Graduate Program Curriculum Outline  
Cooperative Education Option in Plastics Engineering  
Master of Science in Plastics Engineering

**Major Required (Core) Courses (Total # of courses required = 8)**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Credit Hours</th>
<th>Semesters Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLAS.5030</td>
<td>Mechanical Behavior of Polymers</td>
<td>18</td>
<td>F,S,CE</td>
</tr>
<tr>
<td>PLAS.5440</td>
<td>Advanced Plastics Materials</td>
<td>F,S,CE</td>
<td></td>
</tr>
<tr>
<td>PLAS.5780</td>
<td>Advanced Plastics Processing</td>
<td>F,CE</td>
<td></td>
</tr>
<tr>
<td>PLAS.5060</td>
<td>Polymer Structure Properties and Applications</td>
<td>F,S,CE</td>
<td></td>
</tr>
<tr>
<td>PLAS.5180</td>
<td>Plastics Product Design</td>
<td>F,S,CE</td>
<td></td>
</tr>
<tr>
<td>PLAS.xxxx</td>
<td>Current Topics Plastics Seminars (Materials, Design, etc.) (1 credit)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLAS.5740</td>
<td>Physical Properties Laboratory (1 credit)</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>PLAS.5720</td>
<td>Plastics Processing Laboratory (1 credit)</td>
<td>S</td>
<td></td>
</tr>
</tbody>
</table>

SubTotal # Core Credits Required 18

**Certificate Specialization Courses (Total # of courses required = 4)**

Plus four courses from one area of certificate specialization  
See attached list for summary of required and elective courses associated with each area of specialization.  
12

SubTotal # Certificate Specialization Credits Required 12

**Elective Course Choices (Total # of courses required = 1)**

Plus one course elective See Attached List  
3

SubTotal # Elective Credits Required 3

**Professional Co-op Option Courses (Total # of courses required = 2)**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Credit Hours</th>
<th>Semesters Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGN.6020</td>
<td>Graduate Professional Development for Engineers</td>
<td>1</td>
<td>F,S</td>
</tr>
<tr>
<td>ENGN.6030</td>
<td>Graduate Cooperative Experience</td>
<td>1</td>
<td>F,S</td>
</tr>
<tr>
<td>ENGN.6040</td>
<td>Workforce Development</td>
<td>1 (optional)</td>
<td></td>
</tr>
</tbody>
</table>

SubTotal # Co-op Credits Required 2

**Curriculum Summary**

Total number of courses required for the degree 15

Total credit hours required for degree 35

**Prerequisite, Concentration or Other Requirements:**

Complete the course requirements for one or more of the department's graduate "Certificates" as an "area of specialization." Some of the certificate course requirements may also be core requirements. The course requirements are also outlined below. All courses are 3 credits unless otherwise indicated. Course availability is subject to change.
## Certificate (Choose One)

### Plastics Design Graduate Certificate

**Required Courses:**
- PLAS.5030 Mechanical Behavior of Polymers
- PLAS.5180 Plastics Product Design

**Elective Courses (any two of the following):**
- PLAS.5060 Polymer Structure, Properties, and Applications
- 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 and Design I
- PLAS.6020 Medical Device Development Regulation
- PLAS.6180 Structural Product Design

### Plastics Materials Graduate Certificate

**Required Courses:**
- PLAS.5440 Advanced Plastics Materials
- PLAS.5060 Polymer Structure, Properties, and Applications

**Elective Courses (any two of the following):**
- PLAS.5110 Polymer Blends and Multiphase Systems
- PLAS.5130 New Plastics Materials
- PLAS.5320 Adhesives and Adhesion
- PLAS.5330 Coatings Science and Technology I
- PLAS.5350 Rubber Technology
- PLAS.5400 Commercial Development of Plastics
- PLAS.5420 Colloidal Nanoscience & Nanoscale Engineering
- PLAS.5470 Materials for Renewable Energy & Sustainability
- PLAS.5650 Engineering Thermosetting Resins
- PLAS.5660 Polymeric Material Systems Solution
- PLAS.5890 Polymer Nanocomposites
- PLAS.5900 Survey of Intellectual Property
- PLAS.5950 Thermoplastic Elastomers
- PLAS.5960 Plastics, Elastomers and Additives from Renewable Resources
- PLAS.6100 Plastics Industry Development
- PLAS.6110 Coloration of Engineering Thermoplastics
- PLAS.6420 Characterization of Polymers and Plastics
- PLAS.6820 Physical Polymer Science

### Plastics Processing Graduate Certificate

**Required Courses:**
- PLAS.5180 Plastics Product Design
- PLAS.5780 Advanced Plastics Process Engineering

**Elective Courses (any two of the following):**
- PLAS.5060 Polymer Structure, Properties, and Applications
- PLAS.5090 Plastics Processing Theory I
- PLAS.5150 Lean Plastics Manufacturing
- PLAS.5230 Screw Design Principles
- PLAS.5240 Process Analysis, Instrumentation, and Control
- PLAS.5360 Rheology of Polymers
- PLAS.5480 Analytical and Numerical Methods in Plastics Processing
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLAS.5500</td>
<td>Processing with Elastomers</td>
<td>I</td>
</tr>
<tr>
<td>PLAS.5510</td>
<td>Extrusion Die Design</td>
<td>F</td>
</tr>
<tr>
<td>PLAS.5520</td>
<td>Machine Design</td>
<td>I</td>
</tr>
<tr>
<td>PLAS.5670</td>
<td>Dynamic Mechanical Properties I</td>
<td>F</td>
</tr>
<tr>
<td>PLAS.5680</td>
<td>Dynamic Mechanical Properties II</td>
<td>S</td>
</tr>
<tr>
<td>PLAS.5850</td>
<td>Computer Aided Engineering I</td>
<td>S</td>
</tr>
<tr>
<td>PLAS.6780</td>
<td>New Developments in Polymer Manufacturing</td>
<td>S</td>
</tr>
</tbody>
</table>

**Medical Plastics Design and Manufacturing Graduate Certificate**

**Required Courses:**
- PLAS.5530 Medical Device Design I
- PLAS.5750 Biomaterials

**Elective Courses (any two of the following):**
- PLAS.5030 Mechanical Behavior of Polymers
- PLAS.5180 Plastics Product Design
- PLAS.5540 Medical Device Design II
- PLAS.5790 Problems in Biomaterials - Directed Study
- PLAS.6020 Medical Device Development Regulation
- PLAS.6750 Biomaterials II
- CHEN.5550 Biopharmaceutical GMP and Licensing * - Offered by the Chemical Eng. Department
- BMBT.5000 Introduction to Biomedical Eng. & Biotechnology **Offered by the Biomed Eng Dