credits: 3
An examination of the relationship between individuals and the social world around them. The course examines the underlying structures that pattern human interaction. Topics include the social construction of the self, the construction of social reality, and the sociology of emotions, among others.

SOCI.2710 Sociology of Work (Formerly 48.371 and SOCI.3710) - Credits: 3
In the United States, work is a fundamental part of people’s identities, consumes huge amounts of our time and effort, is a vital part of our economic and social development, and is linked inextricably to gender, racial-ethnic, and class inequalities. This course will take a sociological perspective, challenging students to take a step back and look analytically at work, something with which most of us are intimately familiar.

SOCI.2760 Sociology of the Gun (Formerly 48.276) - Credits: 3
This course examines the social impact of guns on the American psyche, from deer hunters and intergenerational family bonds to street gangs and broken families, from collectors and recreational users to hospital trauma. Self-defense issues are discussed within the context of the Second Amendment. The conflict between pro-gun and anti-gun special interest groups and the evolution of an American gun culture will be studied.

SOCI.2800 Drugs and Society (Formerly 48.280) - Credits: 3
This course is designed to introduce students to the cultural and political qualities of drugs in society. The course provides a historical and cross-cultural overview of the use of organic and simple processed substances, as well as a history of drug policy in the United States.

SOCI.3010 Sociology of Human Rights (Formerly 48.301) - Credits: 3
Examines the politically divergent definitions of rights and freedoms. Attention will be paid to the activities of international human rights organizations to the human rights policies of the major powers. Various current human rights issues will be examined. Case histories may include the Soviet Union, Northern Ireland, South Africa, Afro-Americans, Armenians and Palestinians.

SOCI.3020 Seminar on Homelessness: Lowell and Mumbai - Credits: 3
This course will focus on understanding housing insecurity by looking closely at what it means to be homeless in two very different cities, located across the world from each other: Lowell, USA and Mumbai, India. In doing so, we will use this comparison to highlight the root causes of homelessness within a global context, including how certain social situations, policies and innovations may exacerbate and/or improve this situation. Simultaneously, students will gain a first-hand understanding of homelessness in Lowell through performing 3-4 hours of service per week at a local shelter and/or drop-in center.

SOCI.3040 Science, Technology and Society (Formerly SOCI.2220) - Credits: 3
The complex relationships between science, technology, and society are commonly obscured by a popular belief in the value-neutrality and objectivity of science and technology. Being able to analyze that belief as a myth is necessary in order to engage in critical analysis of the ways in which science, technology and society are mutually constituted. Social inequalities are both built into and perpetuated by science, technology, and engineering. Likewise, science, technology, and engineering shape and are shaped by various societal power relations. This course will provide the analytical tools necessary to understand science, technology, and engineering as fundamentally social enterprises and to understand how they shape society.

SOCI.3050 Sociology of Family Law (Formerly 48.305) - Credits: 3
Examines some social issues in family law, the changes therein, and the social climate and consequences accompanying these. By using the sociological method of inquiry to examine family law cases, the relationship between law and society as instruments of order and change are exemplified.

SOCI.3100 Ethnicity in Massachusetts (Formerly 48.310) - Credits: 3
Massachusetts is well known for its rich immigrant history and culture. This course examines the social history of and conditions faced by immigrants upon arrival to Massachusetts,
the ways they are affected as they settle in communities and their social and cultural impact locally and state-wide. Selected ethnic groups/communities are examined to understand the common processes and experiences as well as differences among them.

**SOCI.3110 Sociological Perspective on Communication & Social Change (Formerly 48.311)** - Credits: 3

Most social interactions and interventions involve communication. Thus, communication patterns present critical issues for sociological inquiry. This course introduces communication as a central yet often ignored element of social life. It surveys existing communication theories, then focuses on models used by marginalized populations in efforts to democratize communication systems. Finally, it introduces tools for communication strategizing. As a final product students will conduct a frame analysis of a current social topic. From a general liberal arts perspective, the course will stress critical thinking and writing skills.

**SOCI.3160 Youth and Society (Formerly 48.316)** - Credits: 3

Youth (or adolescence) constitutes a historically and socially constructed stage of the life course between childhood and adulthood. Since the early twentieth century, society’s view of this life period has been ambivalent, at once glorifying the age of youth while also fretting over the problems that youth face. This course takes a sociological view of the study of youth/adolescence with particular attention to: (1) how this stage of the life course intersects with race, gender, immigration status and sexuality; (2) how society has responded to youth over time through a range of youth-serving organizations and media representations; and (3) how youth have responded as agents in their own public representations and development.

**SOCI.3200 Community Service (Formerly 48.320)** - Credits: 3

Course uses fieldwork approach to understand social problems and to discipline study and career pursuit in the area of public service.

**SOCI.3300 Fast Food, Hot Planet: Sociological Approaches (Formerly 48.330)** - Credits: 3

With an eye on climate change sustainability, this course maps the social and historical dimensions of crisis and inequalities of food production and distribution. In addition to exploring food security's relation to sustainable food production, students will strengthen critical thinking, writing, and library research skills.

**SOCI.3410 Wealth, Status and Power (Formerly 48.341)** - Credits: 3

Focuses on the phenomenon of social class distinctions with particular emphasis on social class in America. The approach is both historical and sociological.

**SOCI.3450 Urban Sociology (Formerly 48.345)** - Credits: 3

Deals with issues related to the quality of life in American cities. Students taking this course may engage in research projects on the city of Lowell and the role of the University of Massachusetts Lowell within that city.

**SOCI.3510 The Sociology of Health and Health Care (Formerly 48.351)** - Credits: 3

With the passage of the Affordable Care Act, the U.S. Health Care system is undergoing a radical change as profound as any in U.S. history including those for minority and woman's rights. A large segment of the population has struggled to obtain even basic health care coverage. The changes taking place are analyzed in a historical and comparative context by examining health care in other countries. Special attention is given to understanding the professions in medicine and the role medical professions have had in shaping medical care. At the micro level, the course examines evolving health care provider/patient relationships to better understand the level of control patients can exert over their health care decisions.

**SOCI.3520 Latinos/as in the United States** - Credits: 3

By 2060, Latinos are forecast to comprise over 28 percent of the US population. While the presentation of Latinos/as in public discourse often frames them as recently arrived immigrants, Spanish-speaking peoples in the US have a long and rich history. This course focuses a sociological lens on the historical and contemporary experiences of a community whose emergence requires deep analysis. Emphasis is placed on immigration policy, demographic shifts, labor market discrimination and bilingual education.

**SOCI.3550 Black Experience in American Life** - Credits: 3

An investigation of religious institutions and experiences. Emphasis is placed on the influence of religion on social change.

**SOCI.3600 Sociology of Non-Violence (Formerly**
48.360) - Credits: 3
An analysis of non-violent efforts to achieve social change through demonstrations, civil disobedience, etc. Movements led by Mahatma Gandhi, Martin Luther King, Jr., and others are examined.

SOCI.3610 Sociology of Law (Formerly 48.361) - Credits: 3
The course examines the role of social forces in defining the law. Topics include the legal profession, white-collar crime, and the importance of race, class and gender in the criminal justice system.

SOCI.3620 Social Welfare Policy (Formerly 48.362) - Credits: 3
The course examines the development of social welfare policy in the United States as well as alternative strategies for social welfare provision. Particular attention is paid to the role of race/ethnicity, class, and gender in the formation of social welfare policy.

SOCI.3800 Sociology of Mass Media (Formerly 48.380) - Credits: 3
Examines ownership and control patterns of electronic and print media and their impact on media content and censorship.

SOCI.4040 Learning from the Field (Formerly 48.404) - Credits: 3
Provides students with the opportunity to directly observe and participate in the operation of a social service organization.

SOCI.4050 Feminist Methodologies (Formerly 48.405) - Credits: 3
Despite the recent growth of feminist methodologies, there is no one way of doing feminist methodologies. The growing body of literature in this area addresses the distinctive challenges and strengths of doing this research. Gender Studies scholars especially seek to question the framing of a study, managing of emotions, and ethical dilemmas. We will explore feminist strategies for creating, implementing, and analyzing a project that is grounded in the everyday lives of people while situating them in a social, political, and economic context. We will explore the interdisciplinary intersections where these challenges push at the boundaries of the disciplines of your major field of study. We will also investigate how to use as variety of qualitative approaches while doing a feminist project and the ways in which feminism can enlighten understandings of "traditional" qualitative methods.

SOCI.4210 Seminar on the Family (Formerly 48.421) - Credits: 3
Study of the family structures and gender roles in various human societies. Prerequisites: 48.101 plus either 48.231 or 48.241.

SOCI.4720 Seminar on Ethnic Communities (Formerly 48.472) - Credits: 3
This course examines a variety of issues, problems and prospects immigrants experience as they attempt to "make it in America". Immigrant America is increasingly ethnically diverse and this course focuses on the factors underlying migration and the ethnic communities migrants settle into with the aim to understand the cultural and contextual basis of their lives, their success and challenges.

THEA.2210 Stagecraft (Formerly THEA 221) - Credits: 3
Survey of the materials, skills, and techniques of technical theatre (including scenic construction, scene painting, lighting, and sound production) through reading, lecture, and hands-on experience. Replaces 42.252; credits may not be earned for both 42/59.252 and THEA 221.

WLIT.3250 Italian American Literature and Culture (Formerly 52.325) - Credits: 3
Discusses the most prominent authors and works of Italian-American Literature as they, by using the ethnic setting, are able to convey universal human concerns and themes. The discussion on Italian-American ethnic issues will include such films as The Godfather, Moonstruck, The Sicilian, Goodfellas, and The Untouchables. Conducted in English.
Arabic Studies Minor

The Arabic Studies Minor introduces students to critical approaches to the study of Islam, Muslim societies and cultures of the Middle East. The goal of this interdisciplinary minor in the humanities and social sciences is to broaden and deepen students understanding of Arabic societies and cultures in order to meet the demands of business, government and academia for skilled specialists in the language, culture, history and politics of the Middle East.

A minor in Arabic Studies consists of 18 to 24 credits (6 to 8) courses, at least two courses at the 3000 level from the section of electives, including the following requirements:

**Required Language Courses**

- WLAR.1150
  (https://www.uml.edu/catalog/courses/WLAR/1150)
  Arabic 1 and Culture
- WLAR.1160
  (https://www.uml.edu/catalog/courses/WLAR/1160)
  Arabic 2 and Culture
- WLAR.2150
  (https://www.uml.edu/catalog/courses/WLAR/2150)
  Arabic 3 and Culture
- WLAR.2160
  (https://www.uml.edu/catalog/courses/WLAR/2160)
  Arabic 4 and Culture

**Electives**

Students may take 2 to 4 courses from the list below, two of which (6 credits) must be at the 3000 level or above.

Course Listing for Arabic Studies
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

For more information, please contact Fabiana Viglione (mailto:Fabiana_Viglione@uml.edu), program coordinator.
ARHI.3020 Studies In World Art (Formerly 58.302) - Credits: 3
Historical and critical examination of regions works of art from China, Asia, the Islamic world, India, Africa, North America, Latin America, Native American Art and Mexico. Topics vary from year to year. Course may be repeated.

ARHI.3151 Islamic Art and Contemporary Society (Formerly as 59.315) - Credits: 3
This course introduces students to Islamic art through a survey of works across the broad reach of the Islamic world including Saudi Arabia, Northern and Saharan Africa, Spain, the former Ottoman Empire surrounding Turkey and the Greater Middle East. The last unit of the course looks at Islamic art in the diaspora. The course highlights works form c. 500 CE to the present, ending with the ultra modern city of Dubai.

HIST.3020 The Byzantine Empire (Formerly 43.302) - Credits: 3
Through this course, students will examine the history of Byzantine culture, which grew from the Greek-speaking remains of the Roman Empire. Students will consider how leading men and women shaped Byzantine Civilization and the political and military institutions that preserved it through the fifteenth century. The course will also focus on the development and spread of Eastern Orthodox Christianity and significant aspects of Byzantine culture, such as cuisine, gender roles, cities, and art. We will explore in some detail Byzantium’s complex and difficult dialog with its neighbors: the Islamic world, the Slavs, and the Latin West. This course especially emphasizes reading and discussion of primary source documents. Students will compose a research paper as their main work for this class.

HIST.3930 History of the Middle East and Islamic World (Formerly 43.393) - Credits: 3
This course examines the history of the Middle East and the Islamic World from the time of Muhammad to the present. It provides an introduction to the history of this often turbulent region. It exposes students to the processes and patterns that have shaped the history of the Islamic World. The course examines the historical roots of the many challenges that the region faces today.

HIST.3931 Empire and Resistance in the Modern Middle East - Credits: 3
This course explores the role of empires in the Middle East from the 18th through the first half of the 20th century. During this period various forms of imperial rule defined the region’s governance-from Ottoman rule to the British occupation of Egypt in the late 19th century to British and French mandate states in much of the region post World War I. The course will emphasize comparative approaches to understanding how these empires shaped the region. We will examine how these various forms of empire were engaged by local populations, from elites to peasants, and how their histories impacted the independent nation-states that succeeded them.

PHIL.2960 Introduction to World Religions (Formerly 45.296) - Credits: 3
A study of religious knowledge and the phenomena of religion from a philosophical standpoint. The course considers explanations for religious behavior, some central issues in religious belief, and the values and goals of religious systems. Various world religions provide specific data for these topics.

PHIL.3730 Arabic and Islamic Philosophy (Formerly 45.373) - Credits: 3
An introductory survey of selected philosophical topics and figures in the Arabic-speaking world, focusing on the development of classical Arabic philosophy (falsafa) through its proponents and critics from al-Kindi (9th century) to Averroes (12th century). The course can also include speculative theology (kalam), mystical philosophy (Sufism), later developments, and contemporary issues.

POLI.3340 Islam and Politics (Formerly 46.334) - Credits: 3
The course will explain the nature of the relationship between Islam and Politics by examining the rise of the first modern Islamic movement, and by examining other Islamic movements that spread throughout the Muslim world.

POLI.3680 Middle East Politics (Formerly 46.368) - Credits: 3
The region will be analyzed using a comparativist lens, whereby the historical context of creating nation states in the region and the effect of colonialism will be applied to contemporary politics. Women, religious/ethnic minorities and the dynamics of the Arab Spring will also be addressed comparatively.

POLI.3840 International Politics of Human Rights (Formerly 46.384) - Credits: 3
This course will address the history, content, structure, law, and politics of international human rights. Using interactive participatory class format students will learn analytical and critical thinking skills as well as written and oral
communication skills.

POLI.3870 Politics of International Organizations  
(Formerly 46.387) - Credits: 3

This course will address the history, functioning, structure and politics of international organizations in world politics. International Governmental Organizations as well as Non-Governmental Organizations on the global and regional level will be analyzed and discussed. In a participatory and interactive class format students will develop analytical and critical thinking skills.

POLI.4020 Women in Islam  
(Formerly 46.402) - Credits: 3

Focusing upon one of the most important topics in Islam, this course will go beyond conventional stereotypes and explore woman’s many and varied roles within Islamic cultures and societies.

POLI.4060 The Politics of Identity in the Middle East  
(Formerly 46.406) - Credits: 3

The course will examine the ethnic, political, religious and social changes in the modern Middle East. The course will start with an introduction to the diverse identities all over the Middle East and then it will comparatively examine a number of those identities.

POLI.4460 The Politics of Discord between the Arab East and The West  
(Formerly 46.446) - Credits: 3

The course examines the roots of political discord in the Arab East starting with colonialism and progressing to the contemporary state of dissension. Throughout the course the stress on the effect of this discord on comparative domestic politics and international relations in the region will be examined.

POLI.4470 Theories of Political and Criminal Violence  
(Formerly 46.447) - Credits: 3

The study of violence has been a central piece of debates in comparative politics that range from the causes of revolution to the analysis of civil wars. This course aims to provide a broad overview of different bodies of research on violence. The class will also revisit crucial debates in the study of violence, such as the problems of separating criminal and political violence (such as interstate wars). By the end of the class, students will be able to identify major theoretical and methodological approaches to violence, major debates and concepts, as well as key cases across the world.

POLI.5001 Islam and Politics - Credits: 3

The relationship between Islam and Politics changed little since the rise of Islam. The surge in academic and public interest in the topic started in 1979 with the Iranian Revolution. This course will explain the role that Islam plays in everyday life, and will distinguish myth from fact about Islam and politics. Initially, the course will focus on the Muslim Brotherhood of Egypt as the prototype and first Islamic organization that was heavily involved in politics, will continue on to examine a range of issues including Jihad, woman’s rights, and related topics.

SOCI.2340 Race and Ethnicity  
(Formerly 48.234) - Credits: 3

This course locates and studies the sociological dynamics of race and ethnic relations in the United States as it pertains to all groups. The course material presents theories and models that explain periods of conflict and cooperation between diverse sets of people. While providing some historical background, the course focuses primarily on recent and contemporary situations.

WLAR.1150 Arabic 1 and Culture  
(Formerly 53.115) - Credits: 3

Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 115, 116 and 215, 216 levels must be elected in the prescribed sequence.

WLAR.1160 Arabic 2 and Culture  
(Formerly 53.116) - Credits: 3

This course is for students who have completed 53.115 Arabic 1 and Culture. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 115, 116 and 215, 216 levels must be elected in the prescribed sequence.

WLAR.2150 Arabic 3 and Culture  
(Formerly 53.215) - Credits: 3

Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 117, 118 and 215, 217 levels must be elected in the prescribed sequence.

WLAR.2160 Arabic 4 and Culture  
(Formerly 53.216) - Credits: 3

Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 117, 118 and 215, 217 levels must be elected in the prescribed sequence.
Credits: 3

Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 115, 116 and 215, 216 levels must be elected in the prescribed sequence.

WLAR.4940 Directed Study in Arabic (Formerly 53.494) - Credits: 3

Individual research projects on Arabic or Islamic culture. Students, through regular and frequent consultation with instructor, pursue a special topic of research.
ARCH.2060 History of Architecture (Formerly 58.206) - Credits: 3

A survey of the major technical and stylistic developments in ecclesiastical and secular architecture from Prehistory to the present day studied with an emphasis on the major monuments (Parthenon, Pantheon, Gothic Cathedrals, St. Peter's, Versailles Palace, Eiffel Tower, Guggenheim Museum). Spring, alternate years.

ARCH.3140 American Architecture (Formerly 58.314) - Credits: 3

This course begins with a discussion of native American building traditions and proceeds chronologically from the 17th through the 20th centuries. Students will gain a familiarity with the major movements in American architecture (such as Colonial, Greek Revival, Victorian, Arts and Crafts, City Beautiful, International Style, Postmodern) as well as the leading architects such as Frank Lloyd Wright and Frank Gehry. The architecture is discussed in its historical context with attention to the inventions, materials and aesthetic assumptions that made it possible.

ARCH.3150 Modern Architecture (Formerly 58.315) - Credits: 3

This course will examine global architecture from the 19th century to the present. It addresses the major movements, "isms", architects, publications, schools, and technological innovations that contributed to varied (and often conflicting) notions of "Modern architecture." Growing nationalism and politics, travel and colonial occupation, the effects of war, and changing conceptions of nature and science, all transformed the built environment. This course will provide a better understanding not only of individual works but also of the ways architecture manifests important themes such as nationalism, regionalism, functionalism, rationalism, and the most current theme, happiness.

ARCH.3160 Architectural Utopias - Credits: 3

can we build a better world? Many people from various eras and geographical locations have argued we can. The idea of utopia -- a place of harmony free from want and strife -- has shaped both imagined and real places. So has its opposite: dystopia. This course will focus on architectural visions and solutions for utopias from the ancient world to the present: from myths of long-lost cities to projected colonies on the moon and Mars.

ARCH.3550 The City and the Environment - Credits: 3

This course examines the many ways that communities, architects, and developers have responded (or not responded) to the American landscape and environment. It will begin with the earliest settlements established by the colonists, such as Havana, Cuba, and New York City and progress to the present with a special emphasis on Lowell and Boston. The course will not only examine specific cities but also architectural utopias, city planning, the national park system, sustainable design, and contemporary efforts to merge the needs of the city with environmental awareness.

ARHI.2030 History of Art I: Prehistoric to Medieval Art (Formerly 58.203) - Credits: 3

A survey of the origins of painting, sculpture, and architecture from the prehistoric period through approximately 1300 CE. Works of art are discussed in their historical, cultural, and artistic contexts.

ARHI.3650 Art and Environment (Formerly ARHI.2300) - Credits: 3

This course surveys developments in land, environmental, and ecological art. Some of the most compelling artists today engage with the politics of land use, including the conditions of the global economy, climate change, environmental justice, sustainability, sovereignty and land claims, uneven geographies and expanding megacities, and the privatization of public space.

ARTS.1550 Drawing I (formerly 70.155, 70.255) - Credits: 3

Provides a foundation in basic drawing concepts using a variety of media and approaches. The emphasis is on building visual literacy and its application to the realm of ideas. A wide range of assignments are given to develop graphic expression.

ARTS.1560 Drawing II (Formerly 70.156, 70.256) - Credits: 3

The emphasis is on giving form to ideas through building a solid sense of visual literacy. Assignments include a wide range of color media, surface, and subject matter with the focus on the psychological and structural use of color, creative experimentation, and the development of personal style. Fall and spring.

ARTS.2100 Graphic Design I (Formerly 70.210) - Credits: 3

Exercises, lectures and projects will introduce students to graphic design principles and techniques. Course will begin with a fundamental study of image, form, and space relations, then cover such topics as working with grids, typography basics, page layout, the introduction of color, rendering
techniques, denotative and connotative image making, history, and more. Students will be assigned a series of projects to enhance their visual communication skills. Students will be introduced to the software used in contemporary design practice. Students must earn a C+ or better in the course to continue in the Graphic Design BFA program.

ARTS.2350 Sculpture I (formerly 70.235) - Credits: 3
The exploration of three-dimensional form through the use of basic materials, methods and approaches. Assignments will include expressive problems based on human and non-objective form relationships. Spring.

ARTS.2710 Painting I (formerly 70.271) - Credits: 3
Presents oil painting techniques as vehicles for serious creative expression. A variety of assignments will be given to help the student build proficiency in the use of color, paint handling, and subject matter.

ARTS.3711 Place: A Visual Exploration of Lowell (Formerly ARTS.2711) - Credits: 3
This studio course is designed for students who have an interest in making images to explore the concept of "place", using the landscape of Lowell as a creative resource. Open to all university students, the course is structured for students who are new to the arts as well as students who have previous studio art experience. Drawing upon the unique features of the particular landscape that is the city of Lowell, students will build a body of images that is a response to the geographical and cultural histories evident in the city's physical attributes. From its history as the center of industry and textile design to the present day, the city will be viewed as raw material for the conceptual foundation of the work produced in this course. (Class will meet both on and off-campus.)

ARTS.3780 Interactive Media II - Credits: 3
This course will immerse students in interactive storytelling. The class will investigate time-based interactive media practices and feature hands-on lab projects. The course will contextualize interactivity within the relevant history shaping contemporary storytelling. Students will engage with exemplary interactive media projects as well as survey experimental ones. The students will apply design thinking, user experience design (UX), and media archeology to increasingly self-directed projects. The course will engage in cross-platform content publishing to browsers, mobile devices, and emergent technology platforms such as Virtual Reality.

GEOL.1010 General Geology (Formerly 89.101) - Credits: 3
General meteorology course. Topics include atmospheric composition, solar radiation, temperature, moisture and condensation relationship between air pressure and wind, weather patterns, severe weather, optical phenomena in the atmosphere, and the behavior and possible change of climate. Appropriate for KCS major science elective.

CIVE.1070 Introduction to Engineering for Civil and Environmental (Formerly 25.107/14.107) - Credits: 2
This course provides an introduction to the elements of computer aided design using AutoCAD. Through assignments and projects, students learn various AutoCAD principles, i.e., graphic entities, hatch patterns, layering, and dimensioning, with special emphasis on completing a design project. Two-dimensional drafting and three-dimensional modeling and surface revolution are also discussed. This course is intended for freshmen in civil and environmental engineering majors.

ENGL.2490 Literature on Technology and Human Values (Formerly 42.249) - Credits: 3
A study of the relationship between works of fiction, cultural attitudes toward technology, and social values. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

ENGL.3240 Writing About Place (Formerly 42.324) - Credits: 3
Writers throughout time have been thoroughly grounded in place. Students in this course will read and write on a variety of topics: travel, cities, suburbs, dwelling places, nature, environmental issues, etc., in a variety of genres: creative non-fiction, essays, journalism, short stories, poetry, journals. This course will be held in a workshop format with strong emphasis on revision.

ENGL.3245 Writing about the Environment - Credits: 3
From John Muir to Rachel Carson to Bill McKibben, environmentalists have traditionally relied upon the power of their prose to transform the thoughts and behavior of their contemporaries. Stemming form the premise that writing is a form of environmental action, this course introduces students to a range of modes of writing in environmental studies. In the process of reading, discussing and practicing different kinds of environmental writing, students will develop a variety of writing skill in addition to an appreciation for writing as an important form of environmental action.
Presents a study of the earth with emphasis on earth materials, earth structure (crustal and internal), earth history, and the development of life. Designed for the general student.

MATH.1220 Management Calculus (Formerly 92.122) - Credits: 3
Review of difference quotient, least squares modeling, limit of difference quotient, differential calculus: derivatives, differentials, higher-order derivatives, implicit differentiation, relative and absolute maxima and minima of functions, and applications of derivatives to business and economics. Integrals and applications to business. No credit in Science or Engineering.

MATH.1310 Calculus I (Formerly 92.131) - Credits: 4
Serves as a first course in calculus. Functions, limits, continuity, derivatives, rules for differentiation of algebraic and transcendental function; chain rule, implicit differentiation, related rate problems, linearization, applied optimization, and curve sketching. Introduction to area and integration. Students are expected to have taken pre-calculus and trigonometry in order to be successful in this course.

PCST.5270 Sustainable Housing Development and Land Use: Conflict, Policy, and Practice (Formerly PCS 527) - Credits: 3
Housing is fundamental to the quality of life in communities, and housing conflict, policy and practice shape the availability of this fundamental good. This course will examine the economic, environmental, social, and cultural factors that shape housing and its sustainability. The contentious nature of housing and land use policy in the United States will be summarized, with students learning how housing policy impacts communities, states, and regions. The course will then give students a detailed understanding of the conflictive process through which housing is developed and the role the market, government, funders, workers, and housing consumers play in influencing the creation and development of housing. The course will highlight ways in which current housing development policy and practices are not sustainable, and will examine more recent efforts to establish standards and practices that enhance consensus and sustainability. Students will learn how to manage conflict and take a housing project through the various stages, such as project conceptualization, market analysis, design, site acquisition, financing, construction, and occupancy. While the course focuses on the U.S. context, students will learn of international efforts to achieve greater sustainability in housing. The course will provide students with both practical and theoretical knowledge of housing and land use conflict, policy and development practices. Case studies of actual projects will be presented.

PHIL.3890 Immigration and Global Justice - Credits: 3
This course addresses the question of justice in regards to immigration policy. We consider a variety of views including Communitarianism, Liberalism, Nationalism, Cosmopolitanism, and Democratic Theory. We will look at how these different positions have answered the following sorts of questions: Do we have duties to strangers of foreigners that are of equal weight to the duties we owe to members of our family, our circle of friends or our nation? Does part of the definition of "self-determined state" include the right to unilaterally reject petitions of inclusion from non-citizens? Does a commitment to equality demand that borders be open?

POLI.1750 Introduction to Environmental Politics (Formerly 46.175) - Credits: 3
This course introduces major concepts in environmental politics to provide a comprehensive understanding of the formation of environmental policy in the United States. Throughout the course, particular attention is paid to the role of government and markets in creating environmental crises and shaping policy responses.

POLI.2530 Introduction to Public Administration and Policy (Formerly 46.253) - Credits: 3
An examination of the little studied fourth branch of government. Bureaucratic power in the American political system is reconsidered.

PUBH.1021 Introduction to Public Health (Formerly 30.102) - Credits: 3
Public health topics, both historical and contemporary are of importance to all citizens and to societal decisions. This survey course provides a foundation for understanding public health through exposure to current health care and policy issues viewed through the perspective of multiple disciplines. Methodology for understanding population health and developing critical thinking and decision-making skills in the analysis of public health issues using a population-based perspective will be developed. The course will provide an ecological understanding of the causation and prevention of disease with an emphasis on health issues that affect society as a whole.

PUBH.2080 Principles of Environmental Health Science (Formerly PUBH.208) - Credits: 3
This is a survey course that provides an overview of the rapidly growing field of environmental health, through an introduction to the links between environmental stressors and impacts on public health. The course will explore human and industrial
activities that impact on health such as overpopulation, food production, air and water pollution, waste, toxic substances, pests, and global climate change. The course will also examine the types of diseases and illnesses that result from environmental impacts. These impacts have multiple causes and understanding these can in turn provide clues as to the most effective prevention options. Students will explore topics of interest in greater detail through short writing assignments. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

SOCI.2360 Climate Crisis and Society (Formerly 48.236) - Credits: 3

Focusing on case studies of recent and pending environmental disasters, this course will trace how political, social, economic and cultural arrangements and choices contribute to environmental catastrophes and their resolution. In order to identify possibilities for agency, students will play several environmental games in which they will assume roles in the global economy, governmental and civil society to identify possibilities for agency. As a final project, students will describe a recent disaster identifying both structures that create environmental stresses and the options that might exist for structural changes. The project is intended to develop both critical thinking and communication skills.

SOCI.3450 Urban Sociology (Formerly 48.345) - Credits: 3

Deals with issues related to the quality of life in American cities. Students taking this course may engage in research projects on the city of Lowell and the role of the University of Massachusetts Lowell within that city.

THEA.2300 Foundations of Theatrical Design (Formerly THEA 230) - Credits: 3

Basic principles and techniques in scenic, lighting and costume design for theatre. Replaces 42.260 and 59.386; credits may not be earned for both 42.260 and THEA 230 or for 59.386 and THEA 230.

THEA.3110 Play Production (Formerly THEA 311) - Credits: 3

Introduction to the design and technical aspects of theatre through hands-on experience working on campus productions. Focus on basic principles of set, lighting, props, costume, makeup, and sound production. May be repeated for credit.
ROTC.0001 Independent Study (MSL IS I) (Formerly 28.001) - Credits: 3
Advanced topics in leadership and management utilizing the military decision making process not covered in the regular curriculum. Content may vary from year to year. Due to the unique nature of this course, entrance into this course requires a permission number granted by the instructor.

ROTC.0002 Independent Study II (MSL IS II) (Formerly 28.002) - Credits: 3
Advanced topics in leadership in a tactical environment with a focus on adventure training. Content may vary from year to year. Due to the unique nature of this course, entrance into this course requires a permission number granted by the instructor.

ROTC.1400 Leadership and Personal Development (MSL 101) (Formerly 28.140) - Credits: 3
Leadership and personal development introduces students to the personal challenges and competencies that are critical for effective leadership. They will learn how the personal development of life skills such as goal setting, time management, physical fitness, and stress management relate to leadership, officerhip, and the Army profession. The focus is on developing basic knowledge and comprehension of Army leadership dimensions, attributes and core leader competencies while gaining a big picture understanding of the ROTC program, its purpose in the Army, and its advantages for the student.

ROTC.1700 Introduction to Tactical Leadership (MSL 102) (Formerly 28.170) - Credits: 3
Introduction to tactical leadership overviews leadership fundamentals such as setting direction, problem-solving, listening, presenting briefs, providing feedback, and using effective writing skills. Students will explore dimensions of leadership attributes and core leader competencies in the context of practical, hands-on, and interactive exercises.

ROTC.2300 Foundations of Leadership (MSL 201) (Formerly 28.230) - Credits: 3
Foundations of Leadership explores the dimensions of creative and innovative tactical leadership strategies and styles by examining team dynamics and two historical leadership theories that form the basis of the Army leadership framework. Aspects of personal motivation and team building are practiced planning, executing and assessing team exercises.

ROTC.2400 Foundations of Tactical Leadership (MSL 202) (Formerly 28.240) - Credits: 3
Foundations of Tactical Leadership examines the challenges of leading tactical teams in the complex contemporary operating environment (COE). This course highlights dimensions of terrain analysis, patrolling, and operation orders. Further study of the theoretical basis of the Army Leadership Requirements Model explores the dynamics of adaptive leadership in the context of military operations. MSL 202 provides a smooth transition into MSL 301. Cadets develop greater self-awareness as they assess their own leadership styles and practice communication and team-building skills. COE case studies give insight into the importance and practice of teamwork and tactics in real-world scenarios.

ROTC.3300 Adaptive Team Leadership (MSL 301) (Formerly 28.330) - Credits: 3
During this course students will study, practice, and apply the Fundamentals of Army Leadership, Officerhip, Army values and Ethics, personal development, and small unit tactics at the team and squad level. At the conclusion of this course, students will be capable of planning, coordinating, navigating, motivating and leading a team or squad in the execution of a tactical mission during a classroom PE, a Leadership Lab, or during a Situational Training Exercise (STX) in a field environment. Students will receive systematic and specific feedback on their leader attributes, values and core leader competencies using the ROTC Leader Development Program (LSP) model. Due to the unique nature of this course, entrance into this course requires a permission number granted by the Instructor.

ROTC.3400 Applied Team Leadership (MSL 302) (Formerly 28.340) - Credits: 3
During this course students will study, practice, and apply the fundamentals of Army leadership, Officerhip, Army values and ethics, personal development, and small unit tactics at the team and squad level. At the conclusion of this course, students will be capable of planning, coordinating, navigating, motivating and leading a team or squad in the execution of a tactical mission during a classroom PE, a Leadership Lab, or during a Situational Training Exercise (STX) in a field environment. Students will receive systematic and specific feedback on their leader attributes, values and core leader competencies using the ROTC Leader Development Program (LDP) model. Due to the unique nature of this course, entrance into this course requires a permission number granted by the Instructor.

ROTC.4400 Adaptive Leadership (MSL 401) (Formerly 28.440) - Credits: 3
Adaptive Leadership is designed for students to apply their
leadership techniques. Throughout the semester, students are assigned the duties and responsibilities of an Army staff officer and must apply the fundamentals of principles of training and the military decision making process to plan, execute and assess ROTC training. Students will be given numerous opportunities to train, mentor and evaluate underclass students enrolled in the ROTC Basic Course. Students will study how Army values and leader ethics are applied in the Contemporary Operating environment and how these values and ethics are relevant to everyday life. Students will study the Army officer’s role in the counseling of subordinates, administrative actions and the management of an Army Officer’s career. Due to the unique nature of this course, entrance into this course requires a permission number granted by the Instructor.

ROTC.4500 Leadership in a Complex World (MSL 402) (Formerly 28.450) - Credits: 3

Leadership in a Complex World explores the dynamics of leading in the complex situations of current military operations in the contemporary operating environment (COE). Students will examine differences in customs and courtesies, military law, principles of war, and rules of engagement in the face of international terrorism. This course places significant emphasis on preparing students for their careers in the military. It uses various case studies and scenarios to prepare students to face the complex ethical and practical demands of leading as a commissioned officer in the United States Army. Due to the unique nature of this course, entrance into this course requires a permission number granted by the Instructor.
ARCH.2060 History of Architecture (Formerly 58.206) - Credits: 3

A survey of the major technical and stylistic developments in ecclesiastical and secular architecture from Prehistory to the present day studied with an emphasis on the major monuments (Parthenon, Pantheon, Gothic Cathedrals, St. Peter’s, Versailles Palace, Eiffel Tower, Guggenheim Museum). Spring, alternate years.

ARCH.3140 American Architecture (Formerly 58.314) - Credits: 3

This course begins with a discussion of native American building traditions and proceeds chronologically from the 17th through the 20th centuries. Students will gain a familiarity with the major movements in American architecture (such as Colonial, Greek Revival, Victorian, Arts and Crafts, City Beautiful, International Style, Postmodern) as well as the leading architects such as Frank Lloyd Wright and Frank Gehry. The architecture is discussed in its historical context with attention to the inventions, materials and aesthetic assumptions that made it possible.

ARCH.3150 Modern Architecture (Formerly 58.315) - Credits: 3

This course will examine global architecture from the 19th century to the present. It addresses the major movements, "isms", architects, publications, schools, and technological innovations that contributed to varied (and often conflicting) notions of "modern architecture." Growing nationalism and politics, travel and colonial occupation, the effects of war, and changing conceptions of nature and science, all transformed the built environment. This course will provide a better understanding not only of individual works but also of the ways architecture manifests important themes such as nationalism, regionalism, functionalism, rationalism, and the most current theme, happiness.

ARCH.3160 Architectural Utopias - Credits: 3

can we build a better world? Many people from various eras and geographical locations have argued we can. The idea of utopia -- a place of harmony free from want and strife -- has shaped both imagined and real places. So has its opposite: dystopia. This course will focus on architectural visions and solutions for utopias from the ancient world to the present: from myths of long-lost cities to projected colonies on the moon and Mars.

ARHI.1010 Art Appreciation (Formerly 58.101) - Credits: 3

The course introduces the student to the technical, aesthetic and historical aspects of architecture, sculpture, and painting. An analysis of the visual elements used in fine arts such as color, line, shape, texture, and principles of design are developed through slide lectures, museum visits and assigned readings. In addition, students investigate the purposes of art and visual communication and develop a heightened sense of critical thinking that allows them to investigate successfully different modes of representation, styles and media in a multicultural society.

ARHI.1050 Comparative Arts (Formerly 58.105) - Credits: 3

This course studies the aesthetic, artistic and intellectual similarities between art history and music history. Discussion of the arts focuses on the development in examining the human creativity and expression through the arts: from ancient times as art and morality followed in the Renaissance as art and sciences continued in the Enlightenment as art and society contrasted in the nineteenth century as art and entertainment. Furthermore, this course surveys some of the fundamental aspects of music and art, such as the nature of aesthetic judgment, the task of art and music criticism, including formalist, representational, and contemporary theories on viewing, analyzing, and interpreting the arts. In addition, with a comparative analysis between the modes of visual and aural representation, visual and aural perception, this course analyzes the principal forms and genres of the visual and aural elements of art history and music history, providing an understanding for human creativity and expression. Spring, alternate years.

ARHI.2030 History of Art I: Prehistoric to Medieval Art (Formerly 58.203) - Credits: 3

A survey of the origins of painting, sculpture, and architecture from the prehistoric period through approximately 1300 CE. Works of art are discussed in their historical, cultural, and artistic contexts.

ARHI.2040 History of Art II: Renaissance to Modern Art (Formerly 58.204) - Credits: 3

A survey of the origins and development of painting, sculpture, and architecture from Renaissance times to the Modern period. Emphasis is placed on representative works of art from the Renaissance, Baroque, Rococo, Nineteenth Century Movements-Neoclassicism, Romanticism, Impressionism, Cubism, Dadaism, Surrealism and Abstract Art. The aim of the course is to introduce the student to basic critical and art historical methods as well as the analysis of style and content within sequential cultural contexts.

ARHI.2110 Nineteenth Century Art (Formerly 58.211) - Credits: 3

This course begins with a discussion of native American building traditions and proceeds chronologically from the 17th through the 20th centuries. Students will gain a familiarity with the major movements in American architecture (such as Colonial, Greek Revival, Victorian, Arts and Crafts, City Beautiful, International Style, Postmodern) as well as the leading architects such as Frank Lloyd Wright and Frank Gehry. The architecture is discussed in its historical context with attention to the inventions, materials and aesthetic assumptions that made it possible.
Credits: 3
A study of the major artists and artistic movements of the 19th century. This course examines major cultural, social and political forces (e.g. class struggles, racial and gender inequalities, industrialization, scientific discoveries, emancipation, education reform, the influence of early "social media," etc.) through the lens of the visual arts and pays particular attention to how these forces impacted the way art was produced, viewed, and understood.

ARHI.2210 Twentieth Century Art (Formerly 58.221) - Credits: 3
A study of developments in painting, sculpture, performance, media arts, conceptual art, architecture, and design after 1900. This course encompasses modernisms in Europe, the Americas, Asia and the global south.

ARHI.2310 Greek and Roman Art (Formerly 58.231) - Credits: 3
A study of Greek painting, sculpture, and architecture from the Cycladic to the Hellenistic period, and an examination of Roman Art from the Etruscan age to the beginning of Christian art. Emphasis is placed on the Greek Classical period and the Roman Empire.

ARHI.3000 Art History, Music and Culture (Formerly 58.300) - Credits: 3
This course is a historical and critical examination of the aesthetic and intellectual similarities between art history, music history, literature and culture from Ancient Egypt to contemporary Art. Emphasis is placed on an in-depth exploration of western cultures. In addition, this course provides an understanding of human creativity and expression through a comparative analysis of visual art and music.

ARHI.3020 Studies In World Art (Formerly 58.302) - Credits: 3
Historical and critical examination of regions works of art from China, Asia, the Islamic world, India, Africa, North America, Latin America, Native American Art and Mexico. Topics vary from year to year. Course may be repeated.

ARHI.3130 American Art (Formerly 58.313) - Credits: 3
This course centers on the study of American painting, sculpture, and decorative arts from the period of first contact up through the mid-twentieth century. One of the central questions of American art remains its definition: when does it start? What sources does it draw upon? In this class we will discuss American art through its ties to the peoples, events, institutions, and landscape that shaped it.

ARHI.3151 Islamic Art and Contemporary Society (Formerly as 59.315) - Credits: 3
This course introduces students to Islamic art through a survey of works across the broad reach of the Islamic world including Saudi Arabia, Northern and Saharan Africa, Spain, the former Ottoman Empire surrounding Turkey and the Greater Middle East. The last unit of the course looks at Islamic art in the diaspora. The course highlights works from c. 500 CE to the present, ending with the ultra modern city of Dubai.

ARHI.3210 Italian Renaissance Art (Formerly 58.321) - Credits: 3
A study of painting, sculpture, and architecture in the major artistic centers of Italy (Florence, Rome, Venice, Milan and the Northern Courts) during the 15th and 16th centuries. In addition to examining artworks by some of the most important artists of the period - Leonard da Vinci, Michelangelo, titan - this course considers larger themes raised by these works and gives attention to the conditions within which the works were originally produced and viewed.

ARHI.3230 Northern Renaissance Art (Formerly 58.323) - Credits: 3
A study of 15th and 16th century painting and sculpture north of the Alps including artists such as Jan van Eyck, Hieronymus Bosch, Jean Fouquet and Albrecht Drer. This course considers how social forces (politics, race, religion, gender etc.) influenced the manner in which Northern renaissance art was produced, viewed, and understood, as well as how these forces led to the creation of some of the most startling, strange and enigmatic images of any period in the history of art.

ARHI.3300 Italian Mannerism (Formerly 58.330) - Credits: 3
A study on the impact of the High Renaissance in the sixteenth century, the subsequent development of early Mannerism in central Italy and the formation of the Proto-Baroque syle in Venice and Northern Italy, the establishment of the courtly Mannerist style. The role of representative artists such as Anguissola, Pontormo, Rosso, Parmigianino, Bronzino, Beccafumi, Fontana, Vasari, Veronese, Bandinelli, Cellini, Palladio, Peruzzi and Ammanati is emphasized.

ARHI.3310 Asian Art (Formerly 58.331) - Credits: 3
The purpose of this course is to provide a general overview of the art of the traditional cultures of Asia, China, India and Japan. This survey provides a critical and historical examination of these cultures.

ARHI.3320 Baroque Art (Formerly 58.332) - Credits: 3

This course surveys the drama and dynamism that infused painting and sculpture from 1550-1750. With its origins in Italy, Baroque art quickly spread throughout much of Europe (including Flanders, France, England, the Dutch republic, Spain, Portugal) and the New World. This course will explore the ways the arts were used to express political ambition, forge social and political alliances, as well as to create cultural identity and memory.

ARHI.3350 The Golden Age of Spanish Art - Credits: 3

This course is a survey of art in Spain from the discovery of the Americas in 1492 through the mid-seventeenth. This roughly 150-year period, known as the Spanish Golden Age or Siglo de Oro, witnessed the expansion of the Spanish empire across the Atlantic and Asia and gave rise to many of Spain’s greatest artistic achievements. This course will survey the unprecedented contributions of Spanish painters, sculptors and architects; the patrons and political forces contributing to this Golden Age of artistic production; and the place of the Spanish golden Age within broader European and global contexts.

ARHI.3360 Arts of Sub-Saharan Africa - Credits: 3

This course surveys the arts of Sub-Saharan Africa from the 12th century to the present day. It will situate works of art firmly in the history, aesthetics, values, and motivations of the cultures that created it. Students will discover that each culture has its own unique relationship with art and history. The course will also address the process of ambiguities of living and making art in global, post-colonial world. Students will gain not only a strong foundation of art historical knowledge but also how that knowledge affects our current interactions with African art through museum exhibitions and collections.

ARHI.3400 Women and Art (Formerly 58.340) - Credits: 3

An introduction to key issues and theoretical approaches to the study of women and art. This course examines women as makers of art, as subjects of art, and as interpreters of art. The class will explore the ways artists have represented the intersections of gender identities, sexual orientation, power, race, class and nationality in their works and the socio-cultural conditions in which specific artists have been excluded or marginalized in art practice, exhibition, collecting and critical discourse.

ARHI.3500 Post Modernism (Formerly 58.350) - Credits: 3

Following the Second World War, artists transformed the avant-garde tradition of their European predecessors to establish a dialogue with the mass media and consumer culture that has resulted in a wide array of artistic movements. Issues ranging from multiculturalism and gender to modernism and postmodernism will be addressed through the movements of abstract expressionism, pop, minimalism, neo-expressionism and appropriate in the diverse media of video, performance and photography, as well as painting and sculpture.

ARHI.3520 Contemporary Art and Culture (Formerly 58.352) - Credits: 3

Examination of issues of content, theory, and criticism in contemporary art. Current exhibitions and criticism are integral to the course. Topics vary from year to year. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ARHI.3530 History of Public Art in the Modern Era (Formerly 58.353) - Credits: 3

This course serves as an introduction to the history of public art in the modern and contemporary world. The history of public art is examined in relation to such concerns as the definition of public space, community involvement in the creative process, the institutional and economic support system for the arts, the modern understanding of memorial sculpture, and the use of the visual arts to foster public dialogue and cultural exchange.

ARHI.3600 Museum Issues (Formerly 58.360) - Credits: 3

The art museum in the United States is a unique social institution because of its blend of public and private support and its intricate involvement with artists, art historians, collectors, the art market, and the government. This course will study the art museums history and status in our society today. Special consideration will be given to financial, legal and ethical issues that face art museums in our time. Short papers, oral reports and visits with directors, curators and other museum officials in nearby museums will be included along with a detailed study of a topic of ones choice.

ARHI.3650 Art and Environment (Formerly ARHI.2300) - Credits: 3

This course surveys developments in land, environmental, and
ecological art. Some of the most compelling artists today engage with the politics of land use, including the conditions of the global economy, climate change, environmental justice, sustainability, sovereignty and land claims, uneven geographies and expanding megacities, and the privatization of public space.

ARHI.4900 Art History Seminar (Formerly 58.490) -
Credits: 3
Study of particular artist, style or selected art historical problem. Topics to be announced. Course may be repeated.

ARHI.4910 Art History Seminar (Formerly 58.491) -
Credits: 3
Study of particular artist, style or selected art historical problem. Topics to be announced. Course may be repeated.

ARHI.4940 Directed Study in Art History (Formerly 58.494) - Credits: 1-4
An individual supervised research project relating to stylistic, thematic or methodological issues in Art History, the result to be presented in a significant paper.

ARHI.4950 Advanced Tutorial in Art History (Formerly 58.495) - Credits: 3
A program of directed study affords the advanced student with an additional opportunity to pursue a previously explored problem in greater depth or to initiate and investigate an additional problem. The purpose is to sharpen and refine skills for scholarly research and presentation.

ARHI.4960 Practicum Experience in Art History (Formerly 58.496) - Credits: 3
A program of on-campus and/or off-campus experiences for Art History students only. Specific requirements will vary depending upon department policies and the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural or artistic area and for applying techniques of problem solving and/or credits. Students will be graded satisfactory or unsatisfactory.
Asian Studies Minor

Asian Studies is an interdisciplinary minor that explores the complex interaction between artistic, cultural political, social, literary and religious spheres of life in Asia. Emphasis is placed not only on the diversity and achievements of Asian civilizations, but also on the ways an understanding of Asia may shed new light on western cultural traditions. Asian Studies encompasses the geographical areas of East Asia, South Asia, and Southeast Asia and includes courses that address the Asian American experience. Asian Studies minor courses are based primarily in the humanities and social sciences; classes other than language courses are taught in English. The minor is open to all students.

Students selecting an Asian Studies minor are required to complete 6 to 8 courses (18 to 24 credits) in two or more disciplines; 6 credits must be at the 3000 level or above. Students are encouraged, but not required, to take an Asian language as part of the minor.

Course Listing for Asian Studies
(https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)

For more information contact YuLuo Rioux
(mailto:YuLuo_Rioux@uml.edu), program coordinator.
ARHI.3020 Studies In World Art (Formerly 58.302) - Credits: 3
Historical and critical examination of regions works of art from China, Asia, the Islamic world, India, Africa, North America, Latin America, Native American Art and Mexico. Topics vary from year to year. Course may be repeated.

ARHI.3310 Asian Art (Formerly 58.331) - Credits: 3
The purpose of this course is to provide a general overview of the art of the traditional cultures of Asia, China, India and Japan. This survey provides a critical and historical examination of these cultures.

ASAM.2120 Introduction to Asian American Studies - Credits: 3
This course provides students with an overview of the multidisciplinary field of Asian American Studies from two distinct disciplines. The course begins with the history of Asian American Studies and the methods used to advance the field. Next, various aspects of the Asian American experience, such as gender and sexuality, are examined. Students also participate in service learning in partnership with Asian-serving community organizations in and around Lowell, MA. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ECON.3100 Development Economics (Formerly 49.310) - Credits: 3
Development Economics provides an introduction to the importance of political and market institutions in shaping the economic performance in the context of understanding economic role of institutions; theories of income distribution and distributional conflict; effect of social conflict and class conflict on development; political economic determinants of policies; causes and consequences of corruption; and importance of financial markets. The course utilizes both theoretical and empirical approaches in its analysis of economic development.

ENGL.2770 American Ethnic Literature (Formerly 42.277) - Credits: 3
The course addresses the literature of America’s immigrant and cultural groups and how it contributes to defining our national character. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.3780 Asian American Literature (Formerly 42.378) - Credits: 3
Asian Americans hold an intriguing place in the cultural imagination: as perpetual foreigners, as so-called 'model minorities' that serve to maintain hegemonic power relations, and as living embodiments of America's memory of its involvement in recent wars. As artists, however, Asian Americans have contributed and impressive body of literary work, and we'll examine some of the most enduring and provocative of these texts. We'll explore themes such as trauma and the immigrant experience, issues of exile and dislocation, Asian Americans' embattled place in our country's history, and the intersections of race and ethnicity with gender and sexuality. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

HIST.1070 World Civilizations to 1500 (Formerly 43.107) - Credits: 3
This class examines societies and cultures from ancient until early modern times with the underlying assumption that world history is an important conceptual tool for understanding our interdependent world. Course topics analyze the nature of the earliest human communities, the development of the first civilizations and the subsequent emergence of cultures in selected areas of Eurasia, Africa, and the Americas. This course also offers a consideration of issues related to the connections and relationships that shaped civilizations as a result of migration, war, commerce, and the various cultural expressions of self, society, and the cosmos before 1500. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HIST.2040 China & the Modern World (Formerly 43.204) - Credits: 3
This course introduces China's interactions with the world since the 1840s. With the Opium War as the starting point, students are ushered into a traditional China whose political system, cultural values, and an economic structure stood in sharp contrast to those of the outside world. The main focus of the course is to explore the process in which China fought for its survival as a sovereign nation and searched for its road to modernization.

HIST.2070 Women in China (Formerly 43.207) - Credits: 3
From Confucian texts to current conditions, the course examines the evolution of Chinese women's status throughout the centuries. The course will ask questions such as whether Confucianism dictated oppression against women, what factors influenced the changes of status for women, how Western feminism is connected with Chinese women, what roles women
played in transforming China, and how ordinary women lived and are still living in China.

HIST.2420 World War II (Formerly 43.242) - Credits: 3
The Second World War transformed states and people from East Asia to the United States to Europe. We examine diplomatic and military aspects of the war and how it affected the lives of people in the countries involved. Topics include the prelude to the war, military campaigns in Europe and the Pacific, collaboration and resistance, the home front, the Holocaust, science and the atom bomb, and the consequences of the war.

HIST.2490 The Vietnam War (Formerly 43.249) - Credits: 3
Covers the U.S. was in Vietnam from its origins in the French colonial era to its impact on contemporary culture and foreign policy.

HIST.2790 History of Lowell (Formerly 43.279) - Credits: 3
This course will provide an overview of the growth, decline, and rebirth of the city of Lowell, Massachusetts. Topics will include the Industrial Revolution, role of women and unions in the workplace, immigration and the formation of ethnic neighborhoods, urban renewal, and historic preservation. The survey will also discuss notable personalities such as labor activist Sarah Bagley, Civil War general Benjamin Butler, writer Jack Kerouac, Senator Paul Tsongas and boxer Micky Ward. The foregoing names may differ over time.

HIST.2950 Japan Since 1600 (Formerly 43.295) - Credits: 3
A study of the traditional Japanese institutions and the transformation of Japan into a modern state after 1868: the Tokugawa Shogunate, Meiji Restoration, Russo-Japanese War, world power status, militarism, World War II, and present day Japan.

HIST.3200 American East Asian Relations (Formerly 43.320) - Credits: 3
The course examines relations between the United States on one hand and Japan, Korea, China, Vietnam, and the Philippines on the other in the 19th and 20th centuries. Besides political, trade, and cultural relations, there is also emphasis on American laws and practices regarding immigrants from these East Asian countries. The aim of the course is for students to gain a basic knowledge of American relations with East Asia and to develop analytical skills for sophisticated inter-national relations.

HIST.3220 Chinese Foreign Policy (Formerly 43.322) - Credits: 3
Chinese foreign policy since 1949 with a strong emphasis on tracing the links between historical, ideological, and cultural influences, on the one hand, and pragmatic and nationalistic considerations on the other. While tracing these links, the course explores the intricate process of policymaking in the People’s Republic of China.

PHIL.2960 Introduction to World Religions (Formerly 45.296) - Credits: 3
A study of religious knowledge and the phenomena of religion from a philosophical standpoint. The course considers explanations for religious behavior, some central issues in religious belief, and the values and goals of religious systems. Various world religions provide specific data for these topics.

PHIL.3400 Mysticism: East and West (Formerly 45.340) - Credits: 3
This course explores the religious and psychological phenomenon known as the mystical experience, both within the context of organized religion and outside it. We will approach this subject from a comparative standpoint, considering examples from Christianity, Judaism, and Islam and also from Eastern religions such as Buddhism and Taoism. We will make use of philosophy, psychology, theology and literature in order to try to understand mysticism and its relation to religion. Readings include The Upanishads, the Tao Te Ching, the Bible, and Plato. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PHIL.3500 World Philosophies (Formerly 45.350) - Credits: 3
This course will fuse the historical and the thematic approaches in order to undertake a comparative examination of the relations of the great philosophical traditions (Chinese, Indian, Western, Islamic, and Japanese) to the perennial issues of philosophy. The main focus will be the continuing vitality and heuristic fertility of these traditions and their ability to define how human Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

POLI.3160 Politics and Film (Formerly 46.316) - Credits: 3
Analysis of the role of film in creating, expressing, revealing,
and responding to social and political ideas and values. Examines a variety of film and film styles and introduces students to elements of film theory, the theory of popular culture and the role of film in forming our ideas about the world.

POLI.3490 Politics of Race and Ethnicity (Formerly 46.349) - Credits: 3
A study of the politics of race and ethnicity, focusing primarily on American society, and the racial and ethnic groups of the region.

POLI.3610 Southeast Asian Politics (Formerly 46.361) - Credits: 3
A study of Southeast Asian countries, their anti-colonial struggles and their patterns of political development. Attention is also given to the recent struggle among the former Indochinese states and the broader international involvement in the region.

POLI.3630 Politics of China (Formerly 46.363) - Credits: 3
A study of the recent development of governmental institutions, parties, and ideology in China. Emphasis is placed on the processes of nation-building in the post World War II period.

POLI.3740 Democracy and Development (Formerly 46.374) - Credits: 3
Explores the theories and experiences of countries newly converting to democracy in Asia, Africa, Latin America and the former Eastern Bloc. Also examines the strategies and prospects for development among the same countries.

POLI.3750 Politics of Pacific Rim (Formerly 46.375) - Credits: 3
An examination of the politics, policies and institutions of Japan, the "four tigers" and other countries of the Pacific rim area.

SOCI.2340 Race and Ethnicity (Formerly 48.234) - Credits: 3
This course locates and studies the sociological dynamics of race and ethnic relations in the United States as it pertains to all groups. The course material presents theories and models that explain periods of conflict and cooperation between diverse sets of people. While providing some historical background, the course focuses primarily on recent and contemporary situations.

WLCH.1050 Chinese 1 and Culture (Formerly 53.105) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 105, 106 and 205, 206 levels must be elected in the prescribed sequence.

WLCH.1060 Chinese 2 and Culture (Formerly 53.106) - Credits: 3
Continuation of 53.105 Chinese 1 and Culture. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 103, 104 and 205, 206 levels must be elected in the prescribed sequence.

WLCH.1080 Business Chinese I and Culture - Credits: 3
This introductory language and culture course prepares non-Chinese speakers for potential future business engagements either in China or with Chinese speakers in the United States. Effective communication and cultural competency in standard/Mandarin Chinese are emphasized. Students will be exposed to various aspects of Chinese culture appropriate for informal as well as business social settings. Topics include, but are not limited to, self-introduction, traveling, lodging, dining, shopping, banking, seeing a doctor, making friends, and doing business. Authentic language materials (vocabulary, Pinyin, sentence structures, conversations) are presented and taught in a second language acquisition environment with interactive activities that are relevant to proper social etiquette.

WLCH.1090 Business Chinese II - Credits: 3
This language and culture course is a continuation of Business Chinese I. The course prepares non-Chinese speakers for potential future business engagements either in China or with Chinese speakers in the United States. Effective communication and cultural competency in standard/Mandarin Chinese are emphasized. Students will be exposed to various aspects of Chinese culture appropriate for informal as well as business social settings. Topics include, but are not limited to, self-introduction, traveling, lodging, dining, shopping, banking, seeing a doctor, making friends, and doing business. Authentic language materials (vocabulary, Pinyin, sentence structures, conversations) are presented and taught in a second language acquisition environment with interactive activities that are relevant to proper social etiquette.

WLCH.2050 Chinese 3 and Culture (Formerly...
53.205) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 105, 106 and 205, 206 levels must be elected in the prescribed sequence.

WLCH.2060 Chinese 4 and Culture (Formerly 53.206) - Credits: 3
This course is a continuation of 53.205 Chinese 3 and Culture, which is a pre-requisite. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 105, 106 and 205, 206 levels must be elected in the prescribed sequence.

WLCH.3000 Modern Chinese Literature and Culture (Formerly 53.300) - Credits: 3
This course offers an insight into Chinese culture and society by examining different genres of modern and contemporary Chinese Literature -- the novel, poetry, essay, and drama -- since the early Twentieth Century. Readings in English translations of representative works by major writers/essayists/poets/playwrights will be complemented by selected feature films and documentaries. The survey of Chinese literature will be put in the context of a series of sociopolitical changes in China that informed the production of these works.

WLCH.3150 Chinese Culture and Civilization (Formerly 53.215) - Credits: 3
An in-depth study of culture, civilization, and literature from the Chinese-speaking world. The emphasis of the course is not only on understanding China’s history in general chronological terms, but also on understanding the cultural qualities that have made China a great yet distinctive country. Course taught in English.

WLCH.4900 Directed Study in Chinese Culture (Formerly 53.490) - Credits: 3
Students through regular consultation with the Instructor develop a course of directed study or independent study in Chinese Culture. Students findings are presented in a paper of significant proportion.

WLCH.4950 Advanced Tutorial in Chinese Culture (Formerly 53.495) - Credits: 3
A program of directed study to give an opportunity to a student to explore problems in Chinese Culture in greater dept or to initiate additional problems in Chinese Culture.

WLKH.1040 Elementary Cambodian for Heritage Speakers - Credits: 3
This intensive, 3-credit Cambodian language and culture course is intended for heritage Cambodian speakers who already have a basic command of the spoken and written language. The course covers the reading, writing, speaking and listening skills comprising the Cambodian Language & Culture 1 &2 course in a single semester. Contemporary news information is also presented on a weekly basis.

WLKH.1350 Cambodian 1 and Culture (Formerly 53.135) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 135, 136 and 235, 236 levels must be elected in the prescribed sequence.

WLKH.1360 Cambodian 2 and Culture (Formerly 53.136) - Credits: 3
This course continues the oral practice, reading, writing, grammar and cultural studies begun in 53.135. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 135, 136 and 235, 236 levels must be elected in the prescribed sequence.

WLKH.2040 Intermediate Cambodian for Heritage Speakers - Credits: 3
This intensive 3-credit Cambodian language and culture course is intended for heritage Cambodian speakers who already have successfully completed WLKH.1040, Elementary Cambodian for Heritage Speakers, or its equivalent. The course covers the reading, writing, speaking and listening skills comprising the Cambodian Language & Culture 3 &4 courses in a single semester. Contemporary news information is also presented on a weekly basis.

WLKH.2100 Introduction to Cambodian Culture (Formerly 59.210) - Credits: 3
This 3-credit course focuses on the culture of Cambodia from ancient times to present. Specifically, this course provides an overview of the geography, demographics, monarchy, religion, architecture, dance & music, literature and performing arts in historical context. The course also requires students to examine
contemporary Cambodia in terms of change continuity.

WLKH.2350 Cambodian 3 and Culture (Formerly 53.235) - Credits: 3

Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 135, 136 and 235, 236 levels must be elected in the prescribed sequence.

WLKH.2360 Cambodian 4 and Culture (Formerly 53.236) - Credits: 3

This course is a continuation of 53.235 Cambodian 3 and Culture, which is a pre-requisite. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 135, 136 and 235, 236 levels must be elected in the prescribed sequence.

WLKH.3100 The Literary Cultures of Cambodia - Credits: 3

This course provides a survey of the role and function of literature and literary institutions in Cambodia. Selections of literature in translation from various genres (poetry, the short story, novels) are analyzed in terms of the development of the particular genre and its function vis-a-vis Cambodia's cultural institutions. Similarly, the course examines the role of these cultural institutions in supporting the production of these literatures in different historical periods (classical to modern). Particular emphasis is given to the role of literature and literary institutions in the development of national and cultural identity during and after colonial rule.

WLKH.3200 Cambodian Culture in Lowell - Credits: 3

This course examines the emergence and growth the Cambodian American culture in Lowell from the early 1980s until the present. The course focuses on cultural and artistic organizations and events, such as the Angkor dance troupe and the Southeast Asian Water Festival within the changing political and historical context of Lowell during that period. Particular attention is given to the role of Cambodian cultural organizations and events in Lowell’s cultural economy, which includes Lowell's art district and city organizations like the Cultural Organization of Lowell (COOL), the Merrimack Repertory Theater and the Lowell National Historical Park.

WLKH.3250 Contemporary Cambodian Cinema - Credits: 3

This 3-credit course examines Cambodian cinema and filmmakers from the 20th and 21st centuries. The course will include films in English or with English subtitles made by Cambodian filmmakers, as well as films about Cambodia made by foreign filmmakers. The course will be organized chronologically and thematically beginning with the first documentary films from the 1290's produced by foreign filmmakers, to Cambodia’s "golden age" of cinema in the 1960’s, to films from the 1980’s about the genocide, to the fast-growing contemporary film scene in Cambodia. Students will view and examine the films in terms of their cultural context and how this context is reflected in the films’ plot, characters and perspective.

WLKH.3490 Literature, Politics and Genocide in Cambodia (Formerly 59.349) - Credits: 3

This course will examine various literary and political responses to the Cambodian genocide, particularly personal accounts or literary testimony by survivors and government sanctioned legal proceedings. The course will consider how the literary and political responses to the Cambodian genocide have at different times paralleled, complimented and opposed each other. The course will also ask whether their overall effect contributes to or detracts from the serving of justice and the process of healing for the survivors. To pursue these questions, we will read selections from novels and poetry written by Cambodian survivors side by side with accounts of political activities of the Cambodian government and the international community to bring the perpetrators of the genocide to justice.

WLKH.4930 Directed Study in Cambodian Culture (Formerly 53.493) - Credits: 1-6

Students through regular and frequent consultation with their instructor develop a course of directed study in Cambodian (Kmer) culture, and define a problem for individual research. The student’s findings are presented in a paper of significant proportions.
AEST.2800 From Collective to Personal Aesthetics (Formerly 79.280) - Credits: 3

This course is an exploration in aesthetics and culture. The seminar examines a variety of works by contemporary artists and designers; and also introduces important texts by philosophers, art theorists, and critics. Throughout the semester, student will study current trends in visual studies. They will examine a range of works form popular culture to high art and respond to various readings through class discussions and papers. In addition, the course will facilitate intellectual engagement with ones own visual work. Through their research, student will explore the connections between their work and that of other artists and designers. They will situate their artwork within the field of criticism, creating a bridge across the traditional divide between theory and practice.

AEST.3620 Post-digital Aesthetics - Credits: 3

Post-digital Aesthetics explores art after the digital revolution focusing on critical analysis of digital images and environments. We will study how digital technology has transformed art making and also how it impacts the very definition of art. The blurring of boundaries between art, life and design is more than ever evident as human experiences are increasingly mediated through technological devices and high-quality design. The internet has dramatically altered how and why we make art while virtual presence and embodiment in VR bring unprecedented questions about the role of artists and designers in our understanding of the world. This course will be taught as a face-to-face seminar. However, we will also travel beyond the classroom walls into virtual worlds and environments.

ARCH.2060 History of Architecture (Formerly 58.206) - Credits: 3

A survey of the major technical and stylistic developments in ecclesiastical and secular architecture from Prehistory to the present day studied with an emphasis on the major monuments (Parthenon, Pantheon, Gothic Cathedrals, St. Peter’s, Versailles Palace, Eiffel Tower, Guggenheim Museum). Spring, alternate years.

ARHI.1010 Art Appreciation (Formerly 58.101) - Credits: 3

The course introduces the student to the technical, aesthetic and historical aspects of architecture, sculpture, and painting. An analysis of the visual elements used in fine arts such as color, line, shape, texture, and principles of design are developed through slide lectures, museum visits and assigned readings. In addition, students investigate the purposes of art and visual communication and develop a heightened sense of critical thinking that allows them to investigate successfully different modes of representation, styles and media in a multicultural society.

ARHI.2030 History of Art I: Prehistoric to Medieval Art (Formerly 58.203) - Credits: 3

A survey of the origins of painting, sculpture, and architecture from the prehistoric period through approximately 1300 CE. Works of art are discussed in their historical, cultural, and artistic contexts.

ARHI.2040 History of Art II: Renaissance to Modern Art (Formerly 58.204) - Credits: 3

A survey of the origins and development of painting, sculpture, and architecture from Renaissance times to the Modern period. Emphasis is placed on representative works of art from the Renaissance, Baroque, Rococo, Nineteenth Century Movements-Neoclassicism, Romanticism, Impressionism, Cubism, Dadaism, Surrealism and Abstract Art. The aim of the course is to introduce the student to basic critical and art historical methods as well as the analysis of style and content within sequential cultural contexts.

ARHI.2110 Nineteenth Century Art (Formerly 58.211) - Credits: 3

A study of the major artists and artistic movements of the 19th century. This course examines major cultural, social and political forces (e.g. class struggles, racial and gender inequalities, industrialization, scientific discoveries, emancipation, education reform, the influence of early "social media," etc.) through the lens of the visual arts and pays particular attention to how these forces impacted the way art was produced, viewed, and understood.

ARHI.2310 Greek and Roman Art (Formerly 58.231) - Credits: 3

A study of Greek painting, sculpture, and architecture from the Cycladic to the Hellenistic period, and an examination of Roman Art from the Etruscan age to the beginning of Christian art. Emphasis is placed on the Greek Classical period and the Roman Empire.

ARHI.3020 Studies In World Art (Formerly 58.302) - Credits: 3

Historical and critical examination of regions works of art from China, Asia, the Islamic world, India, Africa, North America, Latin America, Native American Art and Mexico. Topics vary from year to year. Course may be repeated.
ARHI.3130 American Art (Formerly 58.313) - Credits: 3
This course centers on the study of American painting, sculpture, and decorative arts from the period of first contact up through the mid-twentieth century. One of the central questions of American art remains its definition: when does it start? What sources does it draw upon? In this class we will discuss American art through its ties to the peoples, events, institutions, and landscape that shaped it.

ARHI.3151 Islamic Art and Contemporary Society (Formerly as 59.315) - Credits: 3
This course introduces students to Islamic art through a survey of works across the broad reach of the Islamic world including Saudi Arabia, Northern and Saharan Africa, Spain, the former Ottoman Empire surrounding Turkey and the Greater Middle East. The last unit of the course looks at Islamic art in the diaspora. The course highlights works form c. 500 CE to the present, ending with the ultra modern city of Dubai.

ARHI.3320 Baroque Art (Formerly 58.332) - Credits: 3
This course surveys the drama and dynamism that infused painting and sculpture from 1550-1750. With its origins in Italy, Baroque art quickly spread throughout much of Europe (including Flanders, France, England, the Dutch republic, Spain, Portugal) and the New World. This course will explore the ways the arts were used to express political ambition, forge social and political alliances, as well as to create cultural identity and memory.

ARHI.4900 Art History Seminar (Formerly 58.490) - Credits: 3
Study of particular artist, style or selected art historical problem. Topics to be announced. Course may be repeated.

HIST.1060 The Modern World (Formerly 43.106) - Credits: 3
In a period of intensifying globalization a basic understanding of our world is increasingly important. The main purpose of this course is to expose students to the global processes that have shaped our modern world since roughly the year 1500. Taking on a global and comparative perspective, this course will help students to develop a topical, chronological, and geographical understanding of global history and cultures.

HIST.2040 China & the Modern World (Formerly 43.204) - Credits: 3
This course introduces China’s interactions with the world since the 1840s. With the Opium War as the starting point, students are ushered into a traditional China whose political system, cultural values, and an economic structure stood in sharp contrast to those of the outside world. The main focus of the course is to explore the process in which China fought for its survival as a sovereign nation and searched for its road to modernization.

HIST.2090 Colonial Latin America (Formerly 43.209) - Credits: 3
This class examines the history of Latin America from 1492 until the early nineteenth century. After considering the rise of the Aztec and Inca empires, we will consider how the Spanish and Portuguese were able to acquire and maintain control in the region. Topics include indigenous-European relations, slavery, economic developments, the challenges of maintaining a colonial government, and Latin American independence.

HIST.2740 Native American History (Formerly 43.274) - Credits: 3
A comprehensive study of the Native Americans through historical and first-hand accounts of their lives. Designed to enlighten students and to represent fairly the Native Americans, dispelling some of the existing myths about them.

HIST.2750 African-American History (Formerly 43.275) - Credits: 3
This course surveys African American history in the United States from colonization to the present. It begins with a study of life in West Africa and traces the forced migration of Africans to the Americas. It explores West African transmissions, the freedom struggle, the great migrations from the South, the Harlem Renaissance, the modern Civil Rights movement, and the continuing impact of African Americans on life in the 21st century.
HIST.2810 Sub-Saharan Africa (Formerly 43.281) - Credits: 3
This course provides a basic introduction to the history of the African continent. It will expose students to the processes and patterns that have shaped modern African history. The course examines the historical roots of the many challenges that the continent faces today. But, at the same time, it will also provide students with the knowledge to shatter the myths and stereotypes about Africa.

HIST.2950 Japan Since 1600 (Formerly 43.295) - Credits: 3
A study of the traditional Japanese institutions and the transformation of Japan into a modern state after 1868: the Tokugawa Shogunate, Meiji Restoration, Russo-Japanese War, world power status, militarism, World War II, and present day Japan.

HIST.3340 The French Revolution and Napoleon (Formerly 43.334) - Credits: 3
This course will involve students directly in critical consideration of the central events and issues of the Revolutionary and Napoleonic periods, with an eye to their longer-term historical resonances in France, Europe and beyond. The core problems we will be discussing are ones which have remained vital in modern and even contemporary political history: the nature of liberty, the nation and national identity, equality and inequalities, violence and terror in politics, the cult of the leader, war and empire.

HIST.3930 History of the Middle East and Islamic World (Formerly 43.393) - Credits: 3
This course examines the history of the Middle East and the Islamic World from the time of Muhammad to the present. It provides an introduction to the history of this often turbulent region. It exposes students to the processes and patterns that have shaped the history of the Islamic World. The course examines the historical roots of the many challenges that the region faces today.

LGST.3600 Legal Issues in Racism (Formerly 41.360) - Credits: 3
This course presents a study of racial discrimination in the United States. Emphasis is placed on relevant constitutional provisions, statutory provisions, and on United States Supreme Court cases.

LGST.3660 International Law (Formerly 41.366) - Credits: 3
This course provides a broad introduction to international law with emphasis on current issues. Within public international law, topics covered will include the recognition of new states, organizations such as the United Nations and the European Union, the use of force, human rights, international crimes, the global environment, and international courts and tribunals. Within private international law, topics surveyed will include legal aspects of international trade and foreign investment, labor, intellectual property, cyber theft, and taxation. Current issues discussed will include global warming, recent corruption scandals, the Eurozone crisis, and legal issues facing global technology companies.

LGST.3760 Family Law (Formerly 41.376) - Credits: 3
This course studies the critical family law issues facing society today. Subject matter examined may include the law of marriage, custody, adoption, divorce, child support, juveniles, right to die, fetal tissue transfer to prolong the life of another, reproduction control, and surrogate parenting. This course is taught from a legal and human values perspective.

LGST.3810 Women and the Law (Formerly 41.381) - Credits: 3
This course presents legal issues that often or particularly affect women. Topics may include sex discrimination, sexual harassment, rape, marriage, divorce, reproductive control, surrogate motherhood, and custody.

PHIL.2960 Introduction to World Religions (Formerly 45.296) - Credits: 3
A study of religious knowledge and the phenomena of religion from a philosophical standpoint. The course considers explanations for religious behavior, some central issues in religious belief, and the values and goals of religious systems. Various world religions provide specific data for these topics.

PHIL.3400 Mysticism: East and West (Formerly 45.340) - Credits: 3
This course explores the religious and psychological phenomenon known as the mystical experience, both within the context of organized religion and outside it. We will approach this subject from a comparative standpoint, considering examples from Christianity, Judaism, and Islam and also from Eastern religions such as Buddhism and Taoism. We will make use of philosophy, psychology, theology and literature in order to try to understand mysticism and its relation to religion. Readings include The Upanishads, the Tao Te Ching, the Bible, and Plato. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural
Awareness (DCA).

**PHIL.3840 Philosophies of Art and Beauty (Formerly 45.384) - Credits: 3**

Examines the views of major philosophers on the beautiful and the nature of artistic creativity. An attempt is made to correlate the views of the thinkers with the works of poets, artists, and composers and the statements the latter have made about their work.

**POLI.2180 Introduction to Politics and Sports (Formerly 46.218) - Credits: 3**

Analyzes the growing importance of sports in American life. Examines the psychological, political and social impact of sports on society. Discusses how sports have been shaped by such monumental events as war, the civil rights movement, and the changing economy.

**SOCI.1020 Social Anthropology (Formerly 48.102) - Credits: 3**

Using the comparative approach to society, this course examines several distinct cultures as a means of understanding both the universal constants and the variations in human societies.

**WLFR.3100 French Speaking World (Formerly 50.310) - Credits: 3**

Designed for prospective majors and minors in French as well as for those who have completed four years of high school or two years of college French. The course examines similarities and differences in the ethos of nations of the French-speaking world and in the life-styles of the individuals and groups that make them up. Conducted in French.

**WLIT.3780 Italian Cinema and Culture (Formerly 52.378) - Credits: 3**

A guide to contemporary Italian studies through literary and cultural approaches. The works of central figures in contemporary Italian letters are examined in view of their impact on Italian life. Emphasis is given to poets, novelists, the new cinema, the influences of existentialism, and the impact of America on Italian literature. Conducted in Italian/English.

**WLKH.3490 Literature, Politics and Genocide in Cambodia (Formerly 59.349) - Credits: 3**

This course will examine various literary and political responses to the Cambodian genocide, particularly personal accounts or literary testimony by survivors and government sanctioned legal proceedings. The course will consider how the literary and political responses to the Cambodian genocide have at different times paralleled, complimented and opposed each other. The course will also ask whether their overall effect contributes to or detracts from the serving of justice and the process of healing for the survivors. To pursue these questions, we will read selections from novels and poetry written by Cambodian survivors side by side with accounts of political activities of the Cambodian government and the international community to bring the perpetrators of the genocide to justice.

**WLSP.3010 Introduction to Spanish Literature (Formerly 54.301) - Credits: 3**

This course studies representative literary texts of Spain form its beginnings to present times. The readings exemplify various genres and reveal the complicated series of interactions, conflict, and influences which have contributed to its cultural diversity and relevance in today's global context. Conducted in Spanish.

**WLSP.3100 Spanish Civilization and Culture (Formerly 54.310) - Credits: 3**

Considers Spanish culture and civilization up to the present. Through audiovisual aids, current newspapers and selected readings, the student will explore the Spanish way of being, thinking, and living. Emphasis is placed on the main contributions of Spain to the Western world. Conducted in Spanish only.
Learning Outcomes

To prepare students for careers such as television and film production; advertising; corporate communications; broadcasting and digital journalism; podcasting and audio journalism; marketing; motion graphics and animation; sports media programming; editing for film, television and multimedia; digital cinematography, and directing for film and TV, the courses in the Digital Media program advance the following program learning outcomes.

Students who graduate with the B.A. degree in Digital Media will be able to:

1. Articulate theoretical and historical contexts of media, including its impact on culture and society, and perform critical analysis of media
2. Demonstrate critical media literacy by creating successful media messages employing a variety of media elements
3. Select and employ video and audio editing language and related effects appropriate to both content and audience
4. Demonstrate skills related to all stages of media production process, from writing script to establishing venues of distribution
5. Collaborate effectively in diverse and interdisciplinary teams and work with an awareness of diverse audiences
6. Produce work in a variety of media formats using relevant technologies, culminating in an original capstone project suitable for their professional portfolio

Degree Pathways

Degree Pathways are a sample semester-by-semester sequence of courses which might be followed for successful completion of a degree, diploma, credential or certificate from the university.

Digital Media

- fall 2021 and beyond

Digital Media

The interdisciplinary Digital Media program prepares students for a career in the ever-changing field of dynamic and rapidly expanding media market. The rigorous curriculum and hands-on client-based projects emphasize a creative approach to content production and are designed to equip students with skills necessary to navigate the field of communications shaped by convergent media. Courses provide theoretical and practical knowledge combining historical and critical inquiry with vocational skills. Instruction in writing, broadcasting journalism, editing, pre-production, and production offers students many approaches to short and long-format video and audio content for a variety of platforms including social media. The programs interdisciplinary format emphasizes strategies for integrating technical and conceptual skills into the creative process.

The University of Massachusetts Lowell offers a Bachelor of Arts degree with a major in Digital Media and a minor in Digital Media. The students can also select the Digital Media Concentration in the Bachelor of Liberal Arts major.

For additional information, visit the Digital Media website.

Major

The University of Massachusetts Lowell offers a Bachelor of Arts degree with a major in Digital Media. The program provides opportunities for students who see their talents and passion best applied in a diverse and rapidly expanding field of media production. Built on a rigorous curriculum and prioritizing real-life client experiences, this program offers many courses in video, film, sound production, editing, motion graphics, broadcasting, and screenwriting instructed by industry experts. The interdisciplinary structure of the program is built on close collaborations with other programs and departments offering options for students to further their theoretical and practical knowledge of the field.

Classes mix theory and hands-on learning, so students develop a fundamental baseline of knowledge as well as their personal interests in media creation. The Digital Media program prepares students from formative introductory classes to the completion of a professional capstone portfolio project that meets the requirements of future employers.

View the complete Degree Pathway.

For additional information, contact the program coordinator (https://www.uml.edu/FAHSS/Digital-Media/Contact.aspx).
AEST.3800 Understanding Movies: Cinema as Social Commentary (Formerly 79.380) - Credits: 3

This film theory seminar has several main objectives: to study the production of meaning in films; to analyze how moving images are used in social representation; and to introduce students to the visual and critical language of cinema. In this course, we will view a series of films by international authors. These address some of the most pressing issues of today’s global world such as identity, subjectivity, difference and otherness, race relations, representations of gender and sexuality, immigration, war, colonialism and post-colonialism, poverty, and social inequalities. The films that we watch will be studied not as isolated cinematic texts but as illustrations and examples of theories of representation. Students will develop their critical analysis skills by being introduced to theoretical concepts such as “the gaze” in art and cinema as well as formal elements such as mise-en-scène, cinematography, editing, and sound.

ARTS.2420 Language of Video (formerly 70.242) - Credits: 3

An introductory course in video camera principles and editing functions. Utilizing writing and still photography, students will explore the language of video in both images and sound as they produce factual documents and/or personal fiction.

ARTS.2780 Interactive Media (formerly 70.278) - Credits: 3

This course provides students with the ability to create interactive motion graphics for Multimedia projects using Adobe Flash and Adobe After Effects. Students learn how to make sophisticated vector and pixel based graphics with basic action scripting and a variety of interactive graphic elements as well as compositing, editing, character rigging, effects for digital media and animation.

CRIM.2230 Crime and the Media (Formerly 44.223) - Credits: 3

This course provides an overview about how the media portrays crime and its impact on the general public, crime, and victims and offenders.

DGMD.1000 Introduction to Digital Media (Formerly JMS 100/DGMD 100) - Credits: 3

This foundational course that surveys the history and current state of digital and web-based media from a variety of perspectives: cultural and ethical, as well as the production and monetization of media. Students engage with and become critical consumers of media, learning how we use it to disseminate, market, entertain, influence and disrupt.

DGMD.2200 Screenwriting - Credits: 3

In this class students will be immersed in the art and craft of creating compelling stories for the screen in both fiction and nonfiction genres. As it has been said many times about media making, the story is the heart of media production. Students will develop screenwriting abilities through gaining knowledge of and experience with story conception and development: character development; story structure; dramatic action; dialogue; scene/sequence construction and writing for emotional impact.

DGMD.2310 Media, Law and Ethics (Formerly 41.237/DGMD 231) - Credits: 3

This course explores key legal issues likely to confront journalists, mass media professionals or students interested in learning more about the relationships between law, media and ethics in this global community. Nonetheless, students are challenged to think critically about the applicability of those issues to individuals and to media institutions that transmit information via spoken communications, writing, traditional media, mobile messages, social network sites, or e-mail messages.

DGMD.2400 Introduction to Digital Editing - Credits: 3

This is an introductory course in digital editing. Students are going to be introduced to the basics of digital editing, the aesthetics and technical skills of digital editing for film and video.

DGMD.2510 Video Production for Digital Media - Credits: 3

In this course students are going to understand the theory and practice of video production using a single digital camera for digital media through a mix of heavy hands-on practice and lectures. Students will be expected to understand; full digital camera operation and settings, audio control, basic directing, basic lighting, and basic editing intended for digital production. Students will also be expected to learn the terminology of video production/post-production intended for digital media.

DGMD.3000 Multimedia Storytelling (Formerly JMS 300/DGMD 300) - Credits: 3

This course will facilitate a deeper understanding of the uses of online and multimedia communication technologies in a democratic society and the impact of such technologies on the way we communicate The course will provide students with the
opportunity to develop professional knowledge and skills with the tools used in online and multimedia creation. Students will develop a critical understanding of multiplatform and multimedia technologies and will learn how to use video, digital photography, audio, video, social networking and other new technologies.

DGMD.3100 Advanced Editing for Digital Media - Credits: 3

This class is dedicated to the practice of non-linear editing of media for films, television, or the web. Instruction will focus on the development of formal and conceptual post-production practices needed for creating compelling visual stories. Students will consolidate their post-production skills developed in previous courses and further improve in areas of editing picture and sound, color grading and effects. Emphasis will be made on developing necessary software skills, post-production workflow, and aesthetic approaches.

DGMD.3300 Digital Cinematography - Credits: 3

This course emphasizes the concepts needed to control the quality of images created, including such techniques as varying the frame rate, shutter speed, exposure, camera filters and color temperature. Topics covered will include camera operation, composition, framing, lens choice, camera movement, collaboration, blocking, continuity and all aspects of visual storytelling.

DGMD.3400 Lighting Principles (Formerly JMS 340/DGMD 340) - Credits: 3

In this course students are going to understand the principles of lighting, its nature, its physical Characteristics, and its artistic role in media production. Class will have significant hands-on assignments and demonstrations beside theoretical background lectures. The concept will be developed based on a one-camera setting only. Students will work with light meters to guide their lighting schemes.

DGMD.3502 Production Management for Film - Credits: 3

In this course students are going to be introduced to the process of film production management from preproduction through production and screening. Students will learn budget management, crewing requirements, location needs, equipment rentals, and associated production costs.

DGMD.3701 Visual Motion Effects - Credits: 3

In this course, students are going to use After Effects as a tool to help them achieve a successful and visually convincing effect after going through idea generation process. Students will work on masking, cloning, and three-dimensional space with the aim of producing short productions. Familiarity with Photoshop is preferred.

DGMD.4000 Directed Study in Digital Media (Formerly JMS 400/DGMD 400) - Credits: 1-6

Through frequent consultation with the instructor, the student carries out the investigation of a particularly specialized area of interest. This course may be repeated for up to a total of 6 credits.

DGMD.4100 TV Studio Production (Formerly JMS 410/DGMD 410) - Credits: 3

This course will offer you the opportunity to produce different types of live programs using digital technology. Plan, organise and direct TV studio-based broadcasting. Work effectively as part of a group. It provides a working knowledge of compositional, personal and organizational production skills in relation to the making of a live broadcast program using at least three cameras having in mind that you will cut/ edit form a camera to another without stopping. It requires collaboration, teamwork and strict, organized structures. In most cases, it requires leadership. But for everybody, personal qualities such as determination, enthusiasm and persistence are almost essential. So too is engaged participation.

DGMD.4103 TV Sport Broadcasting - Credits: 3

In this course, students are going to learn the techniques and theory behind mobile TV production in regards to the professional sports industry. A look into the major sports of American culture and production techniques utilized to produce each. Environmental factors governing outdoor TV production as well as state and community government issues regarding the broadcast of each sport. In this course, students will be working in collaboration with UMass Lowell Athletic Department and will be involved with the Tsongas Arena sports activities through its Audio/Video department.

DGMD.4110 Titles in Motion (Formerly DGMD 411) - Credits: 3

The course aims to provide students with an understanding of the creative, visual and formal aspects of time-based communication and motion graphic design from both a contextual and technical point of view. Designers, with their comprehension of the principles of graphic design, typography and theories of visual communication will develop a knowledge and understanding of processes and techniques involved in creating time-based media including title sequence design. Projects introduce students to time-based visual communication environments. Unique conditions influencing the roles of storyboarding, planning, typography, graphics,
symbolic systems, narrative, sound and time.

DGMD.4200 Podcasting - Credits: 3
In this class, students will create audio segments in the style of a Podcast, each executed with increasing complexity. Students will use the language of cinema, television, print, and the web. They will conduct research, scriptwriting, producing, location scouting, and organize scheduling. Students will use current technology to record a location-based audio program.

DGMD.4300 Directing for Film - Credits: 3
In this course, students will work on spatial exploration, mise en scene, and directing the actor. Students will learn methods in scene study and improvisation beside rehearsal techniques, script breakdown and analysis. Students will have first hand experience of the role of director on set and beyond. Leadership and decision making are two qualities and major factors that play a crucial role in the progress of this class.

ENGL.2220 Oral Communication (Formerly 42.222) - Credits: 3
Develops and applies the basic speaking skills that can be adapted to a variety of personal and professional contexts. Emphasis is placed on selection, analysis, organization and presentation of speech materials. Practice skills include listening, interviewing and the delivery and critique of extemporaneous speeches.

ENGL.2260 Scientific and Technical Communication (Formerly 42.226) - Credits: 3
Studies the theory and practice of letters, memoranda, reports and oral presentations on specific scientific and technical problems.

ENGL.2320 Turning Fiction into Film (Formerly 42.232) - Credits: 3
This course explores film adaptation by looking at how writing can be turned into the visual and auditory forms. Through reading novels and watching their film adaptations, students learn conventions of fiction and film, and draw on this knowledge to discover the implications of adapting a written story into a movie. By asking students to think about the different ways writers and filmmakers convey meaning to their audiences, this course attempts to answer the question of why the movie is never exactly like the book.

ENGL.3000 Intro to Journalism (Formerly 42.300) - Credits: 3
An introduction to techniques of writing for the news media.

ENGL.3050 Reviewing the Arts (Formerly 42.305) - Credits: 3
Theory and practice of writing short, critical essays in a journalistic mode on the visual and performing arts. Special attention to theater, movie, and television criticism. Conducted as a workshop with close analysis of student work.

ENGL.3100 Writing Popular Fiction (Formerly 42.310) - Credits: 3
This course is designed for students who are interested in writing in one or more of the popular forms of genre fiction: the mystery, the horror story, science fiction, fantasy, romance, and the thriller. Class time will be spent discussing and workshop student writing. Some time will also be devoted each week to brief lectures on practical matters like choosing between the short story and the novel, finding ideas, constructing plots, building characters, pacing, generating suspense, and marketing one's work. In addition, there will be assigned readings to illustrate the above.

ENGL.3200 Personal and Reflective Writing (Formerly 42.320) - Credits: 3
A workshop format encourages peer criticism of individual writings and discussion of models from various texts.

ENGL.3690 Reading and Writing New Media (Formerly 42.369) - Credits: 3
This course will focus on learning how to write for electronic media and understanding the changing world of journalism.

ENGL.3870 Introduction to Editing and Publishing (Formerly 42.387) - Credits: 3
Designed for students considering a career in book publishing, this course provides an overview of the publishing industry. You will examine the stages of the book publishing process from acquisition to bound book or e-book, using assignments and examples from school, college, and trade book publishing. You will also consider the specific responsibilities of an editor. The course includes class visits by authors, editors, or publishing executives, as well as a trip to a local printing company.

ENGL.4070 Creative Writing Fiction II (Formerly 42.407) - Credits: 3
Creative Writing Fiction II
HIST.3480 Making an Historical Documentary
(Formerly 43.348) - Credits: 3

This course provides students with the basic conceptual and technical skills for developing and completing an historical documentary, including instruction about subject choice, narrative structure, camera work, and editing.

POLI.2120 American Media and Politics (Formerly 46.212) - Credits: 3

This course explores the role of the media in American politics and the role of politics in the American media. We focus first on the historical evolution of newspapers, radio, television, and the internet as vehicles of political news reporting. Next, we look at instances of journalistic bias and distortion in order to explore how corporate consolidation and commercial competition have affected the news industry. Finally, by studying a selection of major stories in depth, we will gain a better understanding of the factors involved in the conversion of political events and developments into seemingly significant news.

POLI.2220 Politics of the Internet (Formerly 46.222) - Credits: 3

This course will examine the influence social media and web connectivity have had on political campaigns, campaign fundraising, political mobilization, and the recent proliferation of democratic movements.

POLI.3160 Politics and Film (Formerly 46.316) - Credits: 3

Analysis of the role of film in creating, expressing, revealing, and responding to social and political ideas and values. Examines a variety of film and film styles and introduces students to elements of film theory, the theory of popular culture and the role of film in forming our ideas about the world.

POLI.4220 SMR: Political communication and Media Studies (Formerly 46.422) - Credits: 3

Advanced study in contemporary issues in Political Communication and Media Studies.
ASAM.2120 Introduction to Asian American Studies - Credits: 3

This course provides students with an overview of the multidisciplinary field of Asian American Studies from two distinct disciplines. The course begins with the history of Asian American Studies and the methods used to advance the field. Next, various aspects of the Asian American experience, such as gender and sexuality, are examined. Students also participate in service learning in partnership with Asian-serving community organizations in and around Lowell, MA. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

CRIM.3600 Gender, Race, and Crime (Formerly 44.360) - Credits: 3

This course examines gender and racial implications of criminal laws, criminal justice practices and programs will be examined. The position of women and racial/ethnic minorities will be assessed from the different perspectives of victims, offenders, and criminal justice practitioners.

EDUC.2060 Inclusion in Education and Society - Credits: 3

This course focuses on the how students with disabilities are included in education and society. The course offers multiple perspectives, strategies and readings to consider how inclusive schools and societies that provide supportive, context-appropriate conditions for learning can lead to more positive outcomes for all students and community members. Within the context of special education, students will be introduced to different types of disabilities and services that can be provided in schools, communities and in society to ensure effective inclusion of people with disabilities. This course may be taken for the education minor.

EDUC.4050 Children with Disabilities in the Classroom (Formerly 01.505) - Credits: 3

This course examines the nature of cognitive emotional, developmental, sensory, and physical disabilities that compromise student capacity to make adequate academic progress without special intervention. Legal and ethical responsibilities of the educator in inclusive classroom settings and as an active member of a multidisciplinary learning team are emphasized.

EDUC.5050 Children with Disabilities in the Classroom (Formerly 01.505) - Credits: 3

This course examines the nature of cognitive emotional, developmental, sensory, and physical disabilities that compromise student capacity to make adequate academic progress without special intervention. Legal and ethical responsibilities of the educator in inclusive classroom settings and as an active member of a multidisciplinary learning team are emphasized.

ENGL.2580 Disability in Literature (Formerly 42.258) - Credits: 3

This course explores how texts – including novels, short stories, poems, memoirs, essays, plays, and videos – portray people with disabilities. We will consider the problematic stereotypes about disabilities that sometimes appear in popular culture and literary depictions, and read texts that provide insight into a diverse community of people with a range of disabilities.

EXER.3150 Kinesiology (Formerly 38.315) - Credits: 3

This course combines the study of mechanics, kinematics, kinetics, anatomy and neuromuscular physiology to teach the examination and evaluation of human movement. The major focus of the course is in qualitative evaluation of movement. Topics also include quantitative evaluation, body mechanics, posture and gait evaluation with a focus on identification of abnormal movement patterns.

FAHS.2200 Designing the Future World (Formerly 57.220) - Credits: 3

All purposeful human activity involves design. Every day we are surrounded by the products of design processes – buildings, cars, entertainment, corporations, schools, even laws and regulations. They make our lives easier in many ways, but they may also create significant social and environmental problems. In the past, designers often did not consider the impact of their designs on society, or ignored the negative consequences. Our culture and legal system usually permitted, or even encouraged, this irresponsibility. Today, a small group of scholars, businessmen and women, and activists are rethinking how we design the things around us, with the goal of addressing the most pressing social and environmental issues. This class will introduce students to some of these issues, the people who are confronting them, and the ways in which all of us can contribute to designing a better Future World. With a series of hands-on projects, coupled with readings and other resources, students will work to design aspects of the future. In the process you will learn about possible solutions to complex, important problems, but also learn valuable life skills such as problem framing, problem solving, critical thinking, active learning, communication, and simple construction methods. No previous experience is required-only curiosity and eagerness to learn.
LGST.2500 Disability and the Law: Legal Rights of People with Disabilities (Formerly 41.250) - Credits: 3

This course examines the history and progress of the disability rights movement in America, the current state of the law, trends, and prospects for the future, with particular focus on those laws designed specifically to address the needs of people with disabilities.

PHIL.3105 Philosophy of Disability - Credits: 3

Examines the basic issues and problems in the philosophical study of disability, including engagement with the interdisciplinary field of disability studies. Provides a survey of issues relating to the lived experience of disability, disability and well-being, theories of disability, and the concepts of normality, fitness and ableism as they relate to the practice and institutions of medicine, politics, religion, and society more generally.

PHIL.3610 Equality, Justice and the Law (Formerly 45.361) - Credits: 3

This class investigates the American fascination with the “rule of law.” Questions to be considered include the following: What do we mean by the rule of law? What is the relation between law and morality? How does the rule of law promote justice, and what is its connection with the ideal of equality? What is the role of a written Constitution in protecting the rule of law? Special emphasis will be given to the Equal Protection clause of the Constitution and its role in prohibiting discrimination against disadvantaged groups, including racial minorities, women, and the handicapped. We will also consider in detail some theories of constitutional interpretation, including the Original Intent theory.

PHIL.4010 Bioethics and Genetics Research (Formerly 45.401) - Credits: 3

This course addresses ethical issues that arise in biomedical research and practice including autonomy in the doctor-patient relationship, the duty of confidentiality, the right to refuse treatment, the right to death with dignity, the ethics of experimentation with human subjects, the ethics of genetic enhancement, and justice in health care distribution. The course will combine theoretical perspectives and concrete case studies that illustrate actual dilemmas that the health care profession has in fact encountered over the years.

POli.2180 Introduction to Politics and Sports (Formerly 46.218) - Credits: 3

Examines the growing importance of sports in American life. Examines the psychological, political and social impact of sports on society. Discusses how sports have been shaped by such monumental events as war, the civil rights movement, and the changing economy.

POli.3370 Constitutional Law: Rights & Liberties (Formerly 46.337) - Credits: 3

A study of constitutional law focused on rights and liberties. We will discuss the balance of liberty and authority under the Constitution, the Bill of Rights, the Fourteenth Amendment, due process, and equal protection, emphasizing the case law on freedom of religion, speech, press, gun rights, LBGT rights, race, abortion, gender, and the death penalty. Political Science offers two courses in constitutional law for students form any major who are preparing for law school or seeking a background in how constitutional law influences American politics and culture. POli.3350 or POli.3370 can be taken alone or both courses in either sequence. On campus and online versions are identical, so students can take each course in either format.

PSYC.2550 Community Psychology (Formerly 47.255) - Credits: 3

Surveys the field of community psychology, including principles of social justice, diversity, and social change. The course reviews historical antecedents, paradigms, conceptual models, strategies and tactics of social and community change and action; examples from selected contexts and social systems, including education, mental health, community organizations, the workplace, health care, justice system, and social services will be employed. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PSYC.2720 Abnormal Psychology (Formerly 47.272) - Credits: 3

Presents an introduction to the study of various patterns of mental, behavioral, and personality disorders including diagnosis, etiology, and treatment. Current research-based theoretical approaches will be discussed as a means to gain a better understanding of psychological, biological, and sociocultural causes. Emphasis will be placed on the important notion that mental health problems are not only linked to individual factors, but also to family, community/social, cultural, societal, political, and historical factors.

PSYC.3120 Learning and Behavior (Formerly 47.312) - Credits: 3

Examines various methods and techniques suitable for the modification of human behavior, based on the principles and findings of experimental studies of animal and human behavior. Considers how such methods can be used in
education, mental health and corrections, and self-directed personal change.

**PSYC.3350 Psychology and Women (Formerly 47.335) - Credits: 3**

Considers such topics as: the psychology of sex differences; biological bases of psychological sex differences; the nature of female sexuality; clinical theory and practice concerning women; women as mental patients and mental health consumers; implications for psychology and for women’s status.

**PSYC.3360 Culture and Psychology (Formerly 47.336) - Credits: 3**

Provides an analysis to the impact of culture, socio-historical, and social influences on psychological processes and outcomes. Students will also learn about techniques for studying the influence of culture including cross-cultural methods and population-specific methods. Through careful analysis of research literature, this class will examine a variety of contexts within the U.S. and internationally. Topics will include identity development, immigration, acculturation, socialization, and social interactions among groups.

**PSYC.3600 Adult Development and Aging (Formerly 47.360) - Credits: 3**

Begins with an overview of recent theoretical perspectives on adult development and aging. In chronological sequence, it presents the stages of adulthood and concludes with death and dying. Topics covered include personal, family, and vocational development through adulthood, gender pattern differences, and the impact of changing demographics, including the lengthening of the life span.

**PSYC.3610 Developmental Psychopathology (Formerly 47.361) - Credits: 3**

Examines behavior problems of childhood and adolescence across developmental transitions with a focus on the interaction of risk and protective factors in the child and his or her social context (e.g., family, school, friendships). Problems such as depression, anxiety, conduct disorder, ADHD, learning disabilities, and the consequences of trauma and maltreatment are addressed.

**PSYC.3620 Psychology of Developmental Disabilities (Formerly 47.362) - Credits: 3**

This course examines a range of developmental disabilities, their etiology, consideration of underlying brain function, assessment procedures, and current diagnostic, treatment and educational approaches. In addition, the impact of disability on individuals and the families of those affected, cultural and social aspects of disability, and current practices in service provision will be considered.

**PSYC.3630 Introduction to Disability Studies (Formerly 47.363) - Credits: 3**

This course provides students with a wide range of interests and backgrounds with the opportunity to examine their own mental model (attitudes/values/assumptions) of disability. It includes an overview of the nature of intellectual disability and other disabilities and it provides opportunities to explore and understand the historical social response to disability. Students will look at a range of strategies for providing support and intervention and they will learn about how to effect change through a variety of strategies, including advocacy.

**PSYC.4820 Dvptl Disabilities Fieldwork: Service Provision - Credits: 3**

In this fieldwork course we explore standards for support and service provision within human services and compare experiences in field placements with these standards, seeking to understand the forces that support or interfere with realizing best practices in disability services. The foundation for this blended learning course (half the classes meet in-person, half online) will be 60 hours of fieldwork with an individual with an intellectual/developmental disability. This course integrates course material with field placement experiences through presentation, discussion, group work, case study, and video materials that address course objectives. Each student will have the time to develop an understanding of a person with I/DD, and how individualized planning can facilitate social inclusion.

**PSYC.4830 Dvptl Disabilities Fieldwork: Leadership & Advoc - Credits: 3**

In this fieldwork course we explore standards for support and service provision within formal services and compare experiences in field placements with these standards, seeking to understand the forces that support of interfere with realizing best practices. The foundation for this blended learning course (half the classes meet in-person, half online) will be 60 hours of fieldwork within a human service organization or educational setting for people with an intellectual/developmental disability. This course provides a critical examination of the nature of organizations and the impact of leadership and advocacy on the lives of people with disabilities through integrating course material with fieldwork experiences through presentation, discussion, group work, case study, and video materials.

**PSYC.5610 Introduction to Behavioral Intervention in Autism (Formerly 47.561) - Credits: 3**
This course provides an introduction to the causes and diagnosis of autism, scientific validation, applied behavior analysis, and ethical treatment. Students also learn to write functional objectives, plan positive reinforcement, and design an applied measurement system in the context of developing Individualized Family Service Plans and Individualized Education plans. The issue of culturally appropriate interventions is addressed. Prerequisite: coursework in the psychology of child development, or permission.

**PUBH.1021 Introduction to Public Health (Formerly 30.102) - Credits: 3**

Public health topics, both historical and contemporary are of importance to all citizens and to societal decisions. This survey course provides a foundation for understanding public health through exposure to current health care and policy issues viewed through the perspective of multiple disciplines. Methodology for understanding population health and developing critical thinking and decision-making skills in the analysis of public health issues using a population-based perspective will be developed. The course will provide an ecological understanding of the causation and prevention of disease with an emphasis on health issues that affect society as a whole.

**PUBH.2010 Community Health and Environment (Formerly 31.201) - Credits: 3**

This course emphasizes the concepts, philosophy, and principles of public health and their relationship to physical, mental, and social well-being of the community. The focus is on the prevention of disease, the promotion and maintenance of health, and the provision of environmental and personal health services through organized community effort.

**SOCI.2250 Sociology of Disability (Formerly 48.225) - Credits: 3**

This course is organized around several key questions that are used to study the concepts of disability and ability from a variety of sociological and interdisciplinary perspectives. Specifically, the course explores representations of disability in popular culture and medical discourses to discuss disability and ability as social constructs. By looking at various literary and cultural representations, this course investigates constructions of the disabled and abled body, how this becomes politicized, and the implications of these constructions.

**SOCI.2340 Race and Ethnicity (Formerly 48.234) - Credits: 3**

This course locates and studies the sociological dynamics of race and ethnic relations in the United States as it pertains to all groups. The course material presents theories and models that explain periods of conflict and cooperation between diverse sets of people. While providing some historical background, the course focuses primarily on recent and contemporary situations.

**SOCI.2400 Sociology of Gender (Formerly 48.240) - Credits: 3**

This course is an interdisciplinary introduction to the field of gender studies. A variety of topics are presented, such as gender stratification, work and family, sexual identities, media representations of women and men, women's movement, and violence against women. Feminist theories and methods are also introduced.

**SOCI.2550 Sociology of Deviance (Formerly 48.255) - Credits: 3**

Analysis of how social institutions define and respond to various forms of social deviance, from individual mental illness to gang violence to illegal acts by governments and corporations. Attention will be paid to the construction and management of deviant identities, the role played by social status, and the social importance of institutions of social control.

**SOCI.3200 Community Service (Formerly 48.320) - Credits: 3**

Course uses fieldwork approach to understand social problems and to discipline study and career pursuit in the area of public service.

**SOCI.3700 Intersections of Disability and Gender - Credits: 3**

This course is organized around several questions that will be used to help engage students in the study of the concepts of disability and gender from a variety of sociological and interdisciplinary perspectives. The course will explore feminist representations of disability and gender in popular culture discourses to discuss disability as well as gender as social constructs. By analyzing books, movies, television, cartoons, and the internet, we will look at how conceptualizations of disability and gender intersect and are represented in these "texts" and the possible influences on perceptions and definitions of disability.

**SOCI.4050 Feminist Methodologies (Formerly 48.405) - Credits: 3**

Despite the recent growth of feminist methodologies, there is no one way of doing feminist methodologies. The growing
body of literature in this area addresses the distinctive
challenges and strengths of doing this research. Gender Studies
scholars especially seek to question the framing of a study,
managing of emotions, and ethical dilemmas. We will explore
feminist strategies for creating, implementing, and analyzing a
project that is grounded in the everyday lives of people while
situating them in a social, political, and economic context. We
will explore the interdisciplinary intersections where these
challenges push at the boundaries of the disciplines of your
major field of study. We will also investigate how to use as
variety of qualitative approaches while doing a feminist project
and the ways in which feminism can enlighten understandings
of "traditional" qualitative methods.
AEST.2250 History of Photography (Formerly 79.225) - Credits: 3

Less than 200 years old, photography seems to span millennia. With 1839 as the invention's launch date, there is no photograph of George Washington, but very soon we are flooded with the faces of composers, painters, and presidents: we know and are reminded of the ravages of civil and world wars, industrial progress and social injustice, or the beauty of pristine landscapes and their ecological demise. In this course, students will become familiar with some 100 notable photographers, from the beginning years of its invention to contemporary times with works by major artists and forgotten visionaries, all serving as a foundation for inspiration and understanding of the art worlds most visible medium. Grading in the course is based on a mid-term and final exam along with a major research paper.

ARCH.3150 Modern Architecture (Formerly 58.315) - Credits: 3

This course will examine global architecture from the 19th century to the present. It addresses the major movements, "isms", architects, publications, schools, and technological innovations that contributed to varied (and often conflicting) notions of "Modern architecture." Growing nationalism and politics, travel and colonial occupation, the effects of war, and changing conceptions of nature and science, all transformed the built environment. This course will provide a better understanding not only of individual works but also of the ways architecture manifests important themes such as nationalism, regionalism, functionalism, rationalism, and the most current theme, happiness.

ARHI.3530 History of Public Art in the Modern Era (Formerly 58.353) - Credits: 3

This course serves as an introduction to the history of public art in the modern and contemporary world. The history of public art is examined in relation to such concerns as the definition of public space, community involvement in the creative process, the institutional and economic support system for the arts, the modern understanding of memorial sculpture, and the use of the visual arts to foster public dialogue and cultural exchange.

ARHI.3650 Art and Environment (Formerly ARHI.2300) - Credits: 3

This course surveys developments in land, environmental, and ecological art. Some of the most compelling artists today engage with the politics of land use, including the conditions of the global economy, climate change, environmental justice, sustainability, sovereignty and land claims, uneven geographies and expanding megacities, and the privatization of public space.

ARHI.4900 Art History Seminar (Formerly 58.490) - Credits: 3

Study of particular artist, style or selected art historical problem. Topics to be announced. Course may be repeated.

ATMO.1410 Weather and Climate (Formerly 85.141) - Credits: 3

General meteorology course. Topics include atmospheric composition, solar radiation, temperature, moisture and condensation relationship between air pressure and wind, weather patterns, severe weather, optical phenomena in the atmosphere, and the behavior and possible change of climate. Appropriate for KCS major science elective.

BIOL.3150 Principles of Ecology (Formerly 81.315) - Credits: 3

A series of lectures concerned with the interrelationships of organisms with their abiotic environment with emphasis on the New England area. Selected current topics will supplement the text.

BIOL.3170L Principles of Ecology Laboratory (Formerly 81.317) - Credits: 2

A series of laboratory exercises to supplement and illustrate lectures of 81.315. Field trips are an integral part of the course involving sampling and analysis of such ecosystem components as water, soil, invertebrate fauna and characteristic flora of various habitats. Directed readings, quizzes, practical exam and oral presentation of a research topic are integral parts of the course.

ECON.3190 Public Finance (Formerly 49.319) - Credits: 3

The economics of the public sector. Principles of public expenditure, taxation, and the public debt applied to federal, state, and local governments.

ECON.4150 Introduction to Environmental Economics (Formerly 49.315/415) - Credits: 3

This course provides an introduction to the field of environmental and natural resource economics. It is designed to give students an overview of how economic principles can be applied to environmental management and policy. Topic areas and applications include evaluation of environmental policies,
valuation of environmental goods and services, climate change, and management of renewable and non-renewable resources. Students will learn to critique articles and other media and have intelligent discussions related to the topics listed above.

**ENGL.3245 Writing about the Environment - Credits: 3**

From John Muir to Rachel Carson to Bill McKibben, environmentalists have traditionally relied upon the power of their prose to transform the thoughts and behavior of their contemporaries. Stemming form the premise that writing is a form of environmental action, this course introduces students to a range of modes of writing in environmental studies. In the process of reading, discussing and practicing different kinds of environmental writing, students will develop a variety of writing skill in addition to an appreciation for writing as an important form of environmental action.

**ENGL.2490 Literature on Technology and Human Values (Formerly 42.249) - Credits: 3**

A study of the relationship between works of fiction, cultural attitudes toward technology, and social values. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

**ENGL.3240 Writing About Place (Formerly 42.324) - Credits: 3**

Writers throughout time have been thoroughly grounded in place. Students in this course will read and write on a variety of topics: travel, cities, suburbs, dwelling places, nature, environmental issues, etc., in a variety of genres: creative non-fiction, essays, journalism, short stories, poetry, journals. This course will be held in a workshop format with strong emphasis on revision.
learning, communication, and simple construction methods. No previous experience is required—only curiosity and eagerness to learn.

FAHS.4970 Directed Studies: Environment and Society - Credits: 3

An individual supervised research project relative to issues of the environment and society. Thematic or methodological issues must result in a significant research paper.

HIST.3010 The World of Things: Consumer Cultures in the Modern West (Formerly 43.301) - Credits: 3

This course will examine the emergence and historical impact of consumer cultures in the modern West, from the eighteenth century through the present. Topics to be covered will include the emergence of spaces of consumption (the home, the commercial/spectacular metropolis, the department store, the shopping mall, the tourist site), changing attitudes toward shopping and spending, the construction of modern social identities of class, gender, and race through consumption, and political struggles over consumption.

HIST.3151 Food in American History - Credits: 3

This course examines change and continuity in American foodways from the pre-Revolutionary era to the present, focusing on the significance of class, race, gender, nationality, religion, and region as well as transnational dimensions in that culinary history.

HIST.3160 American Environmental History (Formerly 43.316) - Credits: 3

This course explores the environmental history of early America and the United States from the end of the last ice age (c. 12,500 years ago) to the present. It examines the role played by nature as an historical agent as well as the relationship between human communities and the physical and organic environment. Course themes include evolving land use, the environmental significance of industrial capitalism, urban public health, resource conservation and wilderness protection, the impact of ecology on public consciousness, as well as environmentalism.

HIST.4320 Research Seminar (Formerly 43.432) - Credits: 3

Systematic research in primary and secondary sources culminating in the writing of an original research paper using proper methodological and stylistic techniques. Weekly meetings and written and oral progress reports. Students must be acquainted with word-processing techniques. Required of all History majors. Meets Core Curriculum Essential Learning Outcome for Applied & Integrative Learning (AIL), Critical Thinking & Problem Solving (CTPS), and Written & Oral Communication (WOC).

HIST.5515 Topics in Middle East History: Environmental History of the Middle East and North Africa - Credits: 3

This course is designed to introduce students to the intensive study of a particular aspect of Middle East History. In this course, with a focus on environmental factors, we will consider various historical perspectives on colonialism, nationalism, capitalism, gender and sexuality, empire, race, and class. What are some of the benefits of these interpretations? Are there also drawbacks? Students will explore this history through reading both primary and secondary sources. They will also pursue their own research project on a topic of their choosing in Middle East environmental history.

LGST.3670 Environmental Law (Formerly 41.367) - Credits: 3

This course examines the legal and administrative problems of protecting the quality of the human environment. Federal and state legislation on environmental policy is studied. Public interest litigation as a supplement to the enforcement of environmental law is discussed. The course also focuses on the practical problems of balancing the needs of business, the global competitiveness of the United States, the increasing demand for natural resources, and the need to protect, preserve, and restore the environment. The importance of sustainable development and environmental ethics are discussed.

MPAD.5030 Public and Non-Profit Management and Leadership - Credits: 3

This course offers students an overview of the practical and theoretical foundations of managing, planning, and leadership within public and community-serving organizations. Topics and issues explored through the course include the role of professional managers within the public sector, the process of executive decision-making, employee incentives and motivation, conflict management, performance measurement, ethical challenges faced by managers, workplace diversity, strategic planning, and power dynamics. Course activities will include weekly critical readings and case studies, as well as individual and group problem-solving exercises.

PCST.5270 Sustainable Housing Development and Land Use: Conflict, Policy, and Practice (Formerly PCS 527) - Credits: 3
Housing is fundamental to the quality of life in communities, and housing conflict, policy and practice shape the availability of this fundamental good. This course will examine the economic, environmental, social, and cultural factors that shape housing and its sustainability. The contentious nature of housing and land use policy in the United States will be summarized, with students learning how housing policy impacts communities, states, and regions. The course will then give students a detailed understanding of the conflictive process through which housing is developed and the role the market, government, funders, workers, and housing consumers play in influencing the creation and development of housing. The course will highlight ways in which current housing development policy and practices are not sustainable, and will examine more recent efforts to establish standards and practices that enhance consensus and sustainability. Students will learn how to manage conflict and take a housing project through the various stages, such as project conceptualization, market analysis, design, site acquisition, financing, construction, and occupancy. While the course focuses on the U.S. context, students will learn of international efforts to achieve greater sustainability in housing. The course will provide students with both practical and theoretical knowledge of housing and land use conflict, policy and development practices. Case studies of actual projects will be presented.

PHIL.3270 Environmental Philosophy (Formerly 45.327) - Credits: 3

An examination of the philosophical foundations of environmentalism. Addresses both the question of ethical duties we owe to animals and to nature, and also the question of man’s relation to the natural world.

POLI.1750 Introduction to Environmental Politics (Formerly 46.175) - Credits: 3

This course introduces major concepts in environmental politics to provide a comprehensive understanding of the formation of environmental policy in the United States. Throughout the course, particular attention is paid to the role of government and markets in creating environmental crises and shaping policy responses.

POLI.3320 The Politics of Food (Formerly 46.332) - Credits: 3

The course will examine current debates in food politics over: regulatory politics and the appropriate reach of the state in food labeling, safety, and oversight; genetically modified food, organic and sustainable agriculture, the effects of economic globalization of the food supply chain and the future of the world food system.

POLI.3570 Thoreau in Our Time (Formerly 46.357) - Credits: 3

This course traces Henry David Thoreau’s influence on major social and political transformations in American history from the abolitionist movement to the present day. We will focus first on Thoreau’s writings on slavery, commercial development, environmental history, and individual liberty. Then we will study his formative role in the civil rights and environmental movements of the twentieth century. Finally, through a mix of outside speakers and student presentations, we will explore how his writings continue to shape ongoing struggles to contend with climate change, advance social justice, and promote a greater sense of fairness in American life. The course will involve at least one trip to Walden Pond and a tour of Thoreau’s birthplace in Concord, Massachusetts. Course page: http://faculty.uml.edu/sgallagher/Thoreau_in_Our_Time.html.

POLI.3580 Global Environmental Policy (Formerly 46.358) - Credits: 3

This course explores contemporary international environmental issues from both theoretical and policy perspectives; consideration too of broader forces impacting international environmental politics.

POLI.3630 Politics of China (Formerly 46.363) - Credits: 3

A study of the recent development of governmental institutions, parties, and ideology in China. Emphasis is placed on the processes of nation-building in the post World War II period.

PUBH.2080 Principles of Environmental Health Science (Formerly PUBH.208) - Credits: 3

This is a survey course that provides an overview of the rapidly growing field of environmental health, through an introduction to the links between environmental stressors and impacts on public health. The course will explore human and industrial activities that impact on health such as overpopulation, food production, air and water pollution, waste, toxic substances, pests, and global climate change. The course will also examine the types of diseases and illnesses that result from environmental impacts. These impacts have multiple causes and understanding these can in turn provide clues as to the most effective prevention options. Students will explore topics of interest in greater detail through short writing assignments. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

PUBH.2110 Sustainable Development (Formerly PUBH/57.211) - Credits: 3
This course examines workplace and regional factors that shape the prospects for sustainable prosperity and worker and community empowerment. The course begins by reviewing recent trends in the distribution of income and wealth and the industrial structure of the New England economy. The historical dynamics shaping work organization and regional development are examined. Several industry case studies are selected because of their importance to the regional and national economy. The case studies provide focus for studying the strategic choices made by firms in mature industries and newly emerging regions; the basis of competitive advantage for Japanese firms and the response of American rivals; and the influence of the product cycle and regional institutions on capture or retention of emerging and mature industries. The final section of the course focuses on the prospects for sustainability of the organization of production and its environmental impact, incentives for skill development and technological innovation, and shared prosperity. A central course objective is to foster an understanding of the links between the workplace and region in the pursuit of sustainable development and shared prosperity.

PUBH.5061 Environmental Health (Formerly 19.506) - Credits: 3

This environmental health course explores the links between human activities and environmental systems and examines how these interactions can impact human health. The course is designed to provide knowledge and skills necessary to understand how human and industrial activities such as population growth, methods of food production, pollution of the air and water, waste, the built environment, toxic substances, pest control, and global climate change can result in human diseases and impact the environment. Understanding the links between human activities and environmental systems is essential to developing effective prevention strategies and building sustainable communities.

SOCI.2110 Sociology of American Education (Formerly 48.303/SOCI.3030) - Credits: 3

Course introduces students to ongoing debates in the field of Sociology regarding the American educational system, its structures and functions and how it relates to issues of inequality by race, class and gender. Students are expected to explore, examine and evaluate the current issues relating to the system of education in the United States.

SOCI.2360 Climate Crisis and Society (Formerly 48.236) - Credits: 3

Focusing on case studies of recent and pending environmental disasters, this course will trace how political, social, economic and cultural arrangements and choices contribute to environmental catastrophes and their resolution. In order to identify possibilities for agency, students will play several environmental games in which they will assume roles in the global economy, governmental and civil society to identify possibilities for agency. As a final project, students will describe a recent disaster identifying both structures that create environmental stresses and the options that might exist for structural changes. The project is intended to develop both critical thinking and communication skills.

SOCI.3110 Sociological Perspective on Communication & Social Change (Formerly 48.311) - Credits: 3

Most social interactions and interventions involve communication. Thus, communication patterns present critical issues for sociological inquiry. This course introduces communication as a central yet often ignored element of social life. It surveys existing communication theories, then focuses on models used by marginalized populations in efforts to democratize communication systems. Finally, it introduces tools for communication strategizing. As a final product students will conduct a frame analysis of a current social topic. From a general liberal arts perspective, the course will stress critical thinking and writing skills.

SOCI.3300 Fast Food, Hot Planet: Sociological Approaches (Formerly 48.330) - Credits: 3

With an eye on climate change sustainability, this course maps the social and historical dimensions of crisis and inequalities of food production and distribution. In addition to exploring food security’s relation to sustainable food production, students will strengthen critical thinking, writing, and library research skills.
AEST.3800 Understanding Movies: Cinema as Social Commentary (Formerly 79.380) - Credits: 3

This film theory seminar has several main objectives: to study the production of meaning in films; to analyze how moving images are used in social representation; and to introduce students to the visual and critical language of cinema. In this course, we will view a series of films by international authors. These address some of the most pressing issues of today's global world such as identity, subjectivity, difference and otherness, race relations, representations of gender and sexuality, immigration, war, colonialism and post-colonialism, poverty, and social inequalities. The films that we watch will be studied not as isolated cinematic texts but as illustrations and examples of theories of representation. Students will develop their critical analysis skills by being introduced to theoretical concepts such as "the gaze" in art and cinema as well as formal elements such as mise-en-scene, cinematography, editing, and sound.

DGMD.2200 Screenwriting - Credits: 3

In this class students will be immersed in the art and craft of creating compelling stories for the screen in both fiction and nonfiction genres. As it has been said many times about media making, the story is the heart of media production. Students will develop screenwriting abilities through gaining knowledge of and experience with story conception and development: character development; story structure; dramatic action; dialogue; scene/sequence construction and writing for emotional impact.

DGMD.2510 Video Production for Digital Media - Credits: 3

In this course students are going to understand the theory and practice of video production using a single digital camera for digital media through a mix of heavy hands-on practice and lectures. Students will be expected to understand; full digital camera operation and settings, audio control, basic directing, basic lighting, and basic editing intended for digital production. Students will also be expected to learn the terminology of video production/post-production intended for digital media.

DGMD.3100 Advanced Editing for Digital Media - Credits: 3

This class is dedicated to the practice of non-linear editing of media for films, television, or the web. Instruction will focus on the development of formal and conceptual post-production practices needed for creating compelling visual stories. Students will consolidate their post-production skills developed in previous courses and further improve in areas of editing picture and sound, color grading and effects. Emphasis will be made on developing necessary software skills, post-production workflow, and aesthetic approaches.

DGMD.3400 Lighting Principles (Formerly JMS 340/DGMD 340) - Credits: 3

In this course students are going to understand the principles of lighting, its nature, its physical Characteristics, and its artistic role in media production. Class will have significant hands-on assignments and demonstrations beside theoretical background lectures. The concept will be developed based on a one-camera setting only. Students will work with light meters to guide their lighting schemes.

ENGL.2320 Turning Fiction into Film (Formerly 42.232) - Credits: 3

This course explores film adaptation by looking at how writing can be turned into the visual and auditory forms. Through reading novels and watching their film adaptations, students learn conventions of fiction and film, and draw on this knowledge to discover the implications of adapting a written story into a movie. By asking students to think about the different ways writers and filmmakers convey meaning to their audiences, this course attempts to answer the question of why the movie is never exactly like the book.

ENGL.3410 Studies in Film (Formerly 42.341) - Credits: 3

A rigorous examination of a topic of current interests in film studies organized by particular themes, genres or filmmakers.

ENGL.3411 International Cinema Studies: French New Wave - Credits: 3

This course will introduce students to the aesthetic and theoretical qualities that define the New Wave movement in French cinema, focusing on major directors, performers, and composers associated with the New Wave. Through the close intertextual comparison of a range of films contextualized through the historical lens of 1960s Paris, students will develop sophisticated analyses that combine elements of film theory and cultural studies. This semester, we will read contemporary criticism, manifestos, mid-century French philosophy, and secondary scholarly studies to ground our discussions and writing in appropriate historical and theoretical context.

ENGL.3920 Visual Rhetoric (Formerly 42.392) - Credits: 3

This course introduces students to the theory and practice of visual communication. Students will explore what scholars mean by terms such as visual rhetoric and visual literacy in order to think concretely about how these concepts apply to
the communication practices they will engage in their academic, professional, and everyday life. Special attention will be paid to the ways in which visual representations communicate culturally-specific meanings about race, gender, class, sexuality, age, nationality, and difference. Assignments include contributions to a course blog, rhetorical analyses of visual texts, design modules, and a multimodal project.

HIST.2860 United States History Through Film
(Formerly 43.286) - Credits: 3
This course explores selected moments in United States history - such as slavery, the Great Depression, World War II, the Vietnam War, and the feminist movement - through the lens of film. Using written historical sources as well as film, students will investigate how particular films have depicted the past and shaped the way that Americans remember their history.

HIST.3480 Making an Historical Documentary
(Formerly 43.348) - Credits: 3
This course provides students with the basic conceptual and technical skills for developing and completing an historical documentary, including instruction about subject choice, narrative structure, camera work, and editing.

HIST.3890 Ancient History in Film
(Formerly 43.389) - Credits: 3
Ancient History in Film seeks understand the interconnection between ancient texts, social history and pop culture in American cinema. This course is more than an excuse to watch fun films and gain academic credit. It will engage the primary texts that are the foundation for these cinematics creations while investigating the social and cultural influences that shaped the making of these movies. Ultimately, this course will provide a clearer view of our own world through the lens of moviemakers mimicking the Greco-Roman world. We will read primary texts in translation, modern analyses of these movies and you are responsible to watch an entire film between class sessions. All films are on reserve in the Media Center of the O’Leary Library.

LGST.3720 Sports, Entertainment and Art Law
(Formerly 41.372) - Credits: 3
This course challenges students to engage in analytic reading, critical thinking and problem solving related to the legal issues facing the sports, entertainment and art worlds. Topics may include contracts, intellectual property rights, employment law, labor law, and other areas of interest.

LGST.3860 Intellectual Property
(Formerly 41.386) - Credits: 3
This course surveys the law of the protection of ideas, trade secrets, inventions, artistic creations, and reputation. The course will briefly review the law of patent, trademark, copyright, trade secret, and geographical indication. The course will cover the distinction between the various forms of intellectual property, and the statutory and common law methods of enforcing rights.

LGST.4890 Seminar in Law
(Formerly 41.489) - Credits: 3
The course provides opportunity for small groups of advanced students to study selected legal topics.

MUHI.4560 Film Music
(Formerly 74.456) - Credits: 3
A study of music in sound cinema from the 1920s to the present. The course focuses on the expressive, formal, and semiotic function that film music serves, either as sound experienced by the characters, as another layer of commentary to be heard only by the viewer, and/or some mixture of the two. Composers to be studied include Max Steiner, Bernard Hermann, Jerry Goldsmith, John Williams, Danny Elfman, and others, as well as film scores that rely upon a range of musical styles, including classical, popular, and non-Western. The singularly most important goal of the course will be to study how music functions in a given film, regardless of its musical style. In the process, ancillary ideas will emerge including discovering how music establishes psychological moods, guides emotions, and reveals aspects of the narrative structure of the film. By the end of the course, the student will have gained a greater understanding of both music and film and it is likely that students will never watch or listen another movie in quite the same way.

PHIL.3140 Philosophy of the Gothic Imagination
(Formerly 45.314) - Credits: 3
A philosophical inquiry into science fiction, fantasy, and horror, with special emphasis on film. This course will attempt to provide interpretations of some classic examples from these genres, as well as to inquire into the philosophical significance of these literary categories and their relation to mythology and religion. Questions to be addressed will include the problem of knowledge and rationality and its limits, the nature of the human being, and the moral problem of the role of violence in the social order. The class will attempt to identify a continuous tradition between these modern genres and ancient Greek tragedy and mythology.

PHIL.3160 Philosophy and Film
(Formerly 45.316) - Credits: 3
This course examines the political and philosophical values and ideas which constitute cinema. It analyzes film as an historical, cultural, commercial, and artistic endeavor. Students will develop the skills to watch film actively and critically.

**POLI.3160 Politics and Film (Formerly 46.316) - Credits: 3**

Analysis of the role of film in creating, expressing, revealing, and responding to social and political ideas and values. Examines a variety of film and film styles and introduces students to elements of film theory, the theory of popular culture and the role of film in forming our ideas about the world.

**SOCI.1120 Sociology Goes to the Movies (Formerly 48.112) - Credits: 3**

This course is designed to give students the opportunity to survey primary sociological texts and view films, offer commentary on and analysis of social behavior.

**WLFR.3400 Contemporary French Cinema (Formerly 50.340) - Credits: 3**

Provides a critical appreciation of contemporary French cinema (1985-today) aiming at sorting out its eclecticism and focusing on the following aspects: 1) French cultural exception in the European Union: cultural integration and national identity; 2) Representation of the ongoing social and moral changes in contemporary France; 3) The new generation of French filmmakers. Class taught in French.

**WLFR.3760 French Cinema & Society (Formerly 50.376) - Credits: 3**

Covers the dramatic presentation French society gives of itself during the period of profound social and economic change, from the New Wave and the May 68 events to today’s younger generation facing an uncertain tomorrow. Each screening (in French with subtitles) is preceded by an introduction placing the film in its historical context. In English.

**WLFR.3800 Francophone Identity through Cinema (Formerly 50.380) - Credits: 3**

Provides a critical appreciation of the notion of Francophone identity through modern and contemporary (1970-today) Francophone cinema from diverse places such as but not limited to North Africa, West Africa (especially Senegal), Canada (especially Quebec) the Caribbean, Belgium, and Switzerland. The course is aiming at showing the evolution of the Francophone identity in the postcolonial period until now and is focusing on the following aspects: 1) The emergence and importance of postcolonial Francophone cinema in the 1970s as a "cinema engage" (especially Sembene Ousmane in Senegal); 2) Contemporary issues of the postcolonial Francophone societies through films; 3) Representations of the cultural diversity in Francophone films; 4) Identity, race and immigration, women’s status issues.

**WLFR.3800 Italian Cinema & Culture (Formerly 52.378) - Credits: 3**

A guide to contemporary Italian studies through literary and cultural approaches. The works of central figures in contemporary Italian letters are examined in view of their impact on Italian life. Emphasis is given to poets, novelists, the new cinema, the influences of existentialism, and the impact of America on Italian literature. Conducted in Italian/English.

**WLFR.3800 Italian Cinema: Directors and Themes (Formerly 52.380) - Credits: 3**

A study of Italian film history and its accomplishment by exploring the relationship of cinema to sociopolitical, economic, cultural, and literary events. The course will discuss in depth either a) one or two major and well known directors; b) a major thematic and stylistic division in a century of cinematic creativity.

**WLPO.3030 Survey of Brazilian Cinema - Credits: 3**

An introduction to Brazilian cinema and society, focusing on the Cinema Novo (New Cinema) of the 1960s and 1970s as well as more contemporary films influenced by the ideals of this movement. Films will be analyzed via reference to historical and theoretical texts. Topics to be addressed include Brazilian history as reflected in film and the formation of a distinct Brazilian aesthetic sensibility. Taught in English.

**WLSP.3710 Hispanic Literature & Film (Formerly 54.371) - Credits: 3**

This course examines the relationship between the Hispanic narrative discourse and cinema, including film adaptations of literary works. Modern social and cultural issues, as well as Hispanic self-images. The selected works provide an array of genres and perspectives that reflect the cultural, historical, and socio-political aspects of each period. Taught in Spanish.

**WLSP.3750 Latin American and Spanish Cinema (Formerly 54.375) - Credits: 3**

An exploration of representative Spanish and Latin American films from a variety of major directors. Areas of investigation include the cinematic representation of nationality, ethnicity, identity, gender, history and politics. This course will be taught...
in English. Knowledge of Spanish is desirable but not required. Spanish majors and minors will complete written assignments, reviews, quizzes, and exams in Spanish.
AEST.3800 Understanding Movies: Cinema as Social Commentary (Formerly 79.380) - Credits: 3

This film theory seminar has several main objectives: to study the production of meaning in films; to analyze how moving images are used in social representation; and to introduce students to the visual and critical language of cinema. In this course, we will view a series of films by international authors. These address some of the most pressing issues of today's global world such as identity, subjectivity, difference and otherness, race relations, representations of gender and sexuality, immigration, war, colonialism and post-colonialism, poverty, and social inequalities. The films that we watch will be studied not as isolated cinematic texts but as illustrations and examples of theories of representation. Students will develop their critical analysis skills by being introduced to theoretical concepts such as "the gaze" in art and cinema as well as formal elements such as mise-en-scene, cinematography, editing, and sound.

ARHI.1050 Comparative Arts (Formerly 58.105) - Credits: 3

This course studies the aesthetic, artistic and intellectual similarities between art history and music history. Discussion of the arts focuses on the development in examining the human creativity and expression through the arts: from ancient times as art and morality followed in the Renaissance as art and sciences continued in the Enlightenment as art and society contrasted in the nineteenth century as art and entertainment. Furthermore, this course surveys some of the fundamental aspects of music and art, such as the nature of aesthetic judgment, the task of art and music criticism, including formalist, representational, and contemporary theories on viewing, analyzing, and interpreting the arts. In addition, with a comparative analysis between the modes of visual and aural representation, visual and aural perception, this course analyzes the principal forms and genres of the visual and aural elements of art history and music history, providing an understanding for human creativity and expression. Spring, alternate years.

ARHI.3400 Women and Art (Formerly 58.340) - Credits: 3

An introduction to key issues and theoretical approaches to the study of women and art. This course examines women as makers of art, as subjects of art, and as interpreters of art. The class will explore the ways artists have represented the intersections of gender identities, sexual orientation, power, race, class and nationality in their works and the socio-cultural conditions in which specific artists have been excluded or marginalized in art practice, exhibition, collecting and critical discourse.

ARHI.3520 Contemporary Art and Culture (Formerly 58.352) - Credits: 3

Examination of issues of content, theory, and criticism in contemporary art. Current exhibitions and criticism are integral to the course. Topics vary from year to year. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ASAM.2120 Introduction to Asian American Studies - Credits: 3

This course provides students with an overview of the multidisciplinary field of Asian American Studies from two distinct disciplines. The course begins with the history of Asian American Studies and the methods used to advance the field. Next, various aspects of the Asian American experience, such as gender and sexuality, are examined. Students also participate in service learning in partnership with Asian-serving community organizations in and around Lowell, MA. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

CRIM.3450 The Role of Women in Terrorism and War - Credits: 3

This interdisciplinary course will examine the gendered processes of war, sub-state violence, counter-terrorism/insurgency and conflict resolution. More specifically, we will review relevant conceptual and theoretical frameworks which focus on the relationships between gender, armed conflict and conflict resolution. In addition, we will examine the strategies used by women's and feminist movements to promote specific security related policy. The class will explore cases from Africa, the Americas, Asia, Europe, and the Middle East and North Africa.

CRIM.3600 Gender, Race, and Crime (Formerly 44.360) - Credits: 3

This course examines gender and racial implications of criminal laws, criminal justice practices and programs will be examined. The position of women and racial/ethnic minorities will be assessed from the different perspectives of victims, offenders, and criminal justice practitioners.

CRIM.4220 Victimology (Formerly 44.422) - Credits: 3

This course examines the patterns of victimization, the characteristics and lifestyles of crime victims, and the impact of their victimizations. The treatment of victims by the criminal justice system will be examined along with possible reforms in
these approaches.

CRIM.4770 Intimate Partner Violence (Formerly 44.477) - Credits: 3

This course examines the causes and consequences of domestic violence and the latest research regarding the responses of the criminal justice system.

ENGL.2400 Literature and Women (Formerly 42.240) - Credits: 3

A survey of literary attitudes toward women from the Judaic and Hellenic periods through the present.

ENGL.2420 The Heroine in Modern Fiction (Formerly 42.242) - Credits: 3

Provides a study of selected short stories and novels which deal sympathetically with the changing roles of women.

ENGL.2430 Contemporary Women Writers (Formerly 42.243) - Credits: 3

Contemporary Women Writers introduces students to American women writers of the last fifty years. We examine the historical, socio-cultural, political, and personal influences on these writers’ work by studying trends and events in recent American history and themes reflected in the works. By studying contemporary women’s writing in this contextualized fashion, students can appreciate larger trends in our society, the role writing plays in examining such trends, and the value of literature as an exploration of human growth and struggle. Through discussion, group collaboration, critical analysis, and by designing their own graphic organizers, students gain a breadth of knowledge in the following areas: the themes and stylistic concerns of contemporary American women writers; the key historical events that influence contemporary American women’s writing; the critical reading of literary texts. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2460 Gay & Lesbian Literature (Formerly 42.246) - Credits: 3

Explores the treatment of homoeroticism and homosexual love in literature from Antiquity to the present. Emphasis is given to texts reflecting the construction of a homosexual identity and recurring motifs among gay, lesbian, and bisexual writers. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2570 The Family in American Literature (Formerly 42.257) - Credits: 3

A study of literary selections dealing with traditions of family life, the individual, and social change. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.3280 Writing About Women (Formerly 42.328) - Credits: 3

Writing About Women

ENGL.3350 American Women Novelists (Formerly 42.335) - Credits: 3

A study of selected novels by American women. Focus on the female voice within the American tradition. Treatment of such issues as domesticity, education, and authorship. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3380 Medieval Women Writers (Formerly 42.338) - Credits: 3

Woman have always written and read and participated in culture. This class will explore writings on literary and non-literary genres by woman in the European Middle Ages (600-1500). Students will learn how different pre-modern cultural conditions affected the possibilities for women's authorship, readership, and patronage. We will also examine how women writers interacted with literary traditions and constructions of gender.

ENGL.3420 Women Writers and the Past (Formerly 42.342) - Credits: 3

Women Writers and the Past. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ENGL.3440 Women in Theatre (Formerly 42.344) - Credits: 3

A study of the significant contributions of women to the literature and art of the theatre in various periods and cultures. Topics may include: plays written by women, the progress of women in theater, the evolution of female roles, and the portrayal of feminism on the stage.

ENGL.3450 British Women Novelists (Formerly 42.345) - Credits: 3
Selected novels by writers such as Austen, the Brontës, Eliot, Woolf, Bowen, and Drabble. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

**ENGL.3920 Visual Rhetoric (Formerly 42.392)** - Credits: 3

This course introduces students to the theory and practice of visual communication. Students will explore what scholars mean by terms such as visual rhetoric and visual literacy in order to think concretely about how these concepts apply to the communication practices they will engage in their academic, professional, and everyday life. Special attention will be paid to the ways in which visual representations communicate culturally-specific meanings about race, gender, class, sexuality, age, nationality, and difference. Assignments include contributions to a course blog, rhetorical analyses of visual texts, design modules, and a multimodal project.

**ENGL.3950 Special Topics in English (Formerly 42.395)** - Credits: 3

This course focuses on the exploration of thematic or issue-oriented or timely topics of interest. The precise topics and methods of each section will vary. Barring duplication of topic, the course may be repeated for credit.

**ENGL.4010 Selected Authors (Formerly 42.401)** - Credits: 3

A study of selected works. Authors to be announced each semester.

**ENGL.4790 Literature Seminar (Formerly 42.479)** - Credits: 3

An advanced course that explores a variety of issues and topics in literature, literary history, and related fields. The topic or issue for a specific seminar will be announced in advanced.

**GNDR.2000 Special Topics in Gender Studies (200-level) (Formerly GNDR 200) (Never Offered)** - Credits: 3

"Special Topics in Gender Studies" (200-level) offers students the opportunity to study a topic of special interest in the field of Gender Studies from an interdisciplinary perspective. The content and approach will vary depending upon the research and teaching interests of the faculty member teaching the course.

**GNDR.2400 Introduction to Gender Studies (Formerly GNDR 240)** - Credits: 3

This course is an interdisciplinary introduction to the field of Gender Studies that examines both commonalities and differences among diverse groups of women. A variety of topics are presented such as past and present stratification in work and family, sexual identities, medial representations of women, and violence against women. Social movements for women’s equality and feminist theories and methods are also introduced.

**GNDR.4010 Gender Studies Practicum (Formerly GNDR 401)** - Credits: 1-3

This course provides a link between the UMASS Lowell campus and the community, offering students a unique learning experience. This Community Service-Learning course provides opportunities for students to learn through thoughtful engagement in community service, applying knowledge of gender issues gained in the classroom to the world outside the classroom. Students and their faculty supervisors together will determine the kind of service work students will engage in during the semester, choosing from a wide range of available placements. They will be using their hard-won knowledge from their years in the classroom and applying it to help meet urgent needs in the community. Students will have the opportunity to make lasting connections and effect positive change in our community. Ideally, this course will promote good citizenship through reflection on gender issues and testing of personal values, leading students toward a heightened sense of social responsibility and a lifelong commitment to their local, national, and global communities.

**GNDR.4100 Directed Studies (400-level) (Formerly GNDR 410)** - Credits: 1-3

This course, taken for 1 or 3 credits, may serve as a capstone experience for advanced gender studies students, helping them to explore a gender-related topic of interest while working closely with a faculty member. Projects that students complete for the Directed Studies will vary in length, scope, and topic, depending on how many credits are taken and which faculty member the student agrees to work with the student. What all projects will have in common is (1) a topic clearly relevant to gender studies, (2) an emphasis on achieving deep learning through advanced study, and (3) the integration of two or more distinct disciplines, integrating these disciplinary insights in order to solve a complex problem or analyze a complicated issue. This course allows for a student and professor to work closely together on a project of mutual interest. It is expected that the faculty member will be supporting and guiding the student’s work, and thus regular meetings will be necessary. In some cases the faculty member may not feel competent to oversee all aspects of a project in which an unfamiliar discipline is employed. In such cases, a second (and even third) faculty member may be asked to participate in the Directed Study as a consultant and final reader.
HIST.2070 Women in China (Formerly 43.207) - Credits: 3
From Confucian texts to current conditions, the course examines the evolution of Chinese women’s status throughout the centuries. The course will ask questions such as whether Confucianism dictated oppression against women, what factors influenced the changes of status for women, how Western feminism is connected with Chinese women, what roles women played in transforming China, and how ordinary women lived and are still living in China.

HIST.2280 Women in European History (Formerly 43.228) - Credits: 3
This course examines the history of women in late medieval, early modern, and modern Western Europe (ca. 1300-1900). From medieval saints and Renaissance queens to Enlightenment Saloniers and ordinary wives and mothers, women have played an astonishing variety of roles. We will utilize primary and secondary sources, historical films, and works of art to understand the contributions and challenges of women in the past.

HIST.2700 Women in American History (Formerly 43.270) - Credits: 3
This course surveys the history of women in the British North American colonies and United States with a special focus on social and economic change. It examines women as a distinct group but also attends to divisions among them, particularly those based on class, ethnicity/race, and regional diversity. Course themes include concepts of womanhood, the development and transgression of gender roles, unpaid work and wage labor, social reform and women’s rights activism, as well as changing ideas and practices with respect to the female body.

HIST.3010 The World of Things: Consumer Cultures in the Modern West (Formerly 43.301) - Credits: 3
This course will examine the emergence and historical impact of consumer cultures in the modern West, from the eighteenth century through the present. Topics to be covered will include the emergence of spaces of consumption (the home, the commercial/spectacular metropolis, the department store, the shopping mall, the tourist site), changing attitudes toward shopping and spending, the construction of modern social identities of class, gender, generation and race through consumption, and political struggles over consumption.

HIST.3333 American Women and Public Activism, 1800-1920 - Credits: 3
Over the course of the 1800’s, women developed numerous strategies for influencing American society and politics, even though they were unable to vote in most elections. This course will explore how diverse groups of American women formed organizations that acted decisively in the public arena. By analyzing women’s social and political activism, we will see how vital civil society is for a functional democracy, and explore how change happens. Possible topics include women’s activism in social reform, local and state governments, civil rights, labor organizations, charitable work, religion, and women’s rights. Consideration will be paid to the differences among women in terms of race, class, and sexuality.

HIST.3380 War and Memory in Twentieth Century France (Formerly 43.338) - Credits: 3
This course will address the individual and collective trauma of modern warfare, as that was experienced in France both during and after the country’s three main wars in the twentieth century. It focuses on how the experience of modern war was negotiated in culture—in personal and official memory, in gender relations, and in a great variety of written and visual texts. Individual units will be dedicated to World War I, the Occupation and Vichy Regime during World War II, and the Algerian War, and to the long and conflicted afterlife of those conflicts.

HIST.3585 American Women’s Lives, 1600 - present - Credits: 3
Some of the very best and most readable examples of American Women’s History come in the form of biographies. While historians may sometimes lack sources for writing women’s history, we often know spectacular amounts about individual women. Scholars have used this wealth of information to produce rich, complex readings of women’s lives. In the process of doing so, historians of American Women also write the history of all of American society, culture, politics, and economics. This course seeks to broaden our understandings of American History, the genre of biography, and most importantly, the history of American Women. The women chosen for the study will depend on the preferences of the professor, with attempts made to cover a variety of topics, time periods, and types of biographies.

HIST.3800 Work and Society (Formerly 43.380) - Credits: 3
Provides a survey of labor history from the colonial period to the present focusing on the interrelationship between culture and work in American society and on the dynamics of technical and economic changes on the organization of work processes.

HIST.3840 Radicalism in American History (Formerly
43.384) - Credits: 3
A biographical approach to the influence of radicalism on American history with emphasis on significant and representative personalities and their contributions.

LGST.3760 Family Law (Formerly 41.376) - Credits: 3
This course studies the critical family law issues facing society today. Subject matter examined may include the law of marriage, custody, adoption, divorce, child support, juveniles, right to die, fetal tissue transfer to prolong the life of another, reproduction control, and surrogate parenting. This course is taught from a legal and human values perspective.

LGST.3810 Women and the Law (Formerly 41.381) - Credits: 3
This course presents legal issues that often or particularly affect women. Topics may include sex discrimination, sexual harassment, rape, marriage, divorce, reproductive control, surrogate motherhood, and custody.

PCST.5250 Gender, Work and Peace (Formerly PCS 525) - Credits: 3
"Gender, Work and Peace" will explore the relationship between human rights, gender and nonviolence in the 21st century. We will examine how current and future reality can be shaped by related policies, specifically those on the micro and macro level concerned with gender. Today we live in a period of global transition comparable to the period that followed the Industrial Revolution. It presents us with enormous challenges and opportunities regarding factors we will address in class: economic globalization, government restructuring, work-family balancing, environmental safety at work, gender inequalities and the connection between human rights and dignity at work.

PHIL.3060 Feminist Theory Politics (Formerly 45.306) - Credits: 3
What is sexist oppression? Is our culture still sexist, or is the need for feminism over? How should we respond to sexism in other cultures? Do men and women have different natures? Are our culture’s sexual representations of women necessarily degrading, and if so, why? We’ll consider these questions, and others, by examining the arguments and methodology of analytic feminism. We’ll start by tracing the historical development of feminism in the 18th, 19th, and 20th centuries, and then turn to several contemporary feminist analyses of sexist oppression. We’ll then use these feminist frameworks to examine more specific issues. Possible topics include: feminist analyses of sexual objectification in pornography, feminist arguments in ethics and social theory, feminist analyses of science, and feminist criticisms of gendered labour. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PHIL.3080 Philosophy of Race and Gender (Formerly 45.308) - Credits: 3
This course will focus on issues of identity and difference. We will discuss the ways in which group identities are formed and break down. We will discuss how differences are constituted and reconstituted. These issues are central to theories of race and gender, racism and sexism. Some of the questions which we will raise are these: What motivates forming group identities? How are they formed? How is identity used within oppressive social structures? How can it be used to transform society? Why do some differences make a difference and others don’t? Can we choose our group identities? Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PHIL.3670 Feminism and Liberalism (Formerly 45.367) - Credits: 3
Liberalism stresses the importance of protecting individual people’s right to live their lives however they see fit. Feminism strives to show that women are subject to a variety of injustices that prevent them from being able to live lives that are as good as men’s. The aim of this course will be to consider whether liberalism and feminism are compatible, or whether the central ideals of liberalism—the equality, autonomy, and individual rights—actually function to entrench not just sexism but also racism, classism, and other kinds of oppression. Readings will include both historical and contemporary writers such as Isaiah Berlin, Thomas Hobbes, John Locke, Catherine MacKinnon, John Stuart Mill, Martha Nussbaum.

PHIL.3750 Philosophy of Sex and Love (Formerly 45.375) - Credits: 3
The aim of this course is to introduce students to both historical and contemporary discussions surrounding the topics of sex and love. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PHIL.3850 Philosophy of Popular Culture (Formerly 45.385) - Credits: 3
This course analyzes those forms of art/entertainment commonly referred to under the umbrella term "popular culture" through a variety of philosophical lenses. After seeking to establish a categorization of "popular culture," students will examine the mediums of music, film, television, advertisements and sports. Throughout the course, students will read/listen/watch various examples of the mediums listed above and attempt to answer various questions about them.
such as: what societal values make these examples popular at a current moment? What cultural assumptions do these examples reflect? What is the artistic/aesthetic merit of these examples?

POLI.3200 Gender Law and Politics (Formerly 46.320) - Credits: 3

Explores legal constructions of gender by examining Supreme Court cases, federal legislation, historical documents, news stories, and scholarly essays on sexual inequality in the United States. Topics include the evolution of the family as a legal (and illegal) reality; political regulation of reproduction and sexual activity; feminist critiques of economic inequality; the rise and fall of affirmative action; the changing role of gender in class consolidation; and ongoing debates about the relationships between public and private life.

POLI.4020 Women in Islam (Formerly 46.402) - Credits: 3

Focusing upon one of the most important topics in Islam, this course will go beyond conventional stereotypes and explore woman’s many and varied roles within Islamic cultures and societies.

POLI.4060 The Politics of Identity in the Middle East (Formerly 46.406) - Credits: 3

The course will examine the ethnic, political, religious and social changes in the modern Middle East. The course will start with an introduction to the diverse identities all over the Middle East and then it will comparatively examine a number of those identities.

POLI.4110 Dynamics Power and Authority (Formerly 46.411/57.511) - Credits: 3

This course surveys theories of power, authority, participation, and politics. Building on these theories, students will examine changing social, political, and economic patterns of inequality based on class, race (and related divisions of ethnicity, religion, caste, nationality), and gender. Reviews various approaches to altering these dynamics (business strategy, public policy, community and social movements). Cuts across units of firm, community, region, and nation, along with corresponding governmental institutions, and links theoretical analysis with study of practical problem solving. Instructor-initiated cases drawn from a variety of national experiences. Students will learn techniques of power analysis and prepare a power analysis project.

PSYC.3350 Psychology and Women (Formerly 47.335) - Credits: 3

Considers such topics as: the psychology of sex differences; biological bases of psychological sex differences; the nature of female sexuality; clinical theory and practice concerning women; women as mental patients and mental health consumers; implications for psychology and for women’s status.

PSYC.3510 Human Sexuality (Formerly 47.351) - Credits: 3

Addresses the biological, psychosocial, and attitudinal aspects of human sexuality through lectures, discussions, films from a variety of perspectives.

PSYC.4770 Seminar in Contemporary Trends (Formerly 47.477) - Credits: 3

An advanced seminar to consider current trends in psychology, with special focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Specific topics will vary and may include such topics as contemporary models of addictive behavior; the interaction of psychology and law; existential psychology; psychology of technological change. This is a writing intensive course.

PSYC.5230 Women in the Community (Formerly 47.523) - Credits: 3

An examination of women’s roles in the home, community, and workplace; examines psychological consequences, social structural influences, and options for change. Topics include: housework and childcare; violence against women; work place stratification issues; and women’s contributions to their communities.
SOCl.2250 Sociology of Disability (Formerly 48.225) - Credits: 3

This course is organized around several key questions that are used to study the concepts of disability and ability from a variety of sociological and interdisciplinary perspectives. Specifically, the course explores representations of disability in popular culture and medical discourses to discuss disability and ability as social constructs. By looking at various literary and cultural representations, this course investigates constructions of the disabled and able-bodied body, how this becomes politicized, and the implications of these constructions.

SOCl.2310 Sociology of Families (Formerly 48.231) - Credits: 3

This course uses a sociological approach to understand family forms, practices, and controversies in contemporary society, with particular emphasis on families in the United States. We will look closely at how family experiences and opportunities have changed over time, and also how they vary by gender, age, class, race/ethnicity and sexual orientation. What functions do families perform in modern society? How are they changing? How do these changes affect our lives?

SOCl.2400 Sociology of Gender (Formerly 48.240) - Credits: 3

This course is an interdisciplinary introduction to the field of gender studies. A variety of topics are presented, such as gender stratification, work and family, sexual identities, media representations of women and men, women’s movement, and violence against women. Feminist theories and methods are also introduced.

SOCl.3050 Sociology of Family Law (Formerly 48.305) - Credits: 3

Examines some social issues in family law, the changes therein, and the social climate and consequences accompanying these. By using the sociological method of inquiry to examine family law cases, the relationship between law and society as instruments of order and change are exemplified.

SOCl.3350 Sociology of Intimacies and Sexualities - Credits: 3

In this course, students will investigate the relationship between society and sexualities, including: social categorizations of sex, gender, and sexuality; social and cultural representations of intimacy and sexuality; and social and institutional control of sexualities and sexual behavior and practice. Students will read theoretical and methodological works from the field of sexualities studies, including sociological, feminist, post-colonial, and queer theorists. By the end of the course, students will be able to articulate a sociological perspective on intimacy and sexualities.

SOCl.3620 Social Welfare Policy (Formerly 48.362) - Credits: 3

The course examines the development of social welfare policy in the United States as well as alternative strategies for social welfare provision. Particular attention is paid to the role of race/ethnicity, class, and gender in the formation of social welfare policy.

SOCl.3700 Intersections of Disability and Gender - Credits: 3

This course is organized around several questions that will be used to help engage students in the study of the concepts of disability and gender from a variety of sociological and interdisciplinary perspectives. The course will explore feminist representations of disability and gender in popular culture discourses to discuss disability as well as gender as social constructs. By analyzing books, movies, television, cartoons, and the internet, we will look at how conceptualizations of disability and gender intersect and are represented in these "texts" and the possible influences on perceptions and definitions of disability.

SOCl.4050 Feminist Methodologies (Formerly 48.405) - Credits: 3

Despite the recent growth of feminist methodologies, there is no one way of doing feminist methodologies. The growing body of literature in this area addresses the distinctive challenges and strengths of doing this research. Gender Studies scholars especially seek to question the framing of a study, managing of emotions, and ethical dilemmas. We will explore feminist strategies for creating, implementing, and analyzing a project that is grounded in the everyday lives of people while situating them in a social, political, and economic context. We will explore the interdisciplinary intersections where these challenges push at the boundaries of the disciplines of your major field of study. We will also investigate how to use as variety of qualitative approaches while doing a feminist project and the ways in which feminism can enlighten understandings of "traditional" qualitative methods.

WLIT.3300 Italian Women Writers (Formerly 52.330) - Credits: 3

Studies women writers of Italy by giving attention to the genres of narrative, poetry, theater and autobiography. Authors are selected according to their impact on issues affecting women, gender studies, feminism, avant-garde, modernism, social
relations and psychological discourse. Conducted in English.
ARHI.3230 Northern Renaissance Art (Formerly 58.323) - Credits: 3

A study of 15th and 16th century painting and sculpture north of the Alps including artists such as Jan van Eyck, Hieronymus Bosch, Jean Fouquet and Albrecht Drer. This course considers how social forces (politics, race, religion, gender etc.) influenced the manner in which Northern renaissance art was produced, viewed, and understood, as well as how these forces led to the creation of some of the most startling, strange and enigmatic images of any period in the history of art.

ENGL.3150 Old English Language and Literature (Formerly 42.315) - Credits: 3

Students will acquire reading knowledge of the Old English Language, spending half the semester mastering grammar and vocabulary, and the second half translating texts such as The Wanderer, Dream of the Rood, and Beowulf. Attention will also be given to early medieval cultures in England.

ENGL.3360 Beowulf and Heroic Literature (Formerly 42.336) - Credits: 3

We will read Beowulf in translation, and discuss contemporary approaches to the poem. We will also study other Old English works such as Judith, as well as Frankish and Old Norse-Icelandic literature in translation to gain a cultural context for Beowulf. May include discussion of how later works, such as those of J.R.R. Tolkien or modern fantasy writers have been influenced by these medieval epics.

HIST.2310 Renaissance and Reformation (Formerly 43.231) - Credits: 3

The history of Europe in the time of transition between the late Middle Ages and the Early Modern Period. Two principle topics are the intensification of cultural change which began in Italy around 1300 and spread slowly northward and the disruption of the unity of the Western Christian Church.

HIST.2370 Europe in the Twentieth Century (Formerly 43.237) - Credits: 3

This course will survey the continent's history over its "age of extremes" in the twentieth century, moving broadly from the apogee of European global power at the turn of the century to its decline in the trauma of two world wars and decolonization, through the Cold War and post-1945 recovery and the challenges and possibilities that have arisen for Europe in the aftermath of 1989 and the fall of the Berlin Wall.

HIST.3230 World of the Atlantic (Formerly 43.323) - Credits: 3

In a world in which genocide is real, the murder of six-to-eight million Jews between 1939 and 1945 remains a critical topic of inquiry. When were factories of death first conceived? What perverse rationale motivated the collaborators who built and operated the gas chambers and crematoria? This course will answer questions of this kind by examining the most respected scholars who have written on and primary sources that speak directly to the Holocaust.

HIST.3230 World of the Atlantic (Formerly 43.323) - Credits: 3

The concept of the Atlantic world arose to describe the interactions of the peoples of the Americas, Europe, and Africa through trade, conquest, colonialism, independence and beyond. In this class, we will consider the cultural, economic, and political relationships that are formed and change over time between these groups. We will pay special attention to historical approaches to studying and writing about the Atlantic World.

HIST.3370 Germany Since 1871 (Formerly 43.337) - Credits: 3

This course will survey major developments of Modern German History, from German Unification through European Union. Topics covered will include German social, political and military evolution under the Empire: the impact of modern, "total" war; the upheavals of the Weimar and Nazi periods; German recovery and division during the Cold War; German reunification and its contemporary aftermath.

HIST.3730 Nazi Germany (Formerly 43.373) - Credits: 3

This course looks at the period 1933-1945 (the period of the "Third Reich") in Germany from the perspectives of economics, politics, society, and the arts. In the course, we will read preeminent historians who have written on each of these themes in order to gain a firm understanding of the historical debates that surround the period. Specific subjects include the Nazi consolidation of power, the increasingly brutal nature of anti-Semitic policies, the power struggles among chief Nazi officials, the ideologies and personae of figures like Hitler, Rosenberg, and Goebbels, the nature of "Nazi art" and cultural policies, and the path to war.

HIST.3790 United States Industry Twentieth Century (Formerly 43.379) - Credits: 3

An exploration of the rapid growth of the American economy in the 20th century, including the evolution of the large
corporation and the mass production assembly line. Particular attention is devoted to the ways in which immigrants, women, and the African Americans were affected by the rise of big business. The course also traces the decline of the traditional U.S. manufacturing base following the Second World War and the impact this had on the working class and their unions.

PHIL.3230 PhilosophyClassics: Nietzsche (Formerly 45.323) - Credits: 3

A detailed introduction to Nietzsche's thought and its reception. This course will examine Nietzsche's most important works and central concepts such as the Dionysian and Apollonian, the last man, overman, eternal recurrence, genealogy, and will to power.

WLGE.1010 German 1 and Culture (Formerly 51.101) - Credits: 3

Develops German speaking, listening, reading and writing skills through the discovery of the culture of German speaking countries in a communicative approach (instruction occurs in German with clarification in English). This class is the 1st of the 4-course German language program offered at UML. Language courses are sequential and must be taken accordingly.

WLGE.1020 German 2 and Culture (Formerly 51.102) - Credits: 3

Continuation of German 1 and Culture (or equivalent), which is a pre-requisite. Strengthens German speaking, listening, reading and writing skills acquired in German 1 and Culture through the discovery of the culture of German speaking countries in a communicative approach (instruction occurs in German with some clarification in English). This class is the 2nd of the 4-course German language program offered at UML. Language courses are sequential and must be taken accordingly.

WLGE.2110 German 3 and Culture (Formerly 51.211) - Credits: 3

Enhances the four skills acquired in German 2 and Culture (or equivalent), which is a pre-requisite: speaking, listening, reading and writing through the discovery of the culture of German speaking countries in a communicative approach (instruction occurs in German with minimal use of English). This class is the 3rd of the 4-course German language program offered at UML. Language courses are sequential and must be taken accordingly.

WLGE.2120 German 4 and Culture (Formerly 51.212) - Credits: 3

This course has German 3 and Culture (or equivalent) as a pre-requisite and is the 4th and last of the 4-course German language program offered at UML. The course strengthens the four skill acquired in prior levels. It emphasizes increased accuracy and depth of students’ abilities and knowledge of the culture of German speaking countries in a communicative approach (instruction occurs in German with almost no use of English). Students express themselves orally and in writing at the national standards level of high-intermediate and understand key-concepts when spoken clearly at native speed.

WLGE.3000 Grimms' Fairy Tales (Formerly 51.300) - Credits: 3

This course will provide a study of the Grimms' fairy tales, their collection and publication by Jacob and Wilhelm Grimm in the contest of 19th century German Romanticism, and their enduring relevance to modern social commentary. Reading the texts in English translation, students will gain a critical understanding of the content and structure of the tales, of their cultural components, and their function through time to entertain, edify, and inform about life in the social milieu. The course is taught in English.

WLGE.3010 German Culture and Civilization - Credits: 3

This course examines the cultural and social development of Germany, from the end of World War II until now. This course analyzes the radical transformation of Germany through a deep identity crisis and the rising of new German generations. Germany’s cultural, political and economical reconstruction will be discussed in readings, films, documentaries, architecture, pictures, and paintings. Course materials are in English or in German with English subtitles. This course is conducted in English.
CHEM.1350 Honors Chemistry I (Formerly 84.135) - Credits: 3

A more in-depth view of the topics covered in Chemistry I, (84.121). Topics include chemical reactions and calculations, atomic history and structures, the behavior of gases and bonding theory. Open to students enrolled in the Honors Program, and may be taken instead of 84.121.

CHEM.1360 Honors Chemistry II (Formerly 84.136) - Credits: 3

A continuation of 84.135. A more in-depth view of the topics covered in Chemistry II (84.122). Topics include solutions, kinetics, thermodynamics, acids and bases, chemical equilibrium, electrochemistry and solubility. Open to students enrolled in the Honors Program, and may be taken instead of 84.122.

COMP.4800 Honors Project I (Formerly 91.480) - Credits: 3

This course provides an undergraduate research experience for Computer Science majors enrolled in the Honors Program. Each student develops a project idea in consultation with the instructor. The student writes a proposal for the project, reads the relevant literature, performs the project, writes a project report or thesis, and makes an oral presentation about the project.

COMP.4810 Honors Project II (Formerly 91.481) - Credits: 3

In this course, students continue and complete the project started in 91.480 Honors Project I.

HONR.1100 First Year Seminar in Honors: Text in the City (Formerly HON 110) - Credits: 3

The First Year Seminar in Honors (FYSH) uses Lowell as its text. Rich in history and culture, and the students' home for the next four years, the City of Lowell offers a perfect topic to promote connections while learning how to view the city through the lens of the Humanities. Students will develop library research skills, including facility with primary and secondary sources, and an appreciation for the narratives that lie in buildings, objects, and what people leave behind. Activities include field trips, readings, writing, and an artistic interpretation. As important, students will have the opportunity to form strong connections to each other, to the faculty, and to the community. Note: New course, but combination of current 59.102 and 59.103 in one semester.

HONR.2001 Honors College: Student Fellowship - Credits: 0

Honors College Student Fellowship is a grant given to a Commonwealth Honors student for pre-approved scholarly engagement that is overseen and guided by a mentor. Fellowships are awarded for research, creativity, theme-based reading, author-based reading, community engagement, curating, or entrepreneurial projects. Each fellowship must have a reading component, a writing component and a speaking component.

HONR.2002 Honors College: Community Engage/Impactful Experience - Credits: 0

Honors College Community Engagement experience allows students to engage in structured community service. Students will collaborate with a community non-profit partner and work with them over the course of a year (two academic semesters) and is conducted under the mentorship of someone within the non-profit organization as well as a representative from the Honors College. Students will be required to read articles/texts appropriate to their Community Engagement experience and conduct a presentation at the completion. Each Community Engagement must have a reading, writing and speaking component.

HONR.2003 Honors College: Reading Symposium - Credits: 0

Honors College Reading Symposium consists of two one-semester sessions. Each session has three one-month long units of study, a written essay and a public presentation. A unit of study is defined by a faculty facilitator and consists of: reading, watching, and/or listening to books, articles, plays and/or films; completing pre-discussion assignments; submitting a unit reading notebook. Attending and participating in mandatory faculty-led discussion. Student must prepare and execute a 20-30 minute public presentation.

HONR.3100 Honors Thesis Project Workshop (Formerly 59.258 and HON 310) - Credits: 3

This course is designed to promote the application of interdisciplinary perspectives to problems, issues, concepts, and creations, as well as an appreciation of the research methods that characterize a broad range of disciplines. It is a writing intensive class with active participation requirements to enhance students' oral and written expository communication skills in preparation for the Honors Thesis/Project. Students complete the CITI module on research ethics and discuss the role of the University Office for Compliance/IRB.

HONR.3200 Seminar: Special Topics in Honors
Seminar: Special Topics in Honors offers students the opportunity to engage in depth with a subject that is of special interest in an Honors-level seminar. The course will address an inquiry-based topic that spans or falls outside the boundaries of any individual major on campus, but integrates methodology, content, and/or approaches from two or more.

HONR.3300 Seminar: Special Topic in Honors (Arts & Humanities Perspective) - Credits: 3

Seminar: Special Topics in Honors offers students the opportunity to engage in depth with a subject that is of special interest in an Honors-level seminar. The course will address an inquiry-based topic that spans or falls outside the boundaries of any individual major on campus, but integrates methodology, content, and/or approaches from two or more.

HONR.3400 Seminar: Special Topic in Honors (Social Science Perspective) - Credits: 3

Seminar: Special Topics in Honors offers students the opportunity to engage in depth with a subject that is of special interest in an Honors-level seminar. The course will address an inquiry-based topic that spans or falls outside the boundaries of any individual major on campus, but integrates methodology, content, and/or approaches from two or more.

HONR.3500 Seminar: Special Topic in Honors (STEM Perspective) - Credits: 3

Seminar: Special Topics in Honors offers students the opportunity to engage in depth with a subject that is of special interest in an Honors-level seminar. The course will address an inquiry-based topic that spans or falls outside the boundaries of any individual major on campus, but integrates methodology, content, and/or approaches from two or more.

HONR.4900 Honors Thesis Research (Formerly HON 490) - Credits: 0

This zero credit course is designed to facilitate tracking of Honors students’ thesis progress. During the first semester of a two semester (6 credit) project, students will register for the appropriate 301 section in their department as well as HONR.4900, for which the Honors College components are required. These components include a timely and complete thesis proposal as well as an end-of-the-semester progress report, both of which are to be signed by the faculty advisor and committee member and submitted for approval to the Honors Director.

HONR.4910 Honors Thesis Project Research (Formerly HON 491) - Credits: 0

Honors students in their first semester of work towards the required Honors thesis or project enroll in this course to gain access to the Blackboard and D2L tools used to track their progress and archive their achievements. Requirements for Honors Projects and Theses include the on-time completion of a thesis/project proposal approved by the faculty mentor, committee member, and Honors Dean and development and maintenance of an ePortfolio in which the work is presented both in progress and as a finished, written product. Honors projects and theses conclude with the public presentation of the work and submission of an archival document and completion paperwork. Honors students sign up for this course in addition to and simultaneously with the credit-bearing course used to satisfy their H7 requirement (or their H8 in the case of 3-credit Honors Projects).

HONR.4992 Honors College Directed Study - Credits: 0-3

Honor’s College Directed Study. "Variable credit course, student chooses appropriate amount of credits when registering."

MATH.1410 Honors Calculus I (Formerly 92.141) - Credits: 4

This course covers the same topics as MATH.1310 Calculus I, but in an enriched environment.

MATH.1420 Honors Calculus II (Formerly 92.142) - Credits: 4

This course covers the same topics as MATH.1320 Calculus II, but in an enriched environment.

MATH.2410 Honors Calculus III (Formerly 92.241) - Credits: 4

Covers the same topics as MATH.2310 Calculus II, but in an enriched environment.

MATH.2440 Honors Differential Equations (Formerly 92.244) - Credits: 3

Introduction to differential equations. Topics include first-order equations, second-order and higher-order linear equations, systems of first-order linear equations with constant coefficients, and Laplace transforms.

PHYS.1610 Honors Physics I (Formerly 95.161) - Credits: 4
Introductory mechanics at a more challenging level and the first semester of a sequence for physics majors. Mechanics of particles in one dimension, kinematics, forces, dynamics; particles in two and three dimensions, vectors, curvilinear and oscillatory motion; conservation principles, work, energy, linear momentum, collisions; rotational mechanics, angular momentum, torque and static equilibrium; gravitation and planetary orbits; wave motion, transverse and longitudinal, standing waves.

PHYS.1610L Honors Physics I Laboratory (Formerly 96.161) - Credits: 2

An introductory laboratory course at the honors level on the methods and techniques of experimental physics. Lectures on measurement uncertainties and error analysis are included and experiments are selected principally in mechanics.

PHYS.1640 Honors Physics II (Formerly 95.164) - Credits: 4

Geometrical optics, reflection, refraction, flat and curved mirrors, thin lenses; physical optics, interference and diffraction; electrostatics, charge, electric forces, fields and flux, electric potential, capacitance and field energy; electric charge in motion, currents, DC and RC circuits; magnetic fields, forces on moving charges, magnetic field of an electric current, electromagnetic induction, inductance, changing currents, AC circuits; electromagnetic radiation; the limits of classical electromagnetic theory.

PHYS.1640L Honors Physics Lab II (Formerly 96.164) - Credits: 2

A continuation of 96.161 with experiments selected principally in optics, electricity and magnetism.

PHYS.2690 Honors Physics III (Formerly 95.269) - Credits: 4

Statics and dynamics of fluids, pressure, viscosity, Archimedes and Bernoulli principles, mechanical properties of solids, stress and strain, shear, electric and magnetic properties of materials, para- dia- and ferromagnetism, electro-mechanical and magneto-mechanical effects, hysteresis, advanced topics in waves and vibrations, damping, resonance in mechanical and AC oscillators, thermodynamics, Maxwell's velocity distribution, blackbody radiation, and the limits of classical physics, introduction to special relativity.

PLAS.4170 Honors Capstone Project II (Formerly 26.417) - Credits: 1-3

A section of capstone laboratory for honor students only.
ENGN.1030 Environmental Biotechnology (Formerly 25.103) - Credits: 3

This UML TEAMS Academy course will investigate the chemical and biological impact of human activity on aquatic environments. A specific focus of this course will be to observe the behavior of microorganisms impacted by pollutants introduced into the environment by humans. Students will explore possible engineering solutions to alleviate the problems caused by pollutants. This course can be described as “inquiry based discovery” and will rely heavily on laboratory investigations and laboratory based projects analyzing environmental samples collected in the field. This course is open only to high school students accepted to the UML-TEAMS Academy. Instructor permission required.

ENGN.1070 Introduction To Engineering I (Formerly 25.107) - Credits: 2

This course provides a hands-on introduction to engineering and the engineering design process. Through assignments and projects, students learn how to: identify a problem, develop alternative solutions, select the best alternative, make critical decisions, and work as a team. The course is intended for freshmen in all engineering majors and provides an overview of the different engineering disciplines. Lecture and lab component.

ENGN.1080 Introduction To Engineering II (Formerly 25.108) - Credits: 2

This course is intended for first-year engineering students and provides an introduction to technical communications, teamwork and other skills. Topics vary depending on the department and include data analysis, computer-aided drafting/design/modeling program usage, report-writing and/or oral presentation. Depending on the department, software introduced may include Excel, PowerPoint, AutoCad, Matlab and/or MathCad. Team-based labs and projects may be employed. Students should enroll in the sections corresponding to their major or intended department to develop relevant skills.

ENGN.1300 Introduction to Nano-Engineering (Formerly 25.130) - Credits: 3

The multi-billion dollar investment in nanoscience and nanotechnology is beginning to yield new products, including better sunscreens and wear-resistance materials. "Introduction to Nano-Engineering” is as overview of engineering at the nanoscale, including measurement techniques, nanoelectronics, nanomaterials, design of nanodevices, nanomanufacturing, and the societal impact of nanotechnology. "Lecture” material is accompanied by open-ended questions for chat-room discussion and five virtual laboratories. Targeted for the general public. This is an interdisciplinary course.

ENGN.1510 Assistive Technology & Electronics (Formerly 25.151) - Credits: 3

UML-TEAMS Academy students will explore basic electronics physics in a hands-on laboratory environment. Students will apply their knowledge as they learn how to breadboard, test, and troubleshoot a series of lab projects. Students will use CAD tools as they learn how to fabricate printed circuit boards. The course culminates with groups projects that apply the engineering design process and electronics to design and build a product for disabled clients in our community. This course is open only to high school students accepted to the UML-TEAMS Academy. Instructor permission required.

ENGN.2000 Community-based Engineering Project I (Formerly 25.200) - Credits: 1

Students work on multi-disciplinary teams and apply their engineering problem-solving skills on community-based design projects.

ENGN.2100 Professional Development Seminar (Formerly 25.210) - Credits: 1

The Professional Development Seminar is designed to provide students with the necessary structure, resources, and support to successfully secure and engage in their first cooperative education experience. Through a variety of teaching methodologies and assignments, students will prepare to engage in the job search process through resume writing, strategic interviewing, professional networking and through learning professional behavior and presentation skills. Course open to undergraduates who have previously applied and been accepted to participate in the Professional Co-op Program. Enrollment is by Instructor permission only. For more information on applying to the Professional Co-op Program, see https://www.uml.edu/student-services/Career-Services/Cooperative-Education/Forms-Handbooks.aspx. Pre-Req: Permission of Instructor.

ENGN.3000 Community-based Engineering Project II (Formerly 25.300) - Credits: 1

Students work on multi-disciplinary teams and apply their engineering problem-solving skills on community-based design projects.

ENGN.3100 Co-op assessment 1 (Formerly 25.310) - Credits: 1

The primary goal of this seminar is to assist students in the
overall assessment of their overall cooperative education experience. Through facilitated small group discussion, individual consultation and hands on practice, students will have an opportunity to identify and articulate their technical and professional skills, and explore how these skills and their co-op employment might be translated and leveraged into future work environments and their academic program at UML.

ENGN.4000 Community-based Engineering Project III (Formerly 25.400) - Credits: 1

Students work on multi-disciplinary teams and apply their engineering problem-solving skills on community based design projects. Completion of 25.400, 25.300, and 25.200 can count as a mechanical engineering technical elective (academic petition required).

ENGN.4010 Engineering Capstone Design Project (Formerly 25.401) - Credits: 3

Integrative design experience in engineering. Students work on multi-disciplinary teams and apply their engineering problem-solving skills on open-ended, real-world projects Projects may be service-oriented in concept and teams may include members from other Departments and Colleges. Emphasis on communication, team-work, report-writing, oral presentations, This course may be used as a Technical elective for all Engineering Departments. Alternatively, this course may be used as a substitute for the culminating Capstone course in Electrical and Computer Engineering (16.499), Mechanical Engineering (22.423) and Plastics Engineering (26.416). Prerequisite: senior status & permission of instructor.

ENGN.4100 Co-op Assessment 2 (Formerly 25.410) - Credits: 1

This seminar is designed to support and assist students in the continued assessment of their cooperative education experience. Through a deepening of their work in Co-op Assessment 1, students will review their overall performance in the cooperative education program, while continuing to demonstrate their technical and professional skills through written work and public presentations to multiple audiences. It is expected that students will clearly define their future academic and career goals, enhance their professional networks, and develop a future plan to support aspirations related to their major.

ENGN.4900 Industrial Experience (Formerly 25.490) - Credits: 0
ENGN.4910 Industrial Experience I (Formerly 25.491) - Credits: 0-12
AMST.2480 Perspectives American Culture
(Formerly 40/42.248) - Credits: 3

The goal of this class is to enhance students’ ability to read and interpret American texts by learning how to see them in context, to understand the way readers approach texts from interpretative lenses, and to express their insights about American culture in a variety of forms and genres. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ARHI.2030 History of Art I: Prehistoric to Medieval Art (Formerly 58.203) - Credits: 3

A survey of the origins of painting, sculpture, and architecture from the prehistoric period through approximately 1300 CE. Works of art are discussed in their historical, cultural, and artistic contexts.

ARHI.2040 History of Art II: Renaissance to Modern Art (Formerly 58.204) - Credits: 3

A survey of the origins and development of painting, sculpture, and architecture from Renaissance times to the Modern period. Emphasis is placed on representative works of art from the Renaissance, Baroque, Rococo, Nineteenth Century Movements-Neoclassicism, Romanticism, Impressionism, Cubism, Dadaism, Surrealism and Abstract Art. The aim of the course is to introduce the student to basic critical and art historical methods as well as the analysis of style and content within sequential cultural contexts.

ARHI.3151 Islamic Art and Contemporary Society (Formerly as 59.315) - Credits: 3

This course introduces students to Islamic art through a survey of works across the broad reach of the Islamic world including Saudi Arabia, Northern and Saharan Africa, Spain, the former Ottoman Empire surrounding Turkey and the Greater Middle East. The last unit of the course looks at Islamic art in the diaspora. The course highlights works from c. 500 CE to the present, ending with the ultra modern city of Dubai.

ARHI.3210 Italian Renaissance Art (Formerly 58.321) - Credits: 3

A study of painting, sculpture, and architecture in the major artistic centers of Italy (Florence, Rome, Venice, Milan and the Northern Courts) during the 15th and 16th centuries. In addition to examining artworks by some of the most important artists of the period - Leonard da Vinci, Michelangelo, titan - this course considers larger themes raised by these works and gives attention to the conditions within which the works were originally produced and viewed.

ARHI.3230 Northern Renaissance Art (Formerly 58.323) - Credits: 3

A study of 15th and 16th century painting and sculpture north of the Alps including artists such as Jan van Eyck, Hieronymus Bosch, Jean Fouquet and Albrecht Drer. This course considers how social forces (politics, race, religion, gender etc.) influenced the manner in which Northern renaissance art was produced, viewed, and understood, as well as how these forces led to the creation of some of the most startling, strange and enigmatic images of any period in the history of art.

ARHI.3250 Studies in Latin American Art (Formerly 58.325) - Credits: 3

An introduction to the art and architecture of ancient, colonial, and modern Latin America. The course provides a framework by which students consider the complex intersections--of vision, power, history, and artistic production--in Latin American art within both local and global contexts.

ARHI.3300 Italian Mannerism (Formerly 58.330) - Credits: 3

A study on the impact of the High Renaissance in the sixteenth century, the subsequent development of early Mannerism in central Italy and the formation of the Proto-Baroque syle in Venice and Northern Italy, the establishment of the courtly Mannerist style. The role of representative artists such as Anguissola, Pontormo, Rosso, Parmigianino, Bronzino, Beccafumi, Fontana, Vasari, Veronese, Bandinelli, Cellini, Palladio, Peruzzi and Ammanati is emphasized.

ARHI.3320 Baroque Art (Formerly 58.332) - Credits: 3

This course surveys the drama and dynamism that infused painting and sculpture from 1550-1750. With its origins in Italy, Baroque art quickly spread throughout much of Europe (including Flanders, France, England, the Dutch republic, Spain, Portugal) and the New World. This course will explore the ways the arts were used to express political ambition, forge social and political alliances, as well as to create cultural identity and memory.

ARHI.3400 Women and Art (Formerly 58.340) - Credits: 3

An introduction to key issues and theoretical approaches to the study of women and art. This course examines women as makers of art, as subjects of art, and as interpreters of art. The class will explore the ways artists have represented the
intersections of gender identities, sexual orientation, power, race, class and nationality in their works and the socio-cultural conditions in which specific artists have been excluded or marginalized in art practice, exhibition, collecting and critical discourse.

ARHI.3600 Museum Issues (Formerly 58.360) - Credits: 3
The art museum in the United States is a unique social institution because of its blend of public and private support and its intricate involvement with artists, art historians, collectors, the art market, and the government. This course will study the art museums history and status in our society today. Special consideration will be given to financial, legal and ethical issues that face art museums in our time. Short papers, oral reports and visits with directors, curators and other museum officials in nearby museums will be included along with a detailed study of a topic of one's choice.

ENGL.3820 Theatre History I: Ancient Greece through the 18th Century (Formerly 42.382) - Credits: 3
A survey of ancient to early modern theatre in its historical and social contexts, tracing changes and developments in acting styles, theatre architecture, scenic practices, dramatic literature, and the audience. The course examines how theatre both reflects and shapes the changing beliefs and priorities of a culture.

ENGL.3830 Theatre History II: Nineteenth Century to the Present (Formerly 42.383) - Credits: 3
A survey of theatre in its historical and social contexts from the 19th century to the present, focusing on innovations in design and technology, the advent of the director, the emergence of modern schools of acting, and the creation of new forms of theatre to suit the changing needs of a modern world.

FAHS.1010 Values and Creative Thinking (formerly 59.101) - Credits: 3
Values and Creative Thinking is a course designed specifically for freshmen. Throughout the semester you will be asked to examine your personal value system and how it relates to your education. The purpose of this course is to help you identify those individual qualities that you can use to achieve your highest academic potential. Specifically, this course is intended to help you develop greater self-awareness and confidence; creative and critical thinking skills; career planning skills designed to help you understand the full spectrum of available careers; an understanding of different computer technologies and multimedia techniques; an awareness of the role of values in determining your experiences and perspectives; problem solving and group decision making skills relating to issues that affect the quality of your life.

FAHS.1150 Lowell as Text - Credits: 3
First year seminar for students interested in exploring Lowell, past and present, and using the city to investigate various other issues beyond local.

FAHS.3700 Washington Center Term (Formerly 59.370) - Credits: 1-12
FAHS.4960 Directed Study in Peer Tutoring (Formerly 59.496) - Credits: 1-9
FAHS.4970 Directed Studies: Environment and Society - Credits: 3
An individual supervised research project relative to issues of the environment and society. Thematic or methodological issues must result in a significant research paper.

PHIL.3360 Early Modern Philosophy - Credits: 3
Examines Early Modern European Philosophy and its religious and scientific context, including movements such as the Mechanical Philosophy, Rationalism, Empiricism, and Transcendental Philosophy. Topics include knowledge and scientific understanding, the human mind and personal identity, and the debate between faith and reason.

PHIL.3520 Existence & Anxiety (Formerly 45.352) - Credits: 3
Explores basic questions of human existence in 19th and 20th Century philosophy and literature. Topics include anxiety and alienation; freedom and responsibility; authenticity and bad faith; individuality and mass society; rationality and the absurd; values and nihilism; and God and meaninglessness. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

THEA.3110 Play Production (Formerly THEA 311) - Credits: 3
Introduction to the design and technical aspects of theatre through hands-on experience working on campus productions. Focus on basic principles of set, lighting, props, costume, makeup, and sound production. May be repeated for credit.

WLIT.3730 Italian Humanism (Formerly 52.373) - Credits: 3
A study of the waning of the Middle Ages and the dawning of
the Renaissance as seen through the work of Petrarch and Boccaccio. Emphasis is on the study of sources and the influence of Petrarch and Boccaccio upon the literatures of western Europe. Conducted in English.

WLKH.2100 Introduction to Cambodian Culture
(Formerly 59.210) - Credits: 3

This 3-credit course focuses on the culture of Cambodia from ancient times to present. Specifically, this course provides an overview of the geography, demographics, monarchy, religion, architecture, dance & music, literature and performing arts in historical context. The course also requires students to examine contemporary Cambodia in terms of change continuity.
EXER.3150 Kinesiology (Formerly 38.315) - Credits: 3
This course combines the study of mechanics, kinematics, kinetics, anatomy and neuromuscular physiology to teach the examination and evaluation of human movement. The major focus of the course is in qualitative evaluation of movement. Topics also include quantitative evaluation, body mechanics, posture and gait evaluation with a focus on identification of abnormal movement patterns.

EXER.4060 Foundations of Strength and Conditioning (Formerly 38.406) - Credits: 4
This course is the second of a two-part series in exercise physiology designed to study the physiological effects of exercise on the human body. It will call upon the knowledge gained in Anatomy and Physiology, Biochemistry, Kinesiology, and Exercise Physiology. The course covers a variety of topics including: physiological adaptations to resistance training, resistance training concepts and methods to include periodization and principles of test selection and administration, concepts of flexibility, dynamic warm-ups, plyometrics, speed, agility and speed-endurance development, basic concepts of rehabilitation and reconditioning, exercise prescription and programming for healthy populations, and the effect of performance-enhancing drugs on performance. This course will cover (cont’d).

HSCI.1041 Topics in Health (Formerly 30.104) - Credits: 3
This introductory course is designed to provide students with the opportunity to explore a variety of topics and issues in health through reading and discussing recently published articles. Using classroom discussions as the major format for this course, students will be encouraged to think critically about current topics and issues in health to strengthen their analytical skills. This course will also assist students in developing oral presentation and communication skills that are necessary in the health field.

HSCI.1200 Life Skills (Formerly 30.120) - Credits: 3
This course is designed to assist new students adjust to, and succeed in college and beyond. Course subject matter has been created in conjunction with the National Collegiate Athletic Association (NCAA). This course has been specifically designed to meet the needs of the student-athletes who are current members of our campus community. Successful completion of this course will give the participants the skills necessary to be successful students, athletes and citizens academically, socially, personally and professionally.

HSCI.1991 Intercollegiate Health 100 level elective (Formerly 30.199) - Credits: 3
Intercollegiate Health 100 level elective

HSCI.2040 Introduction to Exercise Physiology (Formerly 30.204) - Credits: 3
This course serves as an introductory course to the field of Exercise Physiology. It is designed as a program foundation to the profession and to professional behavior. Students will be exposed to what happens in both the fitness centers and in the cardiac or pulmonary rehabilitative facilities. The course will serve as a precursor to the remaining upper division major courses.

HSCI.2100 Clinical Calculations (Formerly 30.210) - Credits: 1
This elective course is designed for students beginning the nursing program. It reviews the mathematics necessary to compute drug calculations using dimensional analysis. This course covers the metric system of weights and measures. The focus of the course is on the computation of drug dosages for oral and parenteral medications with emphasis on the application of skills necessary to calculate intravenous infusions and medications.

HSCI.2140 Careers in Health (Formerly 30.214) - Credits: 1
This introductory survey course is designed to give those students interested in health careers the opportunity to explore a variety of career path options in the health field. The goal of this course is to help students recognize their interests, knowledge, skills, and aspirations so that they can begin to make educated career decisions. The knowledge students will gain throughout this course will help them discern their own career path in the health care industry.

HSCI.3050 Exercise Physiology Lecture (Formerly 30.305) - Credits: 4
This course is designed to enable students to understand the acute and chronic physiologic effects of exercise on the human body. Topics will include bioenergetics, cardiopulmonary and cardiovascular physiology, neuromuscular physiology, special populations, and exercise prescription for apparently healthy athletic and clinical populations. Special topics in exercise physiology and environmental physiology will also be covered.

HSCI.3060 Introduction to Gerontology (Formerly 30.306) - Credits: 3
This course examines human aging from a multidisciplinary and developmental perspective. The course will focus on the adult years of the life span. The social-psychological factors involved in adjustments to the aging process, to retirement, to family, to leisure, to aloneness, to death and bereavement will be discussed together with such special concerns of the elderly as widowhood, finances, religion, sexuality and health problems. Rehabilitative strategies such as remotivation and reality orientation are included.

HSCI.3080 Global Health (Formerly 30.308) - Credits: 3

The focus of this course is on examining health issues from a global perspective including issues related to maternal and child health, aging, infectious diseases, sanitation, and health inequality. Nutritional and environmental health issues in diverse societies are analyzed. Social determinants of health and access to health care in developing and developed countries are emphasized. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HSCI.3090 Universal Design in the Promotion of Health (Formerly 30.309) - Credits: 3

This is a three-credit interdisciplinary undergraduate blended course (face-to-face and online). The is course is designed to examine the principles of universal design and investigate challenges of equity, access and inclusion in healthy communities. Undergraduate students from a variety of disciplines will examine universal design and Assistive Technology (AT) that enhances the participation of individuals with a physical, emotional, sensory or intellectual and cognitive disability in education, community development, health care, recreation and public policy. The course reviews design concepts and the use of Assistive Technology as it relates to education, communication, vocation, recreation, and mobility for individuals with disabilities. Laws focusing on assistive technology in the home, school, community, and the workplace will be examined. The course explores both 'low tech' and 'high tech' types of assistive technologies that are available to support people with disability, based on the ICF model of disability. Interaction with users of assistive technology is accomplished through an experiential learning project. Students will engage in a team project that completes a thorough examination of a particular access or functional challenge and the use of universal design and AT to increase participation and minimize the effects of the person’s impairments.

HSCI.3190 Pathophysiology (Formerly 30/33.319) - Credits: 3

This course provides an overview of the dynamic aspects of disease processes as they present in major body systems.

HSCI.3200 Legal Issues in Nursing (Formerly 30.320) - Credits: 3

This course provides an overview of legal issues nurses encounter in clinical practice. Case studies will be used to identify common risks to safety and quality of care. to examine the legal process when lawsuits are filed and to identify preventive strategies which improve quality of care and therefore, decrease legal risks for nurses.

HSCI.3220 Independent Study Health Promotion (Formerly 30.322) - Credits: 1

This course focuses on a health promotion project. Must have faculty approval for the course. Can be for 1, 2, or 3 credits.

HSCI.4020 Global Health Experience (Formerly 30.402) - Credits: 3

The Global Health Experience provides an experiential learning experience in health within a country outside of the United States. Students will study the health issues of a given country while examining the socio-cultural, economic and environmental determinants of health within that society. The strengths and weaknesses of the existing health care system will be analyzed. Students will explore the culture, environment, and health care system under the direction of School of Health and Environment faculty.

PUBH.1021 Introduction to Public Health (Formerly 30.102) - Credits: 3

Public health topics, both historical and contemporary are of importance to all citizens and to societal decisions. This survey course provides a foundation for understanding public health through exposure to current health care and policy issues viewed through the perspective of multiple disciplines. Methodology for understanding population health and developing critical thinking and decision-making skills in the analysis of public health issues using a population-based perspective will be developed. The course will provide an ecological understanding of the causation and prevention of disease with an emphasis on health issues that affect society as a whole.
ARHI.2040 History of Art II: Renaissance to Modern Art (Formerly 58.204) - Credits: 3
A survey of the origins and development of painting, sculpture, and architecture from Renaissance times to the Modern period. Emphasis is placed on representative works of art from the Renaissance, Baroque, Rococo, Nineteenth Century Movements-Neoclassicism, Romanticism, Impressionism, Cubism, Dadaism, Surrealism and Abstract Art. The aim of the course is to introduce the student to basic critical and art historical methods as well as the analysis of style and content within sequential cultural contexts.

ARHI.3210 Italian Renaissance Art (Formerly 58.321) - Credits: 3
A study of painting, sculpture, and architecture in the major artistic centers of Italy (Florence, Rome, Venice, Milan and the Northern Courts) during the 15th and 16th centuries. In addition to examining artworks by some of the most important artists of the period - Leonard da Vinci, Michelangelo, titan - this course considers larger themes raised by these works and gives attention to the conditions within which the works were originally produced and viewed.

ARHI.3300 Italian Mannerism (Formerly 58.330) - Credits: 3
A study on the impact of the High Renaissance in the sixteenth century, the subsequent development of early Mannerism in central Italy and the formation of the Proto-Baroque style in Venice and Northern Italy, the establishment of the courtly Mannerist style. The role of representative artists such as Anguissola, Pontormo, Rosso, Parmigianino, Bronzino, Beccafumi, Fontana, Vasari, Veronese, Bandinelli, Cellini, Palladio, Peruzzi and Ammanati is emphasized.

ARHI.3320 Baroque Art (Formerly 58.332) - Credits: 3
This course surveys the drama and dynamism that infused painting and sculpture from 1550-1750. With its origins in Italy, Baroque art quickly spread throughout much of Europe (including Flanders, France, England, the Dutch republic, Spain, Portugal) and the New World. This course will explore the ways the arts were used to express political ambition, forge social and political alliances, as well as to create cultural identity and memory.

HIST.2420 World War II (Formerly 43.242) - Credits: 3
The Second World War transformed states and people from East Asia to the United States to Europe. We examine diplomatic and military aspects of the war and how it affected the lives of people in the countries involved. Topics include the prelude to the war, military campaigns in Europe and the Pacific, collaboration and resistance, the home front, the Holocaust, science and the atom bomb, and the consequences of the war.

HIST.3420 Inquisition: Myth and Reality (Formerly 43.342) - Credits: 3
Following a brief introduction and an overview of the medieval Inquisition, the first few weeks of the course will be devoted to a study of the Inquisition in Spain and Italy from 1450-1650. We will also discuss the way in which the history of the Inquisition has been analyzed during the past five hundred years (what historians call “historiography”). The second half of the course will focus on student research and selected topics in Inquisition studies.

PHIL.3390 Poetry and Philosophy After Plato (Formerly 45.339) - Credits: 3
After defining “Neoplatonism” with reference to Plato’s Phaedo, Symposium, and Phaedrus, the course will consider the relationships among Homer’s Odyssey, Plotinus’s Enneads, Virgil’s Aeneid, Augustine’s Confessions, and Dante’s Divine Comedy. The focus will be on coming home to the “source and origin” after having been away and, as the philosopher Plotinus puts it, having been “a stranger in something strange”. Students will be invited to work on other literary and philosophical treatments of this theme in English, Irish or American poetry and writing. A principal concern of the course is language “sung, spoken, and written”. Accordingly, the course will applicable to, and count for the Philosophy and Communications track.

POLI.1210 Introduction to International Relations (Formerly 46.121) - Credits: 3
Surveys some recent methods and approaches used in the study of international politics and provides an introduction to current problems of foreign policies of major world powers. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

WLIT.1010 Italian 1 and Culture (Formerly 52.101) - Credits: 3
Develops Italian speaking, listening, reading and writing skills through the discovery of the culture of Italy in a communicative approach (instruction occurs in Italian with clarification in English). This class is the 1st of the 4-course Italian language program offered at UML. Language courses are sequential and must be taken accordingly.
WLIT.1020 Italian 2 and Culture (Formerly 52.102) - Credits: 3
Continuation of Italian 1 and Culture (or equivalent), which is a pre-requisite. Strengthens Italian speaking, listening, reading and writing skills acquired in Italian 1 and Culture through the discovery of the culture of Italy in a communicative approach (instruction occurs in Italian with some clarification in English). This class is the 2nd of the 4-course Italian language program offered at UML. Language courses are sequential and must be taken accordingly.

WLIT.2110 Italian 3 and Culture (Formerly 52.211) - Credits: 3
Enhances the four skills acquired in Italian 2 and Culture (or equivalent), which is a pre-requisite: speaking, listening, reading and writing through the discovery of the culture of Italy in a communicative approach (instruction occurs in Italian with minimal use of English). This class is the 3rd of the 4-course Italian language program offered at UML. Language courses are sequential and must be taken accordingly.

WLIT.2120 Italian 4 and Culture (Formerly 52.212) - Credits: 3
This course has Italian 3 and Culture (or equivalent) as a pre-requisite and is the 4th and last of the 4-course Italian language program offered at UML. The course strengthens the four skill acquired in prior levels. It emphasizes increased accuracy and depth of students’ abilities and knowledge of the culture of Italy in a communicative approach (instruction occurs in Italian with almost no use of English). Students express themselves orally and in writing at the national standards level of high-intermediate and understand key-concepts when spoken clearly at native speed.

WLIT.3000 Modern & Contemporary Italian Civilization and Culture (Formerly 52.300) - Credits: 3
This interdisciplinary and multimedia course will provide a comprehensive view of Italian civilization from the Unification to the present. Through readings, movies, documentaries, pictures, and paintings, students will gain a critical understanding of many of the key events that have shaped Italian history, politics, and economy, and will be guided to discover questions of national identity, language, religion, gender and sexuality, ethnicity, immigration, media and fashion. Conducted in English (English reading material; film screenings In Italian with English subtitles.)

WLIT.3100 Special Topics in Italian Studies - Credits: 3
A limited topic of special interest in culture, civilization, or literature. May be taught in English or Italian. Course content and approach varies depending on instructor. The faculty post and distribute a detailed course description each semester, and students are urged to use this information in making their selections.

WLIT.3250 Italian American Literature and Culture (Formerly 52.325) - Credits: 3
Discusses the most prominent authors and works of Italian-American Literature as they, by using the ethnic setting, are able to convey universal human concerns and themes. The discussion on Italian-American ethnic issues will include such films as The Godfather, Moonstruck, The Sicilian, Goodfellas, and The Untouchables. Conducted in English.

WLIT.3300 Italian Women Writers (Formerly 52.330) - Credits: 3
Studies women writers of Italy by giving attention to the genres of narrative, poetry, theater and autobiography. Authors are selected according to their impact on issues affecting women, gender studies, feminism, avant-garde, modernism, social relations and psychological discourse. Conducted in English.

WLIT.3400 Readings in Contemporary Italian Literature - Credits: 3
This course covers selected works from contemporary Italian prose and poetry, with particular attention to texts written in the last twenty years. It focuses on textual analysis and interpretation, and is intended to improve students’ familiarity with idioms and vocabulary of contemporary Italian language. The course is taught in Italian and will advance students’ skills in all areas of Italian language and culture.

WLIT.3440 Advanced Italian Grammar - Credits: 3
A systematic study of complex grammatical structures in Italian. Conducted in Italian only.

WLIT.3450 Advanced Italian Conversation (Formerly 52.345) - Credits: 3
Advanced oral practice in rapid and idiomatic speech. Topics of contemporary significance are selected from contemporary prose.

WLIT.3500 Italian Language and Culture Through Films - Credits: 3
This course offers a systematic approach to learning Italian language and culture through films. It is designed to improve
students’ language skills and enrich their knowledge of Italian contemporary society. This class is taught in Italian.

WLIT.3600 Advanced Italian Conversation and Composition - Credits: 3

The course aims at developing advanced written and oral proficiency. Topics of contemporary significance are selected for discussions. This class is taught in Italian.

WLIT.3730 Italian Humanism (Formerly 52.373) - Credits: 3

A study of the waning of the Middle Ages and the dawning of the Renaissance as seen through the work of Petrarch and Boccaccio. Emphasis is on the study of sources and the influence of Petrarch and Boccaccio upon the literatures of western Europe. Conducted in English.

WLIT.3780 Italian Cinema and Culture (Formerly 52.378) - Credits: 3

A guide to contemporary Italian studies through literary and cultural approaches. The works of central figures in contemporary Italian letters are examined in view of their impact on Italian life. Emphasis is given to poets, novelists, the new cinema, the influences of existentialism, and the impact of America on Italian literature. Conducted in Italian/English.

WLIT.3800 Italian Cinema: Directors and Themes (Formerly 52.380) - Credits: 3

A study of Italian film history and its accomplishment by exploring the relationship of cinema to sociopolitical, economic, cultural, and literary events. The course will discuss in depth either a) one or two major and well known directors; b) a major thematic and stylistic division in a century of cinematic creativity.

WLIT.4910 Directed Study in Italian Literature (Formerly 52.491) - Credits: 3

Individual research projects for modern language majors. Students, through regular and frequent consultation with their instructor, develop a course of directed study in Italian literature and define a subject for individual research. The student’s findings are presented in a paper of significant proportions.
Labor Studies Minor

The interdisciplinary minor in Labor Studies is designed for students from all departmental majors who are interested in understanding the structure of the labor market, the changing nature of work, and the role of worker organizations, including unions, in addressing economic and social inequities. Exploring these issues from a range of disciplinary perspectives provides critical knowledge and skills for all, and is especially relevant for those who are interested in human resources, labor organizing, workplace law, management, job training, and community or non-profit work.

Through a unique partnership with the Labor Education Program, minors will have access to service-learning and internship opportunities at work and worker-related organizations throughout the local area. Past projects include:

- Language partnerships with Janitors Union
- Labor leader interviews with Lowell Telecommunications, Inc (LTC)
- Labor Market Analysis with Greater Lowell Workforce Investment Board

Requirements

- SOCI.2450 [Introduction to Labor Studies](https://www.uml.edu/catalog/courses/SOCI/2450)
- At least one course from the following: ECON.3020 [Labor Economics](https://www.uml.edu/catalog/courses/ECON/3020), HIST.3800 [Work and Society](https://www.uml.edu/catalog/courses/HIST/3800), HIST.3920 [United States Immigration History](https://www.uml.edu/catalog/courses/HIST/3920), SOCI.2710 [Sociology of Work](https://www.uml.edu/catalog/courses/SOCI/2710)
- At least two courses must be at the 3000 level or above
- Four additional courses from a designated list of approved courses
- No more than two courses from the same department (with exception of Introduction to Labor Studies, which will not be counted towards the sociology maximum)

For additional information visit the Labor Studies website [Labor Studies website](https://www.uml.edu/FAHSS/Labor-studies/default.aspx) or email: LaborStudiesMinor@uml.edu.

Labor Studies Course Listing [Labor Studies Course Listing](https://www.uml.edu/resources/catalog-archive/current/Undergraduate.pdf)
ECON.3020 Labor Economics (Formerly 49.302) - Credits: 3
An introduction to the economic analysis of behaviors and institutions in the labor market: labor supply and participation, labor demand by firms, wage determination under different institutional settings, and gender, race or ethnicity as determinants of different labor market outcomes. The course presents microeconomic models, empirical findings and their public policy implications on topics such as minimum wage, affirmative action, social insurance programs, workplace safety, and subsidized day care.

ECON.3250 United States Economic History (Formerly 49.325) - Credits: 3
The evolution of institutions and their functions, and sources of economic development. The contributions of railroads, agricultural population growth, immigration, capital formation and technological progress to economic development. Other areas addressed: rapid industrialization and antitrust laws; evolution of financial institutions, the creation of the Federal Reserve System, crash of 1929, the depression of the 1930s, the New Deal and various banking acts, the labor movement, the growth of international trade.

HIST.3040 European Economic & Social History (Formerly 43.304) - Credits: 3
Europe has been transformed in the last 250 years from an agricultural society to a post-industrial one. We study the processes by which this happened, from the Industrial Revolution of the 18th and early 19th century to the wars and depressions of the early 20th century and the collapse of the communist system and European unification in the late 20th century. Students learn basic concepts and methods of history and economics.

HIST.3160 American Environmental History (Formerly 43.316) - Credits: 3
This course explores the environmental history of early America and the United States from the end of the last ice age (c. 12,500 years ago) to the present. It examines the role played by nature as an historical agent as well as the relationship between human communities and the physical and organic environment. Course themes include evolving land use, the environmental significance of industrial capitalism, urban public health, resource conservation and wilderness protection, the impact of ecology on public consciousness, as well as environmentalism.

HIST.3333 American Women and Public Activism, 1800-1920 - Credits: 3
Over the course of the 1800’s, women developed numerous strategies for influencing American society and politics, even though they were unable to vote in most elections. This course will explore how diverse groups of American women formed organizations that acted decisively in the public arena. By analyzing women’s social and political activism, we will see how vital civil society is for a functional democracy, and explore how change happens. Possible topics include women’s activism in social reform, local and state governments, civil rights, labor organizations, charitable work, religion, and women’s rights. Consideration will be paid to the differences among women in terms of race, class, and sexuality.

HIST.3620 The Twenties and the Thirties (Formerly 43.362) - Credits: 3
An examination of the emergence of the corporate and governmental institutions of modern America set in two turbulent decades of cultural and political ferment that involved both booming prosperity and the economic collapse of the Great Depression.

HIST.3790 United States Industry Twentieth Century (Formerly 43.379) - Credits: 3
An exploration of the rapid growth of the American economy in the 20th century, including the evolution of the large corporation and the mass production assembly line. Particular attention is devoted to the ways in which immigrants, women, and the African Americans were affected by the rise of big business. The course also traces the decline of the traditional U.S. manufacturing base following the Second World War and the impact this had on the working class and their unions.

HIST.3800 Work and Society (Formerly 43.380) - Credits: 3
Provides a survey of labor history from the colonial period to the present focusing on the interrelationship between culture and work in American society and on the dynamics of technical and economic changes on the organization of work processes.

HIST.3920 United States Immigration History (Formerly 43.392) - Credits: 3
The course focuses on the experiences of women, men, and children who came to the U.S. from the colonial era through the 21st century. Their emigrations will be examined in a global context. Irish migration, the mass European migrations during the mid and late 19th/early 20th centuries, and post-Second World War immigration particularly from Asian and African countries are discussed. The Lawrence, Lowell, and
This course will focus on issues of identity and difference. We will discuss the ways in which group identities are formed and break down. We will discuss how differences are constituted and reconstituted. These issues are central to theories of race and gender, racism and sexism. Some of the questions which we will raise are these: What motivates forming group identities? How are they formed? How is identity used within oppressive social structures? How can it be used to transform society? Why do some differences make a difference and others don’t? Can we choose our group identities? Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PHIL.3660 Globalization and Its Critics (Formerly 45.366) - Credits: 3

The course explores globalization as the process of transformation of regional and national phenomena into global ones, analyzing its social, economic, political, and cultural aspects. Supporters view it as the progress of liberalization and democratization that develop peaceful international cooperation; critics see globalization as the expansion of the profit-seeking global corporations that abuse the less developed and vulnerable regions. The course readings include the works of Amartya Sen, Samuel Huntington, Joseph Stiglitz, and other leading economists, sociologists, and philosophers.

PHIL.3890 Immigration and Global Justice - Credits: 3

This course addresses the question of justice in regards to immigration policy. We consider a variety of views including Communitarianism, Liberalism, Nationalism, Cosmopolitanism, and Democratic Theory. We will look at how these different positions have answered the following sorts of questions: Do we have duties to strangers of foreigners that are of equal weight to the duties we owe to members of our family, our circle of friends or our nation? Does part of the definition of "self-determined state" include the right to unilaterally reject petitions of inclusion from non-citizens? Does a commitment to equality demand that borders be open?

POLI.3780 International Political Economy (Formerly 46.378) - Credits: 3

An examination of the politics of global economic relations stressing the role of international institutions, multinational corporations and other international actors on the policies of the nation-state.

POLI.4390 Justice and Trade in the Global Economy (Formerly 46.439) - Credits: 3

We know that we are part of a global economy and that many of the things we buy and consume are produced in other countries. But what do we know of how they are made? Do we
understand that there may be hidden costs in the price we pay for goods at the supermarket, in a department store? Understanding the nature of global trade is critical for us to be effective citizens in the world. Perhaps more important is that we understand how goods are produced and traded - what many think of as "fair" trade. The subject of Fair Trade isn't simply limited to the production and sale of coffee and chocolate. Fair Trade principles encompass environmental issues, human rights, and politics. Once aware of the ramifications of consumerism on all parts of the world, including the United States, people can make informed choices about the products they buy, the companies that employ them, and the political views they support. By the end of this course students should understand the major ideas and tools used to comprehend complex international and global trade relations. Students will understand the way in which goods are produced for global markets and the possible human and environmental costs such production entails.

POLI.4450 Politics of Repression and Dissent (Formerly 46.445) - Credits: 3

A focus on the dark side of politics - political repression, including politically motivated imprisonment, torture, murder, and disappearance - and the struggle of critics to bring about change through non-violent and violent demonstrations, general strikes and armed resistance.

PSYC.3080 Industrial/Organizational Psychology (Formerly 47.308) - Credits: 3

An introduction to the application of psychological principles and methods to the work domain. Students will develop an understanding of the individual, social, and environmental factors as they relate to organizational performance. Intended as an introduction to the field of Industrial/Organizational (I/O) Psychology, topics include personnel selection and evaluation, training and development, attitudes and motivation, leadership, group dynamics, diversity, organizational structure and climate, and job design and working conditions.

PSYC.5260 Workplace Diversity (Formerly 47.526) - Credits: 3

This course will explore the challenges presented by the increasingly diverse workforce within the United States. Students will consider how work groups and organizations can effectively incorporate a diversity of perspectives. Students will consider issues of oppression, discrimination and bias, with particular attention paid to the situation here in the Merrimack Valley. There will also be some focus on personal awareness and the development of skills for addressing diversity concerns.

PUBH.2110 Sustainable Development (Formerly 48.307/SOCI.3070) - Credits: 3

This course offers sociological examination of immigration processes, laws, and debates. Three areas compose the main portion of class content: historical accounts and theories, legislation, and the social, economical, and political
experiences of immigrants.

**SOCI.2170 Social Movements (Formerly 48.382/SOCI.3820) - Credits: 3**

Considers organized action undertaken to alter the social position of a group. Organization, techniques of action, motivation of participants, and group ideologies are studied. Materials from historical, social, psychological, and sociological sources are used.

**SOCI.2400 Sociology of Gender (Formerly 48.240) - Credits: 3**

This course is an interdisciplinary introduction to the field of gender studies. A variety of topics are presented, such as gender stratification, work and family, sexual identities, media representations of women and men, women's movement, and violence against women. Feminist theories and methods are also introduced.

**SOCI.2450 Introduction to Labor Studies (Formerly 48.245) - Credits: 3**

This foundational course has two overarching learning objectives: (1) to give students basic empirical knowledge and analytical tools to understand the context of work in the United States at the dawn of the twenty-first century and (2) to give students an understanding of how labour unions work, what has been their impact historically, and what their role is in contemporary society. The course will be explicitly interdisciplinary, drawing on readings from history, sociology, economics, political science, and psychology to offer and introduction to understanding work and labor through and analytic lens. In addition, the course will include a service-learning component in collaboration with the UML Labor Education Program.

**SOCI.2710 Sociology of Work (Formerly 48.371 and SOCI.3710) - Credits: 3**

In the United States, work is a fundamental part of people’s identities, consumes huge amounts of our time and effort, is a vital part of our economic and social development, and is linked inextricably to gender, racial-ethnic, and class inequalities. This course will take a sociological perspective, challenging students to take a step back and look analytically at work, something with which most of us are intimately familiar.

**SOCI.3300 Fast Food, Hot Planet: Sociological Approaches (Formerly 48.330) - Credits: 3**

With an eye on climate change sustainability, this course maps the social and historical dimensions of crisis and inequalities of food production and distribution. In addition to exploring food security’s relation to sustainable food production, students will strengthen critical thinking, writing, and library research skills.

**SOCI.3410 Wealth, Status and Power (Formerly 48.341) - Credits: 3**

Focuses on the phenomenon of social class distinctions with particular emphasis on social class in America. The approach is both historical and sociological.

**SOCI.4690 Seminar on Global Society (Formerly 48.469) - Credits: 3**

Considers the spread of industrial society globally. Emphasizes economic, political and cultural changes in various parts of the world and in the USA.

**SOCI.5150 Social Policy and Inequalities - Credits: 3**

Social Policy and Inequalities is a semester-long course that analyzes the social policies in the United States and Massachusetts that address persistent and structural inequalities in education, health and healthcare access, immigration, workforce, and human services. We will pay particular attention to social policies that contribute to or seek to alleviate inequalities based on race, gender, income and wealth, sexuality and disabilities. The course will identify key features of policy development, implementation and evaluation and interrogate the underlying patterns of inequalities at each stage. The course will analyze case studies of policies such as those related to poverty and income inequality; affirmative action; education; workforce development and employment.
ENGL.2772 Introduction to Latinx Literature - Credits: 3

Describing a wide range of racial and ethnic denominations, Latinx is a complicated term which this course will examine. This course emphasizes the historical and aesthetic networks established in the Latinx literary canon that continue into the present, while also exploring the relationship between genre and socio-historical issues. Reading from a diverse tradition that reflects the contested definition of “Latinx” and its shifting demographics in the U.S., this course investigates how U.S. Latinx literature speaks to and expands “American” literary traditions, and how unique ethnic identities such as the Mexican American, Dominican American, Cuban American, or mainland Puerto Rican offer different yet interconnecting representations of what it means to be Latinx in the U.S.

HIST.2090 Colonial Latin America (Formerly 43.209) - Credits: 3

This class examines the history of Latin America from 1492 until the early nineteenth century. After considering the rise of the Aztec and Inca empires, we will consider how the Spanish and Portuguese were able to acquire and maintain control in the region. Topics include indigenous-European relations, slavery, economic developments, the challenges of maintaining a colonial government, and Latin American independence.

HIST.2120 Modern Latin America (Formerly 43.212) - Credits: 3

Modern Latin America, a 200-level course, surveys Latin America from independence in the early nineteenth century to the present using primary sources, a textbook, and scholarly works. It begins with an understanding of the political, social, and economic context from which ideas of independence emerged and considers the wars for independence. We will spend a significant part of the course studying nation-building: how did the leaders of new nations define their nations and the values that would guide them? Who was included and who was excluded in the process of nation-building? The next part of the course examines the demands of groups originally excluded: the indigenous population, women, and the poor. The portion of the course covering the twentieth century emphasizes Latin America’s international connections, focusing on influence from the United States and the effects of world wars on the region. Mass politics also emerge, and are expressed in the Mexican Revolution and in Peronism. We also will consider the Cuban Revolution and its wider effects in the region. We will conclude our survey of the region by considering how historical trends continue to affect politics today. For example, the Bolivian political scene continues to be affected by the events and outcome of the War of the Pacific (1879-1883) and by a strong indigenist movement.

HIST.3230 World of the Atlantic (Formerly 43.323) - Credits: 3

The concept of the Atlantic world arose to describe the interactions of the peoples of the Americas, Europe, and Africa through trade, conquest, colonialism, independence and beyond. In this class, we will consider the cultural, economic, and political relationships that are formed and change over time between these groups. We will pay special attention to historical approaches to studying and writing about the Atlantic World.

HIST.3450 Slavery and Abolition (Formerly 43.345) - Credits: 3

This course takes a comparative approach to the study of plantation slavery in the Americas with special attention to developments in Virginia and Cuba. It surveys the structure of slavery in the nineteenth century United States South; slavery’s legacy in the United States; and its twenty-first century reincarnation in human trafficking and forced labor around the world.

HIST.3490 The Cuban Revolution (Formerly 43.349) - Credits: 3

The Cuban Revolution has been surrounded by controversy since it took power in 1959. Through readings, films, and discussions, we will examine not only the events that have occurred in Cuba over the last four decades but also the ways that they have been presented to audiences in Cuba, the United States, and elsewhere. We will carefully consider the role of perspective in academic writing and the media and how it has shaped understandings of the Castro era.

PHIL.3880 Latin American Philosophy - Credits: 3

Students in this course will be introduced to current and longstanding debates within Latin American Philosophy. They will also be exposed to many of the principle texts and thinkers within this burgeoning tradition. The class includes a survey of Latin American philosophy ranging from pre-colonial Aztec thought to the debates over the struggle for Latin American independence, and also the question of identity: what constitutes Latin American philosophy.

POLI.3700 Latin American Politics (Formerly 46.370) - Credits: 3

The context, background and forces shaping the contemporary politics of the Latin American region.

WLPO.3030 Survey of Brazilian Cinema - Credits: 3
An introduction to Brazilian cinema and society, focusing on the Cinema Novo (New Cinema) of the 1960s and 1970s as well as more contemporary films influenced by the ideals of this movement. Films will be analyzed via reference to historical and theoretical texts. Topics to be addressed include Brazilian history as reflected in film and the formation of a distinct Brazilian aesthetic sensibility. Taught in English.

WLPO.3040 Survey of Brazilian, Portuguese and Lusophone African Cinema (Formerly 53.304) - Credits: 3

This course is designed as an introduction to film studies and to Brazilian, Portuguese and Lusophone African cinema and cultures. Taught in English. College Writing 1 (421 01) and College Writing 2 (42102).

WLPO.3050 Culture and Civilization of Brazil - Credits: 3

This course is an introduction to Brazilian culture and society. Attention is given to history, geography, cinema, literature, art, and issues of race, gender, and social inequality as they lead toward a fuller understanding of Brazil. This course will cover major aspects of Brazilian society. The main texts review significant events and forces that have helped shape Brazil today. A variety of films and videos will be used. Course will be taught in English.

WLSP.2110 Spanish 3 and Culture (Formerly 54.211) - Credits: 3

Enhances the four skills acquired in Spanish 2 and Culture (or equivalent), which is a pre-requisite: speaking, listening, reading and writing through the discovery of the culture of Spanish speaking countries in a communicative approach (instruction occurs in Spanish with minimal use of English). This class is the 3rd of the 4-course Spanish language program offered at UML. Language courses are sequential and must be taken accordingly.

WLSP.2120 Spanish 4 and Culture (Formerly 54.212) - Credits: 3

This course has Spanish 3 and Culture (or equivalent) as a pre-requisite and is the 4th and last of the 4-course Spanish language program offered at UML. The course strengthens the four skill acquired in prior levels. It emphasizes increased accuracy and depth of students’ abilities and knowledge of the culture of Spanish speaking countries in a communicative approach (instruction occurs in Spanish with almost no use of English). Students express themselves orally and in writing at the national standards level of high-intermediate and understand key-concepts when spoken clearly at native speed.

WLSP.3020 Survey of Latin American Literature (Formerly 54.302) - Credits: 3

A study of the major writers of Latin America from Native American literature to the modernist period. The authors and their works are placed in their historical, sociological, and literary perspective, thus introducing students to the Latin American World. Conducted in Spanish.

WLSP.3030 Modern and Contemporary Latin American Literature (Formerly 54.303) - Credits: 3

A continuation of WLSP 53.3020, Survey of Latin American Literature and Culture I. Conducted in Spanish

WLSP.3040 Special Topics: in Latin American Studies (Formerly 54.304) - Credits: 3

An in-depth study of a specific topic in literature, culture, civilization or cinema from Latin American countries. Class discussions, reading, oral and written work all in Spanish. May be repeated once for credit, if content changes, and with written consent of the Instructor.

WLSP.3130 Fieldwork in the Spanish Community (Formerly 54.313) - Credits: 3

Involves individual assignments under the sponsorship of local service agencies servicing the Spanish-speaking community involving individual family and group contact. Written and oral reports will be in Spanish.

WLSP.3150 Latin American Civilization and Culture (Formerly 54.315) - Credits: 3

Considers significant intellectual, artistic, historical, and sociopolitical aspects of Latin America from the beginning of its history. Through audiovisual aids and selected readings, the student will explore the Latin American way of being and expressing.

WLSP.3510 Latin American Theater (Formerly 54.351) - Credits: 3

Examines Latin American theatrical works as forms of socially accepted resistance and politically charged art forms. The course will consider plays and performances that challenge governments, inequities, and the status quo. In this course, students will study a variety of Latin American plays, as well as performances an political acts that explore these issues.

WLSP.3750 Latin American and Spanish Cinema
(Formerly 54.375) - Credits: 3

An exploration of representative Spanish and Latin American films from a variety of major directors. Areas of investigation include the cinematic representation of nationality, ethnicity, identity, gender, history, and politics. This course will be taught in English. Knowledge of Spanish is desirable but not required. Spanish majors and minors will complete written assignments, reviews, quizzes, and exams in Spanish.

WLSP.4160 The Latin American Novel (Formerly 54.416) - Credits: 3

A study of the development of the Latin American novel. Three major works of Latin American short story writers such as Borges, Cortazar, Marquez, Rulfo.

WLSP.4910 Directed Studies in Spanish Literature (Formerly 54.491) - Credits: 3

Individual research projects in Spanish literature. Students, through regular and frequent consultation with their instructor, develop a course of directed study in Spanish literature and define a problem for individual research. The student's findings are presented in a paper of significant proportions. Permission of Instructor.

WLSP.4920 Directed Study in Latin America (Formerly 54.492) - Credits: 1-4

Individual research projects in Latin American topics. Students, through regular and frequent consultation with their instructor, develop a course of directed study in a specific Latin American topic and define a problem for individual research. The student's findings are presented in a paper of significant proportions. Permission of Instructor.

WLSP.4950 Advanced Spanish Tutorial (Formerly 54.495) - Credits: 3

A program of directed study which affords advanced students an additional opportunity to pursue a previously explored problem in greater depth or to initiate an additional problem. The purpose is to sharpen and refine techniques for scholarly research and presentation and for creative expression.

WLSP.4960 Spanish Practicum Experience (Formerly 54.496) - Credits: 1-9

A program of on-campus and/or off-campus experiences for Spanish or Modern Language majors only. Specific requirements vary depending upon faculty policies and the nature of the program undertaken by the student. The intent of the practicum experience is to provide an occasion for investigation of a community, social, cultural, or artistic area and for applying techniques of problem solving and/or skills which are appropriate to the student's major discipline. May be repeated for a maximum of nine credits. Students are graded satisfactory, or unsatisfactory. The practicum experience may not be substituted for a required course in the major.
ARCH.2060 History of Architecture (Formerly 58.206) - Credits: 3
A survey of the major technical and stylistic developments in ecclesiastical and secular architecture from Prehistory to the present day studied with an emphasis on the major monuments (Parthenon, Pantheon, Gothic Cathedrals, St. Peter’s, Versailles Palace, Eiffel Tower, Guggenheim Museum). Spring, alternate years.

ARHI.2030 History of Art I: Prehistoric to Medieval Art (Formerly 58.203) - Credits: 3
A survey of the origins of painting, sculpture, and architecture from the prehistoric period through approximately 1300 CE. Works of art are discussed in their historical, cultural, and artistic contexts.

ARHI.2040 History of Art II: Renaissance to Modern Art (Formerly 58.204) - Credits: 3
A survey of the origins and development of painting, sculpture, and architecture from Renaissance times to the Modern period. Emphasis is placed on representative works of art from the Renaissance, Baroque, Rococo, Nineteenth Century Movements-Neoclassicism, Romanticism, Impressionism, Cubism, Dadaism, Surrealism and Abstract Art. The aim of the course is to introduce the student to basic critical and art historical methods as well as the analysis of style and content within sequential cultural contexts.

ARHI.3210 Italian Renaissance Art (Formerly 58.321) - Credits: 3
A study of painting, sculpture, and architecture in the major artistic centers of Italy (Florence, Rome, Venice, Milan and the Northern Courts) during the 15th and 16th centuries. In addition to examining artworks by some of the most important artists of the period - Leonardo da Vinci, Michelangelo, titan - this course considers larger themes raised by these works and gives attention to the conditions within which the works were originally produced and viewed.

ARHI.3230 Northern Renaissance Art (Formerly 58.323) - Credits: 3
A study of 15th and 16th century painting and sculpture north of the Alps including artists such as Jan van Eyck, Hieronymous Bosch, Jean Fouquet and Albrecht Drer. This course considers how social forces (politics, race, religion, gender etc.) influenced the manner in which Northern renaissance art was produced, viewed, and understood, as well as how these forces led to the creation of some of the most startling, strange and enigmatic images of any period in the history of art.

ARHI.3320 Baroque Art (Formerly 58.332) - Credits: 3
This course surveys the drama and dynamism that infused painting and sculpture from 1550-1750. With its origins in Italy, Baroque art quickly spread throughout much of Europe (including Flanders, France, England, the Dutch republic, Spain, Portugal) and the New World. This course will explore the ways the arts were used to express political ambition, forge social and political alliances, as well as to create cultural identity and memory.

ARHI.3350 The Golden Age of Spanish Art - Credits: 3
This course is a survey of art in Spain from the discovery of the Americas in 1492 through the mid-seventeenth. This roughly 150-year period, known as the Spanish Golden Age or Siglo de Oro, witnessed the expansion of the Spanish empire across the Atlantic and Asia and gave rise to many of Spain’s greatest artistic achievements. This course will survey the unprecedented contributions of Spanish painters, sculptors and architects; the patrons and political forces contributing to this Golden Age of artistic production; and the place of the Spanish golden Age within broader European and global contexts.

ARHI.3410 Medieval Art (Formerly 58.241) - Credits: 3
This course examines the rich cross-cultural artistic heritage of the medieval world from the Late Antique period (third century CE) through the Gothic period (fourteenth century CE). The course includes the study of paintings, sculpture, illuminated manuscripts, mosaics and architecture. It will explore materials and technique, the relationship of images to sacred texts and rituals, and the controversies regarding image production. Drawing examples for the eastern Mediterranean to the rocky coast of Ireland, the course will draw out the way works of art reflected relationships between the Jewish, Christian, and Islamic religions.

ENGL.2010 Classical Mythology (Formerly 42.201) - Credits: 3
This course takes a literary approach to the mythology of Ancient Greece and Rome. We will explore stories of creation of the world, the fall of Troy, the travels of Odysseus and Theseus, the sins of Oedipus, and the rage of Medea. These texts examine some of the most disturbing and violent of human experiences, as well as some of the most moving: men and women’s encounters with community, family, war, death, and love. We will address how these narratives form ethical and social codes that underpin western culture, and devote some attention to how these texts are reinterpreted by later
authors. Authors may include Homer, Hesiod, Ovid, Virgil, and the Greek tragedians.

ENGL.2011 Medieval Myth and Legend - Credits: 3

Explores myth and legend in the literatures of England, Europe, and the World in the Middle Ages (500-1500). Topics may include dragons, djinns, and King Arthur, as well as knights, chivalry, the storyteller Scheherazade, Dante's walk through the Inferno, werewolves, and magic. We will discover how these fantastic tales negotiate cultural issues like genders, race, and ethnicity, political power, and the creation of art. All readings in modern English translation.

ENGL.2500 The Bible as Literature (Formerly 42.250) - Credits: 3

Presents a literary and historical analysis of selected Old and New Testament books.

ENGL.2670 Discovering Shakespeare (Formerly 42.267) - Credits: 3

This class introduces students to some of the Bard's most popular and accessible plays. We will learn to understand Shakespeare's language and see how the plays were produced in Renaissance England, as well as examine his living legacy, in theater, film, and popular culture, throughout the modern world today. No previous experience with Shakespeare needed. Old Title: Introduction to Shakespeare.

ENGL.2675 Vikings - Credits: 3

An introduction to Norse mythology, sagas, and culture. The class will read translations of medieval texts recalling traditions of the old Norse gods and their cults during the Viking Age (ca. 800-1050 AD), as these were preserved in 13th-century Icelandic texts, but also in Latin, Arabic, Old High German, Old Swedish and Old English manuscripts and runic inscriptions. Students will explore the worldview and value system of this unique culture, and examine relations, often violent but sometimes comic or friendly, between groups of highly intelligent, vulnerable beings, both living and dead, male and female, animal and human, god and giant - a crowded universe full of trolls, elves witches, dwarfs, valkyries, berserks, shapeshifters, and various social classes of human beings.

ENGL.2810 British Literary Traditions (Formerly 42.281) - Credits: 3

A survey of British Literary history from the medieval through the modernist periods.

ENGL.2830 World Literature in Translation I - Credits: 3

A survey of world literature (works outside British and American literary traditions) through 1660; all course readings are translated into English. Students will become familiar with conventions of different literary genres, including epic and lyric poetry, drama, fables and folktales, and religious and philosophical texts. The course also provides the major cultural, religious, and political contexts of the literary texts. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.3070 History of the English Language (Formerly 42.307) - Credits: 3

Explores the origins and structure of the English language, tracing the ways that English has evolved from Old English through Middle English to the varieties of Modern English in England and its former colonies, including the United States. We will also examine the literary, social, and political implications of these developments, for instance the evolution of Standard English or the use of dialects. The course does not assume any knowledge of Old or Middle English.

ENGL.3150 Old English Language and Literature (Formerly 42.315) - Credits: 3

Students will acquire reading knowledge of the Old English Language, spending half the semester mastering grammar and vocabulary, and the second half translating texts such as The Wanderer, Dream of the Rood, and Beowulf. Attention will also be given to early medieval cultures in England.

ENGL.3154 Middle English: Literature and Language (1066-1500) - Credits: 3

England in the 11th century had a multi-lingual and diverse culture, with French, German, Scandinavian, and Latin speakers interacting daily. By 1500, England was English-speaking, with various dialects of Middle English emerging from this linguistic mix. In this class, students will learn to read and analyze the dialects of Middle English, translating text such as Sir Gawain and the Green Knight, the Harley Lyrics, the York Plays, and the Canterbury Tales from their original language. We will learn and apply the rules of grammar, pronunciation, and vocabulary. Students will analyze critically questions of creolization, dialect and social class, and the emergence of print culture.

ENGL.3360 Beowulf and Heroic Literature (Formerly 42.336) - Credits: 3

We will read Beowulf in translation, and discuss contemporary approaches to the poem. We will also study other Old English
works such as Judith, as well as Frankish and Old Norse-Icelandic literature in translation to gain a cultural context for Beowulf. May include discussion of how later works, such as those of J.R.R. Tolkien or modern fantasy writers have been influenced by these medieval epics.

**ENGL.3380 Medieval Women Writers (Formerly 42.338) - Credits: 3**

Woman have always written and read and participated in culture. This class will explore writings on literary and non-literary genres by woman in the European Middle Ages (600-1500). Students will learn how different pre-modern cultural conditions affected the possibilities for women’s authorship, readership, and patronage. We will also examine how women writers interacted with literary traditions and constructions of gender.

**ENGL.3460 Homer’s Iliad and Odyssey (Formerly 42.346) - Credits: 3**

This class will explore the story of the ancient city of Troy from its origins in Homeric epic and classical drama to some of its many European iterations beginning with Vergil’s Aeneid. Students will examine how these Trojan texts encode narratives of gender, ethnicity, and welfare, and how they help create an occidental European identity.

**ENGL.3490 Arthurian Literature (Formerly 42.349) - Credits: 3**

Will examine works in modern English translation from a variety of genres (romance, history, tragedy, epic) that tell stories of the mythical King Arthur and the knights and ladies of his courtly world. The course will focus primarily on texts of the medieval and renaissance periods, but will include attention to nineteenth- and twentieth-century versions in poetry, prose, art, music and film.

**ENGL.3510 Literature of the Middle Ages (Formerly 42.351) - Credits: 3**

This course will examine a variety of medieval genres: epic, chanson de geste, romance, fable, lyric, and drama. We will analyze the circumstances under which the works were produced (orally and in manuscript) and imagine how they may have been read by men and women in their day. Texts are selected from the courtly pursuits of the aristocrats and from the popular, religious rituals and writings of the rising merchant class. We will also give some attention to medievalism, that is, how the middle ages have been perceived and transformed by contemporary cultures.

**ENGL.3520 Renaissance Literature (Formerly 42.352) - Credits: 3**

A study of English prose and poetry of the period. Includes discussion of how later works, such as those of J.R.R. Tolkien or modern fantasy writers have been influenced by these medieval epics.

**ENGL.3530 Literature of the Seventeenth Century (Formerly 42.353) - Credits: 3**

A study of English prose and poetry of the period excluding Milton.

**ENGL.3600 Medieval & Renaissance Theater (Formerly 42.360) - Credits: 3**

A study of Medieval mystery cycles, morality plays, interludes, and other forms of popular and court theater.

**ENGL.3630 English Renaissance Drama (Formerly 42.363) - Credits: 3**

A study of major dramatists of the Age of Shakespeare including Marlowe, Dekker, Webster, Jonson, Beaumont and Fletcher, Massinger, Ford and others.

**ENGL.3820 Theatre History I: Ancient Greece through the 18th Century (Formerly 42.382) - Credits: 3**

A survey of ancient to early modern theatre in its historical and social contexts, tracing changes and developments in acting styles, theatre architecture, scenic practices, dramatic literature, and the audience. The course examines how theatre both reflects and shapes the changing beliefs and priorities of a culture.

**ENGL.4230 Shakespeare I (Formerly 42.423) - Credits: 3**

A study of selected histories, comedies, and tragedies. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Written &Oral Communication (WOC).

**ENGL.4240 Shakespeare II (Formerly 42.424) - Credits: 3**

A study of selected histories, comedies, and tragedies not covered in 42.243. Shakespeare I is not a prerequisite.

**HIST.1050 Western Civilization I (Formerly 43.105) - Credits: 3**

This course surveys some important issues and tendencies in the history of Western Civilization from its origins through the early modern period, including ancient Mesopotamia, classical
Greece and Rome, the Middle Ages, and the Renaissance. These include "civilization" and the rise of cities, different imaginings of god(s) and humanity, evolving forms of political organization, continuity and change in social organization and everyday life, and the ongoing dialogue of faith and reason. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HIST.1070 World Civilizations to 1500 (Formerly 43.107) - Credits: 3
This class examines societies and cultures from ancient until early modern times with the underlying assumption that world history is an important conceptual tool for understanding our interdependent world. Course topics analyze the nature of the earliest human communities, the development of the first civilizations and the subsequent emergence of cultures in selected areas of Eurasia, Africa, and the Americas. This course also offers a consideration of issues related to the connections and relationships that shaped civilizations as a result of migration, war, commerce, and the various cultural expressions of self, society, and the cosmos before 1500. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

HIST.2000 Early Christianity (Formerly 43.200) - Credits: 3
This course serves as an introduction to the first 800 years of Christian history. It will begin with an introduction to the Apostolic Church of the first century (and its Jewish/Greco-Roman background) and conclude with an introduction to the Eastern Orthodox Church of Late Antiquity. The course will also cover popular topics like "Gnosticism," "Women in Early Christianity," and "Early Christian Worship and Art."

HIST.2001 Religions in Medieval Europe - Credits: 3
This course serves as an introduction to religion in medieval Europe (ca. 500-1500), that is, the Roman and Eastern traditions of Christianity, Christian movements deemed "heretical" by "orthodoxy," Judaism, and Islam. Understanding the medieval history of these religions results in our gaining not only a comprehension of their individual developments but also how the three great monotheistic faiths have become some of the most powerful religious forces ever seen in civilization. These different religions will be treated not only individually but also in dialogue with one another.

HIST.2250 Ancient Greek History (Formerly 43.225) - Credits: 3
A study of Greek history, institutions and culture from Minoan times through the Hellenistic period.

HIST.2255 Hellenistic History - Credits: 3
This course investigates the Hellenistic Period, defined as the era from the death of Alexander the Great in 323 BCE to the death of Cleopatra and the conquest of Rome in 31 BCE. In these centuries, the Mediterranean world was exposed to brand new cultures and ideas, leading to an unmatched period of innovation and creativity, as well as to new conflicts and struggles. This course will emphasize themes of cultural, social, and religious hybridity, which were brought about through close contact with the Near East, North Africa, and Central Asia, and closely engaged with all the complexities of the three hundred years that passed between the height of the classical Greek world and the beginning of the Roman Empire.

HIST.2260 Roman History and Civilization (Formerly 43.226) - Credits: 3
This course examines one thousand years of Roman history (ca. 500 BC-500AD) with equal emphasis upon social, political, military, and cultural aspects of the Republic and Empire.

HIST.2270 Europe in the Middle Ages (Formerly 43.227) - Credits: 3
A survey of the Latin West during the formative period from the Roman Empire to the creation and development of the first European civilization.

HIST.2280 Women in European History (Formerly 43.228) - Credits: 3
This course examines the history of women in late medieval, early modern, and modern Western Europe (ca. 1300-1900). From medieval saints and Renaissance queens to Enlightenment Salonieres and ordinary wives and mothers, women have played an astonishing variety of roles. We will utilize primary and secondary sources, historical films, and works of art to understand the contributions and challenges of women in the past.

HIST.2310 Renaissance and Reformation (Formerly 43.231) - Credits: 3
The history of Europe in the time of transition between the late Middle Ages and the Early Modern Period. Two principle topics are the intensification of cultural change which began in Italy around 1300 and spread slowly northward and the disruption of the unity of the Western Christian Church.

HIST.3020 The Byzantine Empire (Formerly 43.302) - Credits: 3
Through this course, students will examine the history of Byzantine culture, which grew from the Greek-speaking remains of the Roman Empire. Students will consider how leading men and women shaped Byzantine Civilization and the political and military institutions that preserved it through the fifteenth century. The course will also focus on the development and spread of Eastern Orthodox Christianity and significant aspects of Byzantine culture, such as cuisine, gender roles, cities, and art. We will explore in some detail Byzantium’s complex and difficult dialog with its neighbors: the Islamic world, the Slavs, and the Latin West. This course especially emphasizes reading and discussion of primary source documents. Students will compose a research paper as their main work for this class.

HIST.3270 Medieval England (Formerly 43.327) - Credits: 3
From the first century Roman Conquest of the Britons to the 15th century Tudor victory at the Battle of Bosworth Field, this course aims to illuminate the social, political, religious, and cultural elements that made medieval England. This course will explore art, gender, class structures, and England’s interactions with non-Christians, among many other topics. In addition to the extensive written sources available, special attention will be paid to archaeological discoveries that help us understand daily life in medieval England.

HIST.3290 Childhood in Premodern Europe (Formerly 43.329) - Credits: 3
This course examines the concept of childhood in medieval and Renaissance Europe (ca. 1100-1600), with particular attention to England and Italy. There are no specific prerequisites, although some knowledge of European history (i.e., Medieval Institutions, Western Civilization, Renaissance-Reformation) will be useful. Among the topics we will consider are the following: the different stages of childhood; children’s education and apprenticeship; dress, diet, and demeanor of children; orphans; royal children; Protestant and Catholic views of children; adolescent sexuality; depiction of children in art; child labor; literature for children.

HIST.3300 Tudor and Stuart England, 1485-1714 ( Formerly 43.330) - Credits: 3
Traces the transformation of England from a small island kingdom to the hub of an overseas empire. During this period the English people underwent religious upheaval and civil war, saw the rise and partial decline of the monarchy, built and rebuilt London, and enjoyed the plays of Shakespeare. Although England provides the focus for this course, the rest of the Tudor and Stuart world is included.

HIST.3320 Warfare in the Ancient World (Formerly 43.332) - Credits: 3
Warfare in the Ancient World is a practical introduction to the study of warfare in the ancient world and traces the advances made in empire building, ideology and military technology. The chronological structure of the class starts with the Egyptians and continues through the Dark Age, Classical and Hellenistic Greeks, to the rise and fall of Rome. This course will trace certain themes through the centuries: how different civilizations waged war; who served in various armies and why soldiers decided to fight. While major battles and important individuals are discussed, military tactics and strategies are only tools to help understand the underlying causes for armed conflict.

HIST.3420 Inquisition: Myth and Reality (Formerly 43.342) - Credits: 3
Following a brief introduction and an overview of the medieval Inquisition, the first few weeks of the course will be devoted to a study of the Inquisition in Spain and Italy from 1450-1650. We will also discuss the way in which the history of the Inquisition has been analyzed during the past five hundred years (what historians call “historiography”). The second half of the course will focus on student research and selected topics in Inquisition studies.

HIST.3710 Medieval Institutions (Formerly 43.371) - Credits: 3
This is a reasonably intensive reading seminar focusing on a number of important medieval institutions that have helped to influence our modern world. You will read a number of works in order to discuss them in detail in class. In addition, you will be required to write a review of one of three required books.

HIST.3720 Women in the Middle Ages - Credits: 3
This course explores medieval Europe through the female lens. We will illuminate the influence of women on war, politics, business, religion and culture. We will study queens, writers, artists, nuns, businesswomen, and peasants in order to understand how women shaped the medieval world, how they were shaped by it, and how they contributed to the brilliance of the Renaissance.

HIST.3870 Pirates of the Mediterranean - Credits: 3
This course uses piracy, defined as armed robbery at sea, to highlight issues of violence, governmental intervention, and economic practices as they relate to marginalized people of the Greco-Roman world. Students will be introduced to the methods of underwater archeology while examining shipwreck evidence, and epigraphic conventions while reading primary source material relating to piratical events. The course follows
the long history of the Mediterranean as a contested, yet central space, and tracks how the sea was used, not just as a resource, but as an opportunity for predation and personal advancement. The main questions will be: what is a pirate, and who has the power to apply that label to others.

**HIST.3880 Ancient Mediterranean: Cultures in Contact (Formerly 43.388) - Credits: 3**

The ancient Mediterranean was home to a diverse array of cultures in close contact with each other through trade, warfare, and colonization. This course will study a variety of Greco-Roman responses to other cultures through a series of case studies of contact between Greeks, Romans, and other cultures of the ancient world. In particular, we will examine questions of the applicability of modern concepts such as race and ethnicity, and explore the ways in which these shifting representations of other cultures are reflective of the ways in which Greeks and Romans perceived themselves. We will also reflect on the ways in which these ancient Greco-Roman conceptions of culture relate to our own modern understandings of cultural difference.

**HIST.3885 Law in the Ancient Greek World - Credits: 3**

This course will examine the body of evidence for law in the ancient Greek world as a means of understanding the legal, political, and social history of the Greek poleis. In particular we will focus our attention on the large corpus of forensic speeches form Classical Athens with an eye to understanding the ways in which the Athenian city governed itself and resolved conflict within the poleis. Due to the nature of these speeches and the evidence for Greek legal practices, we will also be examining various aspects of Greek social and economic history within a legal context, including gender, slavery, property law, and citizenship.

**MUHI.2161 Music of Western Civilization: Antiquity-Mid 18th Century (Formerly 74.161/MUHI.1610) - Credits: 3**

Students will listen to and learn to understand Western European Art music from the earliest times through the Middle Ages, Renaissance, Baroque, and 18th-century Classical era. We will examine significant composers, forms, and styles, and explore such things as the kinds of music people sang and played, the instruments they played, how music has been used in worship and in the theater, how the historical context influenced composers' procedures and decisions, how music from several hundred years ago has influenced music of today, and why music has been one of the most enduring forms of community and culture in Europe and America. Open to non-music majors only.

**MUHI.2610 Music History 1 (Formerly 74.261) - Credits: 3**

Studies sacred and secular musical forms from pre-Christanity to 1750.

**PHIL.3141 Dante’s Way from Fear to Peace - Credits: 3**

The course will involve close reading of central cantos from all three books of Dante’s Divine Comedy, the Inferno, Purgatorio, and Paradiso. Through we will consider Dante’s place in the history of European literature, in particular, his relationship to Virgil and the epic tradition, our primary focus will be on three philosophical concerns, existential/ethical, metaphysical/ontological, and epistemological/Linguistic.

**PHIL.3360 Early Modern Philosophy - Credits: 3**

Examines Early Modern European Philosophy and its religious and scientific context, including movements such as the Mechanical Philosophy, Rationalism, Empiricism, and Transcendental Philosophy. Topics include knowledge and scientific understanding, the human mind and personal identity, and the debate between faith and reason.

**PHIL.3390 Poetry and Philosophy After Plato (Formerly 45.339) - Credits: 3**

After defining "Neoplatonism" with reference to Plato’s Phaedo, Symposium, and Phaedrus, the course will consider the relationships among Homer’s Odyssey, Plotinus’s Enneads, Virgil’s Aeneid, Augustine’s Confessions, and Dante’s Divine Comedy. The focus will be on coming home to the "source and origin" after having been away and, as the philosopher Plotinus puts it, having been "a stranger in something strange". Students will be invited to work on other literary and philosophical treatments of this theme in English, Irish or American poetry and writing. A principal concern of the course is language "sung, spoken, and written". Accordingly, the course will applicable to, and count for the Philosophy and Communications track.

**PHIL.3470 Greek Tragedy & Philosophy (Formerly 45.347) - Credits: 3**

Philosophers such as Plato, Aristotle, Hegel, and Nietzsche have drawn inspiration from, and challenged critically, the great Greek tragedians Aeschylus, Sophocles and Euripides. This course will play off philosophical commentaries against the specific tragedies they have targeted in order to examine the often tense relationship between philosophical discourse and tragic poetry.

**PHIL.3860 Ancient Philosophy (Formerly 45.386) -**
Credits: 3

A survey of the beginnings of philosophy, mainly western, from the Presocratics to Augustine. Studies the emergence of philosophy out of mythical forms of thinking and the development of rational thought in the work of Plato, Aristotle, the Stoics, the Epicureans, and the Neoplatonists.

PHIL.3870 Plato and Beginning of Philosophy
(Formerly 45.387) - Credits: 3

It is Plato who first uses the words "philosopher" and "philosophy", and who, in his dialogs or dramatic discussions, establishes for all subsequent Western thought just was the enterprise of philosophy will be. In our study of these dialogs we will trace the origins in Plato of philosophy's primary questions concerning what is real and true as opposed to mere appearance (ontology, metaphysics), what is knowledge as opposed to mere opinion (epistemology), what is valid argument (logic), what is beautiful (aesthetics), and what is good, just and fair (ethics, politics). Plato foregrounds speech and language in all these considerations. Hence language, as the medium of thought and communication, will be a fundamental concern throughout our study.

WLSP.4045 Cervantes' Don Quijote in translation - Credits: 3

Cervantes' Don Quijote will examine new ideas and concepts concerning one of the world's greatest novels. Taught in English, there is no language requirement for this course; however, this course is designed to engage student interest in historically and culturally significant events in Golden Age Spain and to - more importantly - expand student interest in literary criticism of the Spanish Golden Age and of Cervantes' masterwork in particular. Because it is taught in English, this course does not count toward the Spanish major or minor.
CRIM.2480 Terrorism (international and domestic) (Formerly 44.248) - Credits: 3
This course acquaints the Criminal Justice student with the concept of terrorism at both the international and domestic levels. Topics include the history of terrorism, terrorism today and terrorism in the future. Counter measures taken to respond to terrorist threats are also examined.

CRIM.3260 Hate Crime (Formerly 44.326) - Credits: 3
This course examines prejudice as a motivation for criminal behavior. The criminological theory for hate crime is reviewed, as well as historical perspectives of this crime category.

CRIM.3600 Gender, Race, and Crime (Formerly 44.360) - Credits: 3
This course examines gender and racial implications of criminal laws, criminal justice practices and programs will be examined. The position of women and racial/ethnic minorities will be assessed from the different perspectives of victims, offenders, and criminal justice practitioners.

ECON.3020 Labor Economics (Formerly 49.302) - Credits: 3
An introduction to the economic analysis of behaviors and institutions in the labor market: labor supply and participation, labor demand by firms, wage determination under different institutional settings, and gender, race or ethnicity as determinants of different labor market outcomes. The course presents microeconomic models, empirical findings and their public policy implications on topics such as minimum wage, affirmative action, social insurance programs, workplace safety, and subsidized day care.

ENGL.2400 Literature and Women (Formerly 42.240) - Credits: 3
A survey of literary attitudes toward women from the Judaic and Hellenic periods through the present.

ENGL.3710 The Literature of the Beat Movement (Formerly 42.274/ENGL.2740) - Credits: 3
Explores both the writings and the personal lives of a loose confederation of poets, novelists, and essayist who emerged onto the American literary and cultural scene following World War II and who came to be known as the -Beat Generation.+ The primary focus will be on the life and writings of Lowell native Jack Kerouac (1922-1969) with others of the -beat circle+ included as well, i.e., Allen Ginsberg, William Burroughs, Diana DiPrima, etc.

HIST.2040 China & the Modern World (Formerly 43.204) - Credits: 3
This course introduces China's interactions with the world since the 1840s. With the Opium War as the starting point, students are ushered into a traditional China whose political system, cultural values, and an economic structure stood in sharp contrast to those of the outside world. The main focus of the course is to explore the process in which China fought for its survival as a sovereign nation and searched for its road to modernization.

HIST.2420 World War II (Formerly 43.242) - Credits: 3
The Second World War transformed states and people from East Asia to the United States to Europe. We examine diplomatic and military aspects of the war and how it affected the lives of people in the countries involved. Topics include the prelude to the war, military campaigns in Europe and the Pacific, collaboration and resistance, the home front, the Holocaust, science and the atom bomb, and the consequences of the war.

HIST.3220 Chinese Foreign Policy (Formerly 43.322) - Credits: 3
Chinese foreign policy since 1949 with a strong emphasis on tracing the links between historical, ideological, and cultural influences, on the one hand, and pragmatic and nationalistic considerations on the other. While tracing these links, the course explores the intricate process of policymaking in the People's Republic of China.

HIST.3450 Slavery and Abolition (Formerly 43.345) - Credits: 3
This course takes a comparative approach to the study of plantation slavery in the Americas with special attention to developments in Virginia and Cuba. It surveys the structure of slavery in the nineteenth century United States South; slavery's legacy in the United States; and its twenty-first century reincarnation in human trafficking and forced labor around the world.

HIST.3560 Civil War and Reconstruction (Formerly 43.356) - Credits: 3
This course surveys the increasing political, social, and economic tensions between the North and the South during the first half of the nineteenth century; the explosion of those
tensions into secession and conflict; the four years of war; and the postwar struggle to reconstruct the South and forge a new union.

HIST.3650 United States History since 1960 (Formerly 43.365) - Credits: 3
Discusses Cold War politics and civil rights upheavals during the 1960’s and 1970’s, the decline of American economic and political power, and the resurgence of conservative politics in the 1980’s.

HIST.3800 Work and Society (Formerly 43.380) - Credits: 3
Provides a survey of labor history from the colonial period to the present focusing on the interrelationship between culture and work in American society and on the dynamics of technical and economic changes on the organization of work processes.

PCST.4750 Community Conflict Resolution (Formerly 57.475) - Credits: 3
This course gives students an understanding of the main issues and solutions involved in community level conflict resolution; e.g., in neighborhoods, workplaces, and other institutions. It develops students’ skills in practicing conflict resolution and/or evaluating programs in the field of dispute resolution. It is important to understand why conflict happens and how to resolve conflict.

PCST.5120 Community Conflict Resolution (Formerly PCS 512) - Credits: 3
This course gives students an understanding of the main issues and solutions involved in community level conflict resolution; e.g., in neighborhoods, workplaces, and other institutions. It develops students’ skills in practicing conflict resolution and/or evaluating programs in the field of dispute resolution. It is important to understand why conflict happens and how to resolve conflict.

PHIL.3350 Ethical Issues in Technology (Formerly 45.335) - Credits: 3
This course will examine important ethical issues and value conflicts emerging in contemporary science and technology. Through readings and class discussions students will not only have an opportunity to explore the manner in which ethical and technical problems are related, but to develop insight into areas of ethical philosophy and modes of reasoning essential to an intelligent understanding of such issues. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

POLI.1210 Introduction to International Relations (Formerly 46.121) - Credits: 3
Surveys some recent methods and approaches used in the study of international politics and provides an introduction to current problems of foreign policies of major world powers. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

POLI.3380 Political Participation (Formerly 46.338) - Credits: 3
Political movements; voting and elections, parties and interest groups; civil disobedience in American politics. Consideration of causes, fluctuations and trends.

POLI.3490 Politics of Race and Ethnicity (Formerly 46.349) - Credits: 3
A study of the politics of race and ethnicity, focusing primarily on American society, and the racial and ethnic groups of the region.

POLI.3570 Thoreau in Our Time (Formerly 46.357) - Credits: 3
This course traces Henry David Thoreau’s influence on major social and political transformations in American history from the abolitionist movement to the present day. We will focus first on Thoreau’s writings on slavery, commercial development, environmental history, and individual liberty. Then we will study his formative role in the civil rights and environmental movements of the twentieth century. Finally, through a mix of outside speakers and student presentations, we will explore how his writings continue to shape ongoing struggles to contend with climate change, advance social justice, and promote a greater sense of fairness in American life. The course will involve at least one trip to Walden Pond and a tour of Thoreau’s birthplace in Concord, Massachusetts. Course page: http://faculty.uml.edu/sgallagher/Thoreau_in_Our_Time.html.

POLI.3680 Middle East Politics (Formerly 46.368) - Credits: 3
The region will be analyzed using a comparativist lens, whereby the historical context of creating nation states in the region and the effect of colonialism will be applied to contemporary politics. Women, religious/ethnic minorities and the dynamics of the Arab Spring will also be addressed comparatively.

POLI.4200 Reading and Simulation Experience
International Organization (Formerly 46.420) -
Credits: 3

Students take part in a simulation of the proceedings of a regional or international organization, e.g., U.N., O.A.S., O.A.U., or the Arab League. They study all aspects of the selected institution but concentrate on key economic, social and security issues discussed in the body’s debates. The course aims to give the student a clearer understanding of the forces and constraints which shape the foreign policies of individual states.

POLI.4920 Directed Study In International Organizations (Formerly 46.492) - Credits: 3

Advanced and intensive reading and other activity in connection with the study of selected international organizations.

PSYC.3350 Psychology and Women (Formerly 47.335) - Credits: 3

Considers such topics as: the psychology of sex differences; biological bases of psychological sex differences; the nature of female sexuality; clinical theory and practice concerning women; women as mental patients and mental health consumers; implications for psychology and for women’s status.

PUBH.2110 Sustainable Development (Formerly PUBH/57.211) - Credits: 3

This course examines workplace and regional factors that shape the prospects for sustainable prosperity and worker and community empowerment. The course begins by reviewing recent trends in the distribution of income and wealth and the industrial structure of the New England economy. The historical dynamics shaping work organization and regional development are examined. Several industry case studies are selected because of their importance to the regional and national economy. The case studies provide focus for studying the strategic choices made by firms in mature industries and newly emerging regions; the basis of competitive advantage for Japanese firms and the response of American rivals; and the influence of the product cycle and regional institutions on capture or retention of emerging and mature industries. The final section of the course focuses on the prospects for sustainability of the organization of production and its environmental impact, incentives for skill development and technological innovation, and shared prosperity. A central course objective is to foster an understanding of the links between the workplace and region in the pursuit of sustainable development and shared prosperity.

SOCI.2150 Peacemaking Alternatives (Formerly 48.215) - Credits: 3

Examines various positive alternatives to war and violence, including disarmament, nonviolence, conflict resolution, and the United Nations. Students do volunteer work with an activist agency or interview an activist. The course stresses the historical and contemporary role of peace movements and allied social-change movements such as feminism, civil rights and environmentalism.

SOCI.2160 Sociology of War and Peace (Formerly 48.216) - Credits: 3

The purpose of this course is to examine critically the social forces that contribute to war, war’s social consequences, and the possibilities for creating a more peaceful world.

SOCI.2170 Social Movements (Formerly 48.382/SOCI.3820) - Credits: 3

Considers organized action undertaken to alter the social position of a group. Organization, techniques of action, motivation of participants, and group ideologies are studied. Materials from historical, social, psychological, and sociological sources are used.

SOCI.2340 Race and Ethnicity (Formerly 48.234) -
Credits: 3

This course locates and studies the sociological dynamics of race and ethnic relations in the United States as it pertains to all groups. The course material presents theories and models that explain periods of conflict and cooperation between diverse sets of people. While providing some historical background, the course focuses primarily on recent and contemporary situations.

SOCI.2560 Political Sociology (Formerly 48.256) - Credits: 3

Focuses on the development and use of power in modern society. Emphasis is placed on the relationship of American political institutions to economic institutions, to social class, and to supporting ideologies.

SOCI.3170 Sociology of Genocide (Formerly 48.317) - Credits: 3

The deliberate destruction of an ethnic group is an historical event and a social process. This course addresses such questions as: Why do genocides occur? Why do people become genocide perpetrators? How do genocides affect survivors and
their offspring? How can genocide be prevented? Focus is on Native American, Armenian and Jewish experiences and recent cases of ethnic cleansing.

SOCl.3410 Wealth, Status and Power (Formerly 48.341) - Credits: 3
Focuses on the phenomenon of social class distinctions with particular emphasis on social class in America. The approach is both historical and sociological.

SOCl.3600 Sociology of Non-Violence (Formerly 48.360) - Credits: 3
An analysis of non-violent efforts to achieve social change through demonstrations, civil disobedience, etc. Movements led by Mahatma Gandhi, Martin Luther King, Jr., and others are examined.

SOCl.4690 Seminar on Global Society (Formerly 48.469) - Credits: 3
Considers the spread of industrial society globally. Emphasizes economic, political and cultural changes in various parts of the world and in the USA.

WLFR.3760 French Cinema & Society (Formerly 50.376) - Credits: 3
Covers the dramatic presentation French society gives of itself during the period of profound social and economic change, from the New Wave and the May 68 events to today’s younger generation facing an uncertain tomorrow. Each screening (in French with subtitles) is preceded by an introduction placing the film in its historical context. In English.

WLIT.3780 Italian Cinema and Culture (Formerly 52.378) - Credits: 3
A guide to contemporary Italian studies through literary and cultural approaches. The works of central figures in contemporary Italian letters are examined in view of their impact on Italian life. Emphasis is given to poets, novelists, the new cinema, the influences of existentialism, and the impact of America on Italian literature. Conducted in Italian/English.

WLSP.3020 Survey of Latin American Literature (Formerly 54.302) - Credits: 3
A study of the major writers of Latin America from Native American literature to the modernist period. The authors and their works are placed in their historical, sociological, and literary perspective, thus introducing students to the Latin American World. Conducted in Spanish.
HIST.3901 Topics in History of the Portuguese World - Credits: 3
An advanced course that will cover various topics in the history of the Portuguese-speaking world, including medieval, early modern, and contemporary history in Portugal, Brazil, and other areas of the Lusophone world. The specific focus of each iteration will be announced in advance. Offered irregularly.

PHIL.3880 Latin American Philosophy - Credits: 3
Students in this course will be introduced to current and longstanding debates within Latin American Philosophy. They will also be exposed to many of the principle texts and thinkers within this burgeoning tradition. The class includes a survey of Latin American philosophy ranging from pre-colonial Aztec thought to the debates over the struggle for Latin American independence, and also the question of identity: what constitutes Latin American philosophy.

WLPO.1130 Portuguese 1 and Culture (Formerly 53.113) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 113, 114 and 213, 214 levels must be elected in the prescribed sequence.

WLPO.1140 Portuguese 2 and Culture (Formerly 53.114) - Credits: 3
A continuation of 53.113 Portuguese 1 and Culture, which is a pre-requisite. Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 113, 114 and 213, 214 levels must be elected in the prescribed sequence.

WLPO.2130 Portuguese 3 and Culture (Formerly 53.213) - Credits: 3
Development of fundamental skills in oral expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 113, 114 and 213, 214 levels must be elected in the prescribed sequence.

WLPO.2140 Portuguese 4 and Culture (Formerly 53.214) - Credits: 3
A continuation of 53.213 Portuguese 3 and Culture, which is a pre-requisite. Development of fundamental skills in oral

expression, aural comprehension, reading and writing is required in language courses. Beginning and intermediate language courses at the 113, 114 and 213, 214 levels must be elected in the prescribed sequence.

WLPO.3011 Special Topics: in Lusophone Studies (Formerly 53.301) - Credits: 3
An in-depth study of a specific topic in literature, culture, civilization from the Lusophone world. Class discussions, readings, oral and written work all in Portuguese or in English. May be repeated once for credit, if content changes, and with written consent of the Instructor.

WLPO.3020 Special Topics: in Portuguese Studies (Formerly 53.302) - Credits: 3
An in-depth study of a specific topic in literature, culture, civilization or cinema from Portugal. Class discussions, readings, oral and written work all in Portuguese or in English. May be repeated once for credit, if content changes, and with written consent of the Instructor.

WLPO.3030 Survey of Brazilian Cinema - Credits: 3
An introduction to Brazilian cinema and society, focusing on the Cinema Novo (New Cinema) of the 1960s and 1970s as well as more contemporary films influenced by the ideals of this movement. Films will be analyzed via reference to historical and theoretical texts. Topics to be addressed include Brazilian history as reflected in film and the formation of a distinct Brazilian aesthetic sensibility. Taught in English.

WLPO.3040 Survey of Brazilian, Portuguese and Lusophone African Cinema (Formerly 53.304) - Credits: 3
This course is designed as an introduction to film studies and to Brazilian, Portuguese and Lusophone African cinema and cultures. Taught in English. College Writing 1 (421 01) and College Writing 2 (42102).

WLPO.3050 Culture and Civilization of Brazil - Credits: 3
This course is an introduction to Brazilian culture and society. Attention is given to history, geography, cinema, literature, art, and issues of race, gender, and social inequality as they lead toward a fuller understanding of Brazil. This course will cover major aspects of Brazilian society. The main texts review significant events and forces that have helped shape Brazil today. A variety of films and videos will be used. Course will be taught in English.
WLPO.3060 The Short Story in the Lusophone World - Credits: 3
This course will introduce students to the development of the short story in the Portuguese-speaking world from the 19th century to today. Through theoretical readings, discussion and writing activities, students will learn to analyze, ask critical questions of, and develop critical arguments about short fiction. Readings will be chosen from a variety of canonical authors from Brazil, Portugal, Cabo Verde, Mozambique, Angola, and Macau. Conducted in English.

WLPO.3070 The City in Contemporary Lusophone Literature and Film - Credits: 3
This course provides a comprehensive view of contemporary Lusophone urban space through literature and film. The course will explore the histories and cultures of the Portuguese-speaking countries by analyzing fictional texts and films related to their cities. Through readings and films, students will gain a critical understanding of many key events that have shaped Lusophone history, politics, and economy, and will be guided to discover, among others, themes related to national identity, language, ethnicity, migration, economic injustice, and unhealed wounds of war, dictatorship, and colonialism. Conducted in English (English reading material; film screenings will be in Portuguese with English subtitles).

WLPO.3080 Lusophone Music and Culture - Credits: 3
This course will study the role of music and song in Lusophone cultures, including Brazil, Portugal, and Lusophone Africa. We will examine the historical and cultural evolution of some iconic music genres, including fado, samba, bossa nova, morna, and kizomba. Students will examine the social and political importance of music, including the politically engaged song from the 1960s and 1970s to today. Conducted in English.

WLPO.3090 Luso-Brazilian Women Writers in Translation - Credits: 3
This course studies a diverse selection of texts by women writers from Brazil and Portugal. This course further examines the differing strategies deployed by female-authored fiction, poetry, autobiography and essay as these negotiate genre and gender, and issues affecting feminism, social relations and psychological discourses. Conducted in English.

WLPO.3370 Portuguese Literature in Translation (Formerly 53.237) - Credits: 3
This course offers a broad overview of Portuguese literature, in English translation, from the Middle Ages to the contemporary period, placing literary movements and major authors in their historical and aesthetic context. It focuses on promoting a basic level of cultural literacy about Portugal based on representative reading drawn from the last seven centuries of the country’s history situated in their social, cultural and historic contexts. Course assignments lead students to develop skills in textual interpretation, critical thinking, and academic writing.

WLPO.3440 Advanced Portuguese Grammar - Credits: 3
A systematic review of Portuguese grammar and syntax, and the study and practice of the basic principles of writing in Portuguese. Taught in Portuguese.

WLPO.3450 Advanced Portuguese Conversation and Composition - Credits: 3
The course aims at developing advanced written and oral proficiency in Portuguese. Topics of contemporary significance are selected for discussions. Taught in Portuguese.

WLPO.3810 Directed Studies in Portuguese Composition (Formerly 53.481) - Credits: 3
Students, through regular and frequent consultation with their instructor, pursue a special program of composition or creative expression in Portuguese.

WLPO.4830 Independent Studies in Portuguese (Formerly 53.483) - Credits: 3
This course allows students to undertake research on non-literature related topic on the Portuguese speaking world that is not made available through normal course offerings. The syllabus for the independent study will specify the topic and readings for the course, as well as dates by which readings and written work must be completed, the frequency of required meetings, and how the grade for the course will be determined. As an independent study is an upper level course, there is substantial writing component.

WLPO.4850 Advanced Portuguese Tutorial (Formerly 53.485) - Credits: 3
A program of directed study affords advanced student to provide an additional opportunity to pursue a previously explored problem in greater depth or to initiate and additional problem. The purpose is to sharpen and refine techniques for scholarly research and presentation and for creative expression.
AMST.2480 Perspectives American Culture  
(Formerly 40/42.248) - Credits: 3

The goal of this class is to enhance students’ ability to read and interpret American texts by learning how to see them in context, to understand the way readers approach texts from interpretative lenses, and to express their insights about American culture in a variety of forms and genres. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ASAM.2120 Introduction to Asian American Studies - Credits: 3

This course provides students with an overview of the multidisciplinary field of Asian American Studies from two distinct disciplines. The course begins with the history of Asian American Studies and the methods used to advance the field. Next, various aspects of the Asian American experience, such as gender and sexuality, are examined. Students also participate in service learning in partnership with Asian-serving community organizations in and around Lowell, MA. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

CRIM.3260 Hate Crime  
(Formerly 44.326) - Credits: 3

This course examines prejudice as a motivation for criminal behavior. The criminological theory for hate crime is reviewed, as well as historical perspectives of this crime category. This is a rich and comprehensive exploration that begins with understanding the psychology of prejudice and ends with reviewing genocide as a mass hate crime.

DGMD.2310 Media, Law and Ethics  
(Formerly 41.237/DGMD 231) - Credits: 3

This course explores key legal issues likely to confront journalists, mass media professionals or students interested in learning more about the relationships between law, media and ethics in this global community. Nonetheless, students are challenged to think critically about the applicability of those issues to individuals and to media institutions that transmit information via spoken communications, writing, traditional media, mobile messages, social network sites, or e-mail messages.

EDUC.3000 Understanding Family and Community Engagement - Credits: 3

This course is designed to introduce undergraduate students to key concepts of family and community engagement. Students will utilize readings, discussions, and hands-on activities to examine their understanding of the role that families and communities play in the educational lives of students. They will learn community-based relational approaches and design on family or community engagement strategy to utilize in their classrooms. The course will also explore how social networks and school structures impact the development of meaningful relationship between teachers, families, and community members.

ENGL.2770 American Ethnic Literature  
(Formerly 42.277) - Credits: 3

The course addresses the literature of America’s immigrant and cultural groups and how it contributes to defining our national character. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

ENGL.2772 Introduction to Latinx Literature - Credits: 3

Describing a wide range of racial and ethnic denominations, Latinx is a complicated term which this course will examine the trouble. This course emphasizes the historical and aesthetic networks established in the Latinx literary canon that continue into the present, while also exploring the relationship between genre and socio-historical issues. Reading from a diverse tradition that reflects the contested definition of “Latinx” and its shifting demographics in the U.S., this course investigates
how U.S. Latinx literature speaks to and expands "American" literary traditions, and how unique ethnic identities such as the Mexican American, Dominican American, Cuban American, or mainland Puerto Rican offer different yet interconnecting representations of what it means to be Latinx in the U.S.

ENGL.3640 African American Drama (Formerly 42.364) - Credits: 3

A study of the history and development of African American drama, with emphasis on major aesthetic, political, and social movements in African American culture. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility &Ethics (SRE).

ENGL.3760 African-American Literature (Formerly 42.376) - Credits: 3

A study of selected works by black American writers, such as Toomer, Wright, Ellison, Walker, and Morrison. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility &Ethics (SRE).

ENGL.3765 Native American Renaissance - Credits: 3

Students in this course will examine and discuss fiction, poetry and autobiographical writings by four of the seminal figures of the Native American Renaissance: N.Scott Momaday, Leslie Marmon Silko, Joy Harjo and James Welch. Collectively, these writers helped restore modes of traditional cultural expression and historical perspective long imperiled by the histories of European and U.S. Colonialism in the Americas. Their work is also deeply imbued with concerns for the landscape and ecology, including in regards to conditions within the reservation system. Additionally, we'll pay sizeable attention to critical assessments of the Native American Renaissance as offered in the work of figures such as Paula Gunn Allen, Louis Owens, Gerald Vizenor and others.

ENGL.3780 Asian American Literature (Formerly 42.378) - Credits: 3

Asian Americans hold an intriguing place in the cultural imagination: as perpetual foreigners, as so-called 'model minorities' that serve to maintain hegemonic power relations, and as living embodiments of America’s memory of its involvement in recent wars. As artists, however, Asian Americans have contributed and impressive body of literary work, and we'll examine some of the most enduring and provocative of these texts. We'll explore themes such as trauma and the immigrant experience, issues of exile and dislocation, Asian Americans' embattled place in our country’s history, and the intersections of race and ethnicity with gender and sexuality. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility &Ethics (SRE).

ENGL.3790 Postcolonial Literature (Formerly 42.379) - Credits: 3

When the peoples of Africa, India, the Caribbean, Ireland, and Canada finally gained, to a greater and lesser extent, independence from the British during the 20th century, they found that their national, cultural, and individual identities had been radically altered by the experience of colonization. In this course, we will examine how authors have related this postcolonial condition. We will examine a diverse body of texts--poetry which eloquently describe the hero's journey out of colonialism, drama which lays bare the conflicts of assimilation, and novels which fantastically present political struggle--as we determine how postcolonial theory and literature affects and possibly redefines all literature.

ENGL.3952 Topics in Latinx Literature and Culture - Credits: 3

This course focuses on thematic or issue-oriented topics in Latinx literature and culture. Topics and methods will vary each section, but topics might include: "Monsters, Hauntings, and the Nation," which examines Latinx horror to understand how the genre addresses the unique experience of Latinx people in the Americas. Reading from a wide variety of Latinx texts, students will gain a deeper understanding of the capacities of horror to depict the foundational yet spectral presence of Latinx people in the "American" imaginary.

HIST.2070 Women in China (Formerly 43.207) - Credits: 3

From Confucian texts to current conditions, the course examines the evolution of Chinese women’s status throughout the centuries. The course will ask questions such as whether Confucianism dictated oppression against women, what factors influenced the changes of status for women, how Western feminism is connected with Chinese women, what roles women played in transforming China, and how ordinary women lived and are still living in China.

HIST.2390 The Nonwestern World Since 1945 (Formerly 43.239) - Credits: 3

The recent history of Africa, the Middle East, Asia and Latin America and the comparative global processes and trends that have influenced the world since 1945.

HIST.2740 Native American History (Formerly 43.274) - Credits: 3
A comprehensive study of the Native Americans through historical and first-hand accounts of their lives. Designed to enlighten students and to represent fairly the Native Americans, dispelling some of the existing myths about them.

**HIST.2745 History of the U.S. South - Credits: 3**

The history of the southern United States from the colonial period to the present. Topics include the development of plantation slavery, the Civil War and Reconstruction, industrialization and the "New South," segregation and disenfranchisement, the Civil Rights Movement, and conservatism.

**HIST.2750 African-American History (Formerly 43.275) - Credits: 3**

This course surveys African American history in the United States from colonization to the present. It begins with a study of life in West Africa and traces the forced migration of Africans to the Americas. It explores West African transmissions, the freedom struggle, the great migrations from the South, the Harlem Renaissance, the modern Civil Rights movement, and the continuing impact of African Americans on life in the 21st century.

**HIST.2810 Sub-Saharan Africa (Formerly 43.281) - Credits: 3**

This course provides a basic introduction to the history of the African continent. It will expose students to the processes and patterns that have shaped modern African history. The course examines the historical roots of the many challenges that the continent faces today. But, at the same time, it will also provide students with the knowledge to shatter the myths and stereotypes about Africa.

**HIST.3230 World of the Atlantic (Formerly 43.323) - Credits: 3**

The concept of the Atlantic world arose to describe the interactions of the peoples of the Americas, Europe, and Africa through trade, conquest, colonialism, independence and beyond. In this class, we will consider the cultural, economic, and political relationships that are formed and change over time between these groups. We will pay special attention to historical approaches to studying and writing about the Atlantic World.

**HIST.3449 American Slavery: History, Fiction, and Film - Credits: 3**

This course examines the history of slavery in the United States. It explores topics such as the role of slavery in the economy, the culture of enslaved Americans, resistance to slavery, and the abolition of slavery, often making comparisons to slavery in other parts of the Western Hemisphere. The course also investigates how the institution of slavery has been represented by different generations of historians and in American popular culture from the 1850's through the present.

**HIST.3575 The Age of Jim Crow - Credits: 3**

This course examines U.S. History--particularly the history of the South--during the era of Jim Crow, the period between the Civil War and the Civil Rights Movement when African Americans were systematically denied political and social rights. This course examines the visions white southerners held for what their region should be in this period, as well as the responses of African Americans.

**HIST.3845 Malcolm X - Credits: 3**

This course investigates the personal transformation of Malcolm X during his lifetime as well as the impact he has had on both American and transnational culture and politics from the mid-twentieth century to the present.

**HIST.3880 Ancient Mediterranean: Cultures in Contact (Formerly 43.388) - Credits: 3**

The ancient Mediterranean was home to a diverse array of cultures in close contact with each other through trade, warfare, and colonization. This course will study a variety of Greco-Roman responses to other cultures through a series of case studies of contact between Greeks, Romans, and other cultures of the ancient world. In particular, we will examine questions of the applicability of modern concepts such as race and ethnicity, and explore the ways in which these shifting representations of other cultures are reflective of the ways in which Greeks and Romans perceived themselves. We will also reflect on the ways in which these ancient Greco-Roman conceptions of culture relate to our own modern understandings of cultural difference.

**HIST.3910 America and the World (Formerly 43.391) - Credits: 3**

In an age of increasing globalization, historians realize the need for putting the American national narrative in a wider historical context. This course will help students locate the study of the United States in a global, comparative and transnational perspective. This course will be used as one of the courses needed by History majors in the global, comparative and under-represented areas of the major.

**HIST.3920 United States Immigration History (Formerly 43.392) - Credits: 3**
The course focuses on the experiences of women, men, and children who came to the U.S. from the colonial era through the 21st century. Their emigrations will be examined in a global context. Irish migration, the mass European migrations during the mid and late 19th / early 20th centuries, and post-Second World War immigration particularly from Asian and African countries are discussed. The Lawrence, Lowell, and Boston immigration stories are extensively considered.

HIST.3930 History of the Middle East and Islamic World (Formerly 43.393) - Credits: 3

This course examines the history of the Middle East and the Islamic World from the time of Muhammad to the present. It provides an introduction to the history of this often turbulent region. It exposes students to the processes and patterns that have shaped the history of the Islamic World. The course examines the historical roots of the many challenges that the region faces today.

HIST.3940 Immigration and Assimilation in Contemporary Europe - Credits: 3

This course examines contemporary European dilemmas of immigration, assimilation and multiculturalism, within the context of the larger history of European imperial decline after 1945. It will aim at providing fuller historical understanding of Europe's ongoing crises of integration, while also exploring the textures of individual and community life among those of immigrant descent within contemporary Europe. For purposes of focus and continuity, greatest attention will be dedicated to South Asian, Turkish, and North African communities in Britain, Germany and France, respectively.

HIST.5350 Immigration History (Formerly 43.535) - Credits: 3

The course focuses on the experiences of women, men, and children who came to the U.S. from the colonial era through the 21st century. Their emigrations will be examined in a global context. Irish migration, the mass European migrations during the mid late 19th / early 20th centuries, and post-Second World War immigration particularly from Asian and African countries are discussed. The Lawrence, Lowell, and Boston immigration stories are extensively considered. Students will acquire an understanding of U.S. Immigration History - Both the experiences of immigrants and reactions to that immigration over time, including the frequent passage of federal legislation to block or impede immigration. Students will utilize area immigration archives to produce original research on the topic.

HIST.5460 Topics in African-American History (Formerly 43.546) - Credits: 3

This graduate-level course examines important ideas and events in African-American history as well as debates among historians about how to interpret these ideas and events. We will examine slavery and its demise, the labor system that emerged after slavery, violence against and intimidation of blacks, the relocation of millions of African Americans from the rural South to the urban North, and the struggle for civil rights, among other topics. A theme that runs through the course is how African Americans were able to build a rich and vibrant culture as well as strong networks of kinship even as masters, landlords, and others sought to control their labor and deny them political and other rights.

LGST.3600 Legal Issues in Racism (Formerly 41.360) - Credits: 3

This course presents a study of racial discrimination in the United States. Emphasis is placed on relevant constitutional provisions, statutory provisions, and on United States Supreme Court cases.

LGST.3660 International Law (Formerly 41.366) - Credits: 3

This course provides a broad introduction to international law with emphasis on current issues. Within public international law, topics covered will include the recognition of new states, organizations such as the United Nations and the European Union, the use of force, human rights, international crimes, the global environment, and international courts and tribunals. Within private international law, topics surveyed will include legal aspects of international trade and foreign investment, labor, intellectual property, cyber theft, and taxation. Current issues discussed will include global warming, recent corruption scandals, the Eurozone crisis, and legal issues facing global technology companies.

LGST.3850 Immigration Law (Formerly 41.385) - Credits: 3

Studies the immigration, nationality, and naturalization laws of the United States. The topics discussed are: the immigrant selection system, the issuance of immigrant and nonimmigrant visas; grounds of excludability of aliens and waiver of excludability; grounds for deportation of aliens and relief from deportation; and change of status within the United States including legalization, refugee, and asylum status.

PHIL.3080 Philosophy of Race and Gender (Formerly 45.308) - Credits: 3

This course will focus on issues of identity and difference. We will discuss the ways in which group identities are formed and break down. We will discuss how differences are constituted.
and reconstituted. These issues are central to theories of race and gender, racism and sexism. Some of the questions which we will raise are these: What motivates forming group identities? How are they formed? How is identity used within oppressive social structures? How can it be used to transform society? Why do some differences make a difference and others don’t? Can we choose our group identities? Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA).

PHIL.3880 Latin American Philosophy - Credits: 3
Students in this course will be introduced to current and longstanding debates within Latin American Philosophy. They will also be exposed to many of the principle texts and thinkers within this burgeoning tradition. The class includes a survey of Latin American philosophy ranging from pre-colonial Aztec thought to the debates over the struggle for Latin American independence, and also the question of identity: what constitutes Latin American philosophy.

PHIL.3890 Immigration and Global Justice - Credits: 3
This course addresses the question of justice in regards to immigration policy. We consider a variety of views including Communitarianism, Liberalism, Nationalism, Cosmopolitanism, and Democratic Theory. We will look at how these different positions have answered the following sorts of questions: Do we have duties to strangers of foreigners that are of equal weight to the duties we owe to members of our family, our circle of friends or our nation? Does part of the definition of "self-determined state" include the right to unilaterally reject petitions of inclusion from non-citizens? Does a commitment to equality demand that borders be open?

POLI.2150 African Politics (Formerly 46/57.225) - Credits: 3
The images of Africa most commonly seen in the US flood our minds with inconsistent messages. Africa is portrayed and discussed as a locus of ancient tribal conflicts, disease, famine, and suffering. While struggles do occur - just as they do in all places - understanding the diverse experiences of the peoples of Africa requires engagement with the cultures, politics, religions, and perspectives of people in more than fifty countries across a vast continent. While such engagement can hardly be accomplished in a semester, we will attempt to scratch at the surface in different ways that reveal ideas, experiences, and thoughts that reflect political life and culture in Africa south of the Sahara in a more reflective manner. Throughout this course, I challenge you to remember that politics as we usually conceive them - the policies, programs, and posturing of government and public organizations - are a backdrop to the way real people live their lives every day. Policies and political systems are less important for the fact that they exist than for the ways in which they affect the lives of those they govern.

With this approach, I hope we will be able to pick apart government structures, political organizations, and policy issues in ways that will shed light on the construction and culture of African politics. This requires a focus on power - who has it, how they use it, and to what ends.

POLI.2510 Politics of Identity (Formerly 46.251) - Credits: 3
This interdisciplinary course considers the way we construct self-identity through our affiliation with various cultural and political groups- from the “Red Sox nation” to linguistic, economic, nationalistic and ethnic groups. It examines the central role of nationalism; its symbols, traditions and expectations; the role of the media; and the benefits and risks of our allegiance to these groups.

POLI.3490 Politics of Race and Ethnicity (Formerly 46.349) - Credits: 3
A study of the politics of race and ethnicity, focusing primarily on American society, and the racial and ethnic groups of the region.

POLI.3680 Middle East Politics (Formerly 46.368) - Credits: 3
The region will be analyzed using a comparativist lens, whereby the historical context of creating nation states in the region and the effect of colonialism will be applied to contemporary politics. Women, religious/ethnic minorities and the dynamics of the Arab Spring will also be addressed comparatively.

POLI.4020 Women in Islam (Formerly 46.402) - Credits: 3
Focusing upon one of the most important topics in Islam, this course will go beyond conventional stereotypes and explore woman’s many and varied roles within Islamic cultures and societies.

POLI.4450 Politics of Repression and Dissent (Formerly 46.445) - Credits: 3
A focus on the dark side of politics - political repression, including politically motivated imprisonment, torture, murder, and disappearance- and the struggle of critics to bring about change through non-violent and violent demonstrations, general strikes and armed resistance.

PSYC.2550 Community Psychology (Formerly 47.255) - Credits: 3
PSYC.4713 Seminar in Community Psychology:

Immigrant status, deportations, policy and more will be the point of view. Motivations, expectations, acculturation, the process of migration from a community social psychological perspective around the world. In this seminar we will study the complex immigration, a very important issue in the United States and other countries. The topic of this seminar is immigration, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is immigration, which continues to be a major public health concern in the United States. Preventing youth violence is an important component of creating peaceful and safe neighborhoods and communities. In this course, we will use ecological and multicultural perspectives to understand different types of youth violence, the contexts in which they occur, and intervention strategies to address the violence. This is a writing-intensive course.

Prevent Youth Violence - Credits: 3

An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is youth violence, which continues to be a major public health concern in the United States. Preventing youth violence is an important component of creating peaceful and safe neighborhoods and just communities. In this course, we will use ecological and multicultural perspectives to understand different types of youth violence, the contexts in which they occur, and intervention strategies to address the violence. This is a writing-intensive course.

PSYC.4714 Seminar in Community Psychology:

Bridging Differences - Credits: 3

An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is racism. In this course we will investigate roots of racism, kinds of racism, reasons for perpetuation of racism, possible solutions to ending racism. Many believe that racism is a thing of the past. Yet, research shows that many of us are unconsciously racist and hurt communities of color without any malicious intent. We will explore our own posting in terms of racism. This is a writing-intensive course.

PSYC.4712 Seminar in Community Psychology:

Immigration - Credits: 3

An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is immigration, a very important issue in the United States and around the world. In this seminar we will study the complex process of migration from a community social psychological point of view. Motivations, expectations, acculturation, immigrant status, deportations, policy and more will be covered. This is a writing-intensive course.

PSYC.4711 Seminar in Community Psychology:

Racism - Credits: 3

An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is racism. In this course we will investigate roots of racism, kinds of racism, reasons for perpetuation of racism, possible solutions to ending racism. Many believe that racism is a thing of the past. Yet, research shows that many of us are unconsciously racist and hurt communities of color without any malicious intent. We will explore our own posting in terms of racism. This is a writing-intensive course.

PSYC.4710 Seminar in Community Psychology:

(Dis)justice - Credits: 3

An advanced seminar to consider special topics in community psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. The topic of this seminar is social injustice, its causes, manifestations, explanations, and social psychological theories that help us understand them. We will explore how and why social injustice prevails in today’s world full of resources; why small number of people own majority of world’s wealth; why some countries are poorer than others. We will study our own standpoints and where they come from and we will work on possible remedies that could lead to a more peaceful world.

PSYC.4710 Seminar in Community Psychology:

Outcome for Diversity and Cultural Awareness (DCA).

Provides an analysis to the impact of culture, socio-historical, and social influences on psychological processes and outcomes. Students will also learn about techniques for studying the influence of culture including cross-cultural methods and population-specific methods. Through careful analysis of research literature, this class will examine a variety of contexts within the U.S. and internationally. Topics will include identity development, immigration, acculturation, socialization, and social interactions among groups.

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just world.

PSYC.4735 Seminar in Social Psychology: Workplace Diversity - Credits: 3

An advanced seminar to consider special topics in social psychology with focus on critique of the theoretical and empirical literature, identification of future research pathways, and the potential for application with consideration of ethics and social responsibility. Over the course of our lives, many of us will be working in organizations that include diverse workers, and thus it is important to understand the issues that shape interpersonal and system dynamics within such settings. In this seminar, we review theories and research relevant to how race, ethnicity, class, gender, sexual orientation, and disability dynamics affect workplace systems. Classes will be highly interactive and discussion-oriented as students learn about the challenges diverse organizations face in fostering positive working relationships and about strategies adopted to enhance the effectiveness of the diverse workplace. This is a writing-intensive course.

PSYC.5270 Immigrant Psychology and Communities (Formerly 47.527) - Credits: 3

This course will focus on the immigrant experience and the various immigrant groups in the United States with emphasis on recent immigrants in Lowell and Massachusetts. Theories of acculturation and adaptation to a new cultural environment will be extensively examined in the course. An experiential approach will be integrated throughout the course via the incorporation of guest speakers, films, autobiographies/novels, and food. Students will have ample opportunities to read, reflect, discuss and write about the immigrant experience. As our country is a country of immigrants, this course should have relevance to anyone working in the community.

SOCI.2130 Sociology of Immigration (Formerly 48.307/SOCI.3070) - Credits: 3

The United States is frequently described as a country with a proud history of immigration. As a result, citizens and residents of the U.S. often identify their home as a nation of people who make up a melting pot country. While useful and insightful, the melting pot metaphor requires comparison with additional explanations of immigration and immigrant experiences. In order to provide deeper comprehension of the topic matter, this course offers sociological examination of immigration processes, laws, and debates. Three areas compose the main portion of class content: historical accounts and theories, legislation, and the social, economical, and political experiences of immigrants.

SOCI.2340 Race and Ethnicity (Formerly 48.234) - Credits: 3

This course locates and studies the sociological dynamics of race and ethnic relations in the United States as it pertains to all groups. The course material presents theories and models that explain periods of conflict and cooperation between diverse sets of people. While providing some historical background, the course focuses primarily on recent and contemporary situations.

SOCI.3450 Urban Sociology (Formerly 48.345) - Credits: 3

Deals with issues related to the quality of life in American cities. Students taking this course may engage in research projects on the city of Lowell and the role of the University of Massachusetts Lowell within that city.

SOCI.3520 Latinos/as in the United States - Credits: 3

By 2060, Latinos are forecast to comprise over 28 percent of the US population. While the presentation of Latinos/as in public discourse often frames them a recently arrived immigrants, Spanish-speaking peoples in the US have a long and rich history. This course focuses a sociological lens on the historical and contemporary experiences of a community whose emergence requires deep analysis. Emphasis is placed on immigration policy, demographic shifts, labor market discrimination and bilingual education.

SOCI.3550 Black Experience in American Life (Formerly 48.355) - Credits: 3

WLFR.3820 Francophone Literature and Visual Arts of Senegal - Credits: 3

Senegal has particular significance in Francophone studies for the highly visible contributions of its writers and artists from the colonial era through today, and its emblematic role in cultural production in West Africa. Through film, literature, visual arts and other cultural productions in the country from the French colonial period up through today, we examine how artists have responded to the history and present legacies of colonialism through their creative works. The course is conducted in French.
COMP.1010 Computing I (Formerly 91.101) - Credits: 3

Introduction to computing environments: introduction to an integrated development environment; C, C++, or a similar language. Linear data structures; arrays, records, and linked lists. Abstract data types, stacks, and queues. Simple sorting via exchange, selection, and insertion, basic file I/O. Programming style documentation and testing. Ethical and social issues. Effective Fall 2013, Co-req 91.103 Computing 1 Lab.

COMP.4200 Artificial Intelligence (Formerly 91.420) - Credits: 3

Topics include: search techniques and their properties, including A*; game-playing, including adversarial and stochastic search; probabilistic reasoning, including Markov Decision Processes and Hidden Markov Models; and reinforcement learning, including value iteration and q-learning. Topics are developed theoretically and with programming assignments. The course includes a student-directed final project and paper.

COMP.4500 Mobile Robotics I (Formerly 91.450) - Credits: 3

An introduction to robotics, including laboratory. In the lab, students build and program robots. Topics include sensors, locomotion, deliberative, reactive, and hybrid control architectures, computer vision, application domains, and current research.

COMP.4510 Mobile Robotics II (Formerly 91.451) - Credits: 3

Advanced topics in robotics, including laboratory. Topics to be covered include probabilistic methods, including sensor modeling, hidden Markov models, particle filters, localization, and map making. Research-level robots are used in the laboratories.

EECE.2650 Logic Design (Formerly 16.265) - Credits: 3


EECE.3170 Microprocessors Systems Design I (Formerly 16.317) - Credits: 3

Introduction to microprocessors, Uses assembly language to develop a foundation on the hardware which executes a program. Memory and I/O interface design and programming. Design and operation of computer systems. Study of microprocessor and its basic support components, including detailed schematics, timing and functional analysis of their interactions. Laboratories directly related to microprocessor functions and its interfaces (e.g. memory subsystem, I/O devices and coprocessors).

EECE.4520 Microprocessor Systems II & Embedded Systems (Formerly 16.480/EECE.4800) - Credits: 3

CPU architecture, memory interfaces and management, coprocessor interfaces, bus concepts, bus arbitration techniques, serial I/O devices, DMA, interrupt control devices. Including Design, construction, and testing of dedicated microprocessor systems (static and real-time). Hardware limitations of the single-chip system. Includes microcontrollers, programming for small systems, interfacing, communications, validating hardware and software, microprogramming of controller chips, design methods and testing of embedded systems.

ENGN.2050 Statics (Formerly 14.203/22.211/26.211/25.205) - Credits: 3

The application of Newton's Laws to engineering problems in statics. The free-body diagram method is emphasized. Topics include vector algebra, force, moment of force, couples, static equilibrium of rigid bodies, trusses, friction, properties of areas, shear and moment diagrams, flexible cables, screws, bearings, and belts.

ENGN.2070 Dynamics (Formerly 14.205/22.213/25.207) - Credits: 3
Calculus based vector development of the dynamics of points, particles, systems of particles, and rigid bodies in planar motion; kinematics of points in rotating and non-rotating frames of reference in one, two, and three dimensions; conservation of momentum, and angular momentum; principle of work and energy.

MECH.4530 Mechatronics (Formerly 22.453) - Credits: 3

Devices and methods to monitor and control mechanical systems, with particular emphasis on the use of embedded microprocessors.

MECH.5300 Autonomous Robotic Systems (Formerly 22.530) - Credits: 3

This course covers concepts related to autonomous robotic systems, emphasizing the synthesis and design of control algorithms for autonomous robotic vehicles. Topics that will be covered in the course include: Linear and nonlinear systems analysis, stability in the sense of Lyapunov, linearization of nonlinear dynamic equations, rigid body equations of motion in three dimensions, dynamic model derivation of aerial, space, marine and ground vehicles, fundamentals of flight dynamics, feedback control design for autonomous robotic vehicles, guidance and navigation, description of components typically encountered to autonomous robotic vehicles, guidance and navigation, description of components typically encountered to autonomous robotic vehicles, cooperative control of multi-robot teams and state estimation.

MECH.5790 Robotics (Formerly 22.579) - Credits: 3

Common robotics joints and robotics classification. Planes of motion and fold lines. Robotics capability. Forward and inverse kinematics and the RobSim software package. Trajectory planning and elementary obstacle avoidance. Robotics dynamics and feasible trajectory evaluation. Design of the control system for the non-linear robotics problem. Classroom studies are followed by hands-on applications in the Automated Manufacturing Assembly and Robotics Laboratory.
AMST.2480 Perspectives American Culture (Formerly 40/42.248) - Credits: 3
The goal of this class is to enhance students' ability to read and interpret American texts by learning how to see them in context, to understand the way readers approach texts from interpretative lenses, and to express their insights about American culture in a variety of forms and genres. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility & Ethics (SRE).

ARCH.2060 History of Architecture (Formerly 58.206) - Credits: 3
A survey of the major technical and stylistic developments in ecclesiastical and secular architecture from Prehistory to the present day studied with an emphasis on the major monuments (Parthenon, Pantheon, Gothic Cathedrals, St. Peter's, Versailles Palace, Eiffel Tower, Guggenheim Museum). Spring, alternate years.

ARHI.2030 History of Art I: Prehistoric to Medieval Art (Formerly 58.203) - Credits: 3
A survey of the origins of painting, sculpture, and architecture from the prehistoric period through approximately 1300 CE. Works of art are discussed in their historical, cultural, and artistic contexts.

ARHI.2040 History of Art II: Renaissance to Modern Art (Formerly 58.204) - Credits: 3
A survey of the origins and development of painting, sculpture, and architecture from Renaissance times to the Modern period. Emphasis is placed on representative works of art from the Renaissance, Baroque, Rococo, Nineteenth Century Movements-Neoclassicism, Romanticism, Impressionism, Cubism, Dadaism, Surrealism and Abstract Art. The aim of the course is to introduce the student to basic critical and art historical methods as well as the analysis of style and content within sequential cultural contexts.

ARHI.3151 Islamic Art and Contemporary Society (Formerly as 59.315) - Credits: 3
This course introduces students to Islamic art through a survey of works across the broad reach of the Islamic world including Saudi Arabia, Northern and Saharan Africa, Spain, the former Ottoman Empire surrounding Turkey and the Greater Middle East. The last unit of the course looks at Islamic art in the diaspora. The course highlights works form c. 500 CE to the present, ending with the ultra modern city of Dubai.

ARTS.1130 Digital Foundations (Formerly 70.113) - Credits: 3
This course explores the computer as a tool of the visual language. Topics included are raster and vector-based image making, art for the internet & mobile devices, and current image capture and output methods. This course will introduce Photoshop, Illustrator, Flash and a basic programming with the aim of expanding the artist's toolkit. Lectures, readings, and discussions will provide an overview of history and contemporary ideas on the use of computers in art. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL).

CRIM.2030 Technology and the Criminal Justice System (Formerly 44.203) - Credits: 3
This course is designed to introduce students to the latest innovations in the applications of new technological advances in the criminal justice system. Topic areas include an examination of the new technology of crime commission, and the corresponding new technology of crime control strategies. Our focus will be on the application of both "hard" technology (e.g. equipment, hardware, devices, etc.) and "soft" technology (e.g. computer software programs, information systems, classification devices, and other problem-solving applications) in each of the following areas: crime prevention, police, courts, institutional corrections, community corrections and the private sector.

EECE.2330 History of Radio (Formerly 16.233) - Credits: 3
Intended primarily for students majoring in the liberal arts. The course develops the theory of electricity from an historical perspective. Sufficient background in circuit theory, resonance, field theory and radio waves is given to provide an understanding of the principles of radio from its antecedents in the nineteenth century through the invention of the transistor in the mid twentieth century. The fundamental contributions of, for example Volta, Oersted, Morse, Maxwell, Faraday, Hertz, Lodge, and Marconi are considered. In the present century the technical advances of such figures as de Forest, Fleming, Fessenden, Armstrong and Shockley are studied. The growth, regulation and culture of American broadcasting are also central to the course. Laboratory work is required and students may use this course toward fulfilling the General Education (science/experimental component) requirement of the University. Not open to students in the College of Engineering.

ENGL.2160 Monsters, Apes & Nightmares (Formerly 42.216) - Credits: 3
This course examines literary responses to science in England and the United States from the early Nineteenth Century to the present. Readings include novels—Frankenstein, The Island of Doctor Moreau, Dr. Jekyll and Mr. Hyde, Jurassic Park—essays, and poems. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

ENGL.2330 Play Analysis (Formerly 42.233) - Credits: 3
An introduction to the principles of play construction and the vocabulary and methods of interpreting play texts for theatrical production. Required of all theatre arts concentrators.

ENGL.2360 Science Fiction and Fantasy (Formerly 42.236) - Credits: 3
Designed to introduce students to understand science fiction and fantasy within the broader context of literature and literary theory. It attempts to develop and hone student's skills of critical analysis as it supplies them with the tools to contextualize their reading experience - i.e., to understand the origins and politics of the books that they read.

ENGL.2490 Literature on Technology and Human Values (Formerly 42.249) - Credits: 3
A study of the relationship between works of fiction, cultural attitudes toward technology, and social values. Meets Core Curriculum Essential Learning Outcome for Social Responsibility & Ethics (SRE).

FAHS.1010 Values and Creative Thinking (formerly 59.101) - Credits: 3
Values and Creative Thinking is a course designed specifically for freshmen. Throughout the semester you will be asked to examine your personal value system and how it relates to your education. The purpose of this course is to help you identify those individual qualities that you can use to achieve your highest academic potential. Specifically, this course is intended to help you develop greater self-awareness and confidence; creative and critical thinking skills; career planning skills designed to help you understand the full spectrum of available careers; an understanding of different computer technologies and multimedia techniques; an awareness of the role of values in determining your experiences and perspectives; problem solving and group decision making skills relating to issues that affect the quality of your life.

HIST.3040 European Economic & Social History (Formerly 43.304) - Credits: 3
Europe has been transformed in the last 250 years from an agricultural society to a post-industrial one. We study the processes by which this happened, from the Industrial Revolution of the 18th and early 19th century to the wars and depressions of the early 20th century and the collapse of the communist system and European unification in the late 20th century. Students learn basic concepts and methods of history and economics.

HIST.3800 Work and Society (Formerly 43.380) - Credits: 3
Provides a survey of labor history from the colonial period to the present focusing on the interrelationship between culture and work in American society and on the dynamics of technical and economic changes on the organization of work processes.

LGST.4900 Legal Aspects of Cyberspace (Formerly 41.490) - Credits: 3
This course introduces students to the law of the Internet and regulation of lawful and unlawful computer activities. Traditional notions about privacy, defamation, contracts, freedom of expression, pornography, stalking, jurisdiction and intellectual property are challenged by the latest cyberspace technology. Much of the debate about control, which leads to questions about rights and responsibilities, centers around who, if anyone, should design the legal architecture of cyberspace. These and other topical subjects serve as the focus on the study of legal issues in cyberspace.

MUED.2120 Special Topics (Formerly 73.212) - Credits: 3
Special Topics: A variety of topical issues in music will be explored through an interdisciplinary lens, which will vary from semester to semester. This music elective may include analysis and discussions of musical structure and form, culture and its influence on musical genres, gender in music, as well as identity and inclusion, depending on faculty and student interest.

MUSR.3010 Music, Technology and Society (Formerly 78.301) - Credits: 3
Examines how recording technology has changed music and the relationships of music and society. The course studies and evaluates the application of technology to making music, to music listening, to styles of music, and to music's roles in society, other art forms, and media. The evolving importance of technology in music over the past century is charted through the study of musical examples and through viewing how human values are reflected in this century's timely music. Studies will be based on assigned readings, lectures and discussions, examination of current and historically significant
music recordings, motion pictures and media pieces for this artistry, their use of available technology, and their impact on human values and society.

PHIL.3660 Globalization and Its Critics (Formerly 45.366) - Credits: 3

The course explores globalization as the process of transformation of regional and national phenomena into global ones, analyzing its social, economic, political, and cultural aspects. Supporters view it as the progress of liberalization and democratization that develop peaceful international cooperation; critics see globalization as the expansion of the profit-seeking global corporations that abuse the less developed and vulnerable regions. The course readings include the works of Amartya Sen, Samuel Huntington, Joseph Stiglitz, and other leading economists, sociologists, and philosophers.

POLI.2220 Politics of the Internet (Formerly 46.222) - Credits: 3

This course will examine the influence social media and web connectivity have had on political campaigns, campaign fundraising, political mobilization, and the recent proliferation of democratic movements.

POLI.2510 Politics of Identity (Formerly 46.251) - Credits: 3

This interdisciplinary course considers the way we construct self-identity through our affiliation with various cultural and political groups- from the “Red Sox nation” to linguistic, economic, nationalistic and ethnic groups. It examines the central role of nationalism; its symbols, traditions and expectations; the role of the media; and the benefits and risks of our allegiance to these groups.

POLI.3160 Politics and Film (Formerly 46.316) - Credits: 3

Analysis of the role of film in creating, expressing, revealing, and responding to social and political ideas and values. Examines a variety of film and film styles and introduces students to elements of film theory, the theory of popular culture and the role of film in forming our ideas about the world.

PSYC.2730 Biological Psych (Formerly 47.273) - Credits: 3

Surveys issues and topics dealing with the physiological and evolutionary bases of behavior. Biological systems and processes that influence behavior are considered, with particular emphasis on brain mechanisms. Recent discoveries in the neurosciences will be presented. Methods of research are reviewed.

PUBH.2110 Sustainable Development (Formerly PUBH/57.211) - Credits: 3

This course examines workplace and regional factors that shape the prospects for sustainable prosperity and worker and community empowerment. The course begins by reviewing recent trends in the distribution of income and wealth and the industrial structure of the New England economy. The historical dynamics shaping work organization and regional development are examined. Several industry case studies are selected because of their importance to the regional and national economy. The case studies provide focus for studying the strategic choices made by firms in mature industries and newly emerging regions; the basis of competitive advantage for Japanese firms and the response of American rivals; and the influence of the product cycle and regional institutions on capture or retention of emerging and mature industries. The final section of the course focuses on the prospects for sustainability of the organization of production and its environmental impact, incentives for skill development and technological innovation, and shared prosperity. A central course objective is to foster an understanding of the links between the workplace and region in the pursuit of sustainable development and shared prosperity.

SOCI.2150 Peacemaking Alternatives (Formerly 48.215) - Credits: 3

Examines various positive alternatives to war and violence, including disarmament, nonviolence, conflict resolution, and the United Nations. Students do volunteer work with an activist agency or interview an activist. The course stresses the historical and contemporary role of peace movements and allied social-change movements such as feminism, civil rights and environmentalism.

SOCI.3110 Sociological Perspective on Communication & Social Change (Formerly 48.311) - Credits: 3

Most social interactions and interventions involve communication. Thus, communication patterns present critical issues for sociological inquiry. This course introduces communication as a central yet often ignored element of social life. It surveys existing communication theories, then focuses on models used by marginalized populations in efforts to democratize communication systems. Finally, it introduces tools for communication strategizing. As a final product students will conduct a frame analysis of a current social topic. From a general liberal arts perspective, the course will stress critical thinking and writing skills.
ENGL.2100 Drama (Formerly 42.210) - Credits: 3
Presents a study of plays from the classical period to the present.

ENGL.2180 Comedy (Formerly 42.218) - Credits: 3
Presents the theory and practice of comedy from the Greeks to the present.

ENGL.2330 Play Analysis (Formerly 42.233) - Credits: 3
An introduction to the principles of play construction and the vocabulary and methods of interpreting play texts for theatrical production. Required of all theatre arts concentrators.

ENGL.2670 Discovering Shakespeare (Formerly 42.267) - Credits: 3
This class introduces students to some of the Bard’s most popular and accessible plays. We will learn to understand Shakespeare’s language and see how the plays were produced in Renaissance England, as well as examine his living legacy, in theater, film, and popular culture, throughout the modern world today. No previous experience with Shakespeare needed. Old Title: Introduction to Shakespeare.

ENGL.3040 Creative Writing: Playwriting (Formerly 42.304) - Credits: 3
Studies the theory and practice of playwriting. Conducted as a workshop with close analysis of student work.

ENGL.3440 Women in Theatre (Formerly 42.344) - Credits: 3
A study of the significant contributions of women to the literature and art of the theatre in various periods and cultures. Topics may include: plays written by women, the progress of women in theater, the evolution of female roles, and the portrayal of feminism on the stage.

ENGL.3480 Modern American Drama (Formerly 42.348) - Credits: 3
A study of such playwrights as O’Neill, Odets, Wilder, Williams, and Miller.

ENGL.3600 Medieval & Renaissance Theater (Formerly 42.360) - Credits: 3
A study of Medieval mystery cycles, morality plays, interludes, and other forms of popular and court theater.

ENGL.3610 Restoration Comedy (Formerly 42.361) - Credits: 3
A study of comic plays from 1660 to the mid-eighteenth century. Focus on the works of Ethridge, Wycherley, Congreve, and Sheridan.

ENGL.3620 Modern Drama (Formerly 42.362) - Credits: 3
A study of selected Continental, British and American plays of the late nineteenth century to the present.

ENGL.3630 English Renaissance Drama (Formerly 42.363) - Credits: 3
A study of major dramatists of the Age of Shakespeare including Marlowe, Dekker, Webster, Jonson, Beaumont and Fletcher, Massinger, Ford and others.

ENGL.3635 Renaissance Comedy - Credits: 3
Renaissance culture loved clowning, fools, and folly - not just as entertainment, but as a powerful tool of social awareness and critique. This course explores the development of comedy in the Renaissance, particularly its explosion on the English stage during the reign of Elizabeth I. Taking account of the range and inventiveness of scripted comedy in England, as well as its often sharp social and political commentary and critique, we study how playwrights deployed their clowns, tricksters, fools, knaves, and especially their cross-dressed heroines to entertain their popular and courtly audiences, while negotiating a volatile and politically dangerous time.

ENGL.3640 African American Drama (Formerly 42.364) - Credits: 3
A study of the history and development of African American drama, with emphasis on major aesthetic, political, and social movements in African American culture. Meets Core Curriculum Essential Learning Outcome for Diversity and Cultural Awareness (DCA) and Social Responsibility &Ethics (SRE).

ENGL.3820 Theatre History I: Ancient Greece through the 18th Century (Formerly 42.382) - Credits: 3
A survey of ancient to early modern theatre in its historical and social contexts, tracing changes and developments in acting styles, theatre architecture, scenic practices, dramatic literature, and the audience. The course examines how theatre both
reflects and shapes the changing beliefs and priorities of a culture.

ENGL.3830 Theatre History II: Nineteenth Century to the Present (Formerly 42.383) - Credits: 3
A survey of theatre in its historical and social contexts from the 19th century to the present, focusing on innovations in design and technology, the advent of the director, the emergence of modern schools of acting, and the creation of new forms of theatre to suit the changing needs of a modern world.

ENGL.4230 Shakespeare I (Formerly 42.423) - Credits: 3
A study of selected histories, comedies, and tragedies. Meets Core Curriculum Essential Learning Outcome for Information Literacy (IL) and Written & Oral Communication (WOC).

ENGL.4240 Shakespeare II (Formerly 42.424) - Credits: 3
A study of selected histories, comedies, and tragedies not covered in 42.243. Shakespeare I is not a prerequisite.

THEA.2010 Introduction to Theatre (Formerly THEA 201) - Credits: 3
This course explores the arts and practices of theatre from classical to contemporary times. Students are introduced to the basic concepts and forms of theatre as well as to theories of its origins and purposes. Replaces 42.219 and 59.219; credit may not be earned for both 42/59.219 and THEA 201.

THEA.3110 Play Production (Formerly THEA 311) - Credits: 3
Introduction to the design and technical aspects of theatre through hands-on experience working on campus productions. Focus on basic principles of set, lighting, props, costume, makeup, and sound production. May be repeated for credit.

THEA.3400 Directing Workshop (Formerly THEA 340) - Credits: 3
Study of the process of directing plays of different styles. Students will direct scenes with other members of the workshop and their work will be analyzed by the instructor and fellow students. Replaces 42.343 and 59/343; credits may not be earned for both 42/59.343 and THEA 340.

THEA.3620 Acting 2 (Formerly THEA 262) - Credits: 3
A continuation of THEA 261 emphasizing techniques of scene study and characterization. Pre-requisite THEA 261 or the equivalent. Replaces 42/59.262; credits may not be earned for both 42/59.262 and THEA 262.

THEA.3640 Performing Shakespeare - Credits: 3
An introductory workshop exploring Shakespeare's plays from the standpoint of the actor. We will study techniques for understanding and activating Shakespeare's words through our bodies, voices, and imaginations. Students will gain a basic, hands-on knowledge of Elizabethan theatre practices, as well as skills in analyzing and performing Shakespeare's language, characters, and genres through action exercises, text analysis, monologues, and scene study.
THEA.3650 Voice and Movement (Formerly THEA 265) - Credits: 3

To discover the possibilities of your unique voice and physicality, to gain techniques to free up tension, release habitual blocks and inhibitions, and to explore creative expression through the voice and body, ultimately applying all of these elements to performance. This course uses techniques designed for voice, movement, and physical acting including Linklater, Alexander, Viewpoints, Grotowski, Yakim and others.

THEA.4010 Topics in Theatre (Formerly THEA 401) - Credits: 3

Advanced study of a selected area of theatrical production, history, texts, or theory. Repeatable for credit when topics differ. Replaces 42.414 and 59.414; repeated credit may only be earned when topics differ.

THEA.4900 Performance Practicum (Formerly THEA 490) - Credits: 1-3
THEA.4920 Technical Theatre Practicum (Formerly THEA 492) - Credits: 1

One-credit practicum in technical theatre (scenic construction, lighting, sound, costuming), consisting of work on a campus production under the supervision of Theatre Arts faculty.

THEA.4930 Practicum in Theatre (Formerly THEA 493) - Credits: 1-3

Part-time, full-semester internship at a professional theatre. Program director’s permission required. Replaces 42.495 and 59.495; may be repeated for credit with permission.

THEA.4940 Directed Study in Theatre (Formerly THEA 494) - Credits: 3

Supervised independent project in theatre. Instructor’s permission required. Replaces 42.494 and 59.494; may be repeated for credit with permission.

THEA.4950 Senior Seminar in Theatre (Formerly THEA 495) - Credits: 1

Capstone-experience seminar focusing on advanced projects (in performance, dramaturgy, or design/tech) in the service of portfolio building and preparation for graduate study and/or work in the professional world of theatre. To be taken during the student’s final year in the program. Instructors Consent required.
UNCR.3990 UC - Junior level (Formerly UC 399) -
Credits: 3
University Credit granted for a course that does not have an equivalent within the UML Academic Departments.

UNCR.4990 UC - Senior level (Formerly UC 499) -
Credits: 3
University Credit granted for a course that does not have an equivalent within the UML Academic Departments.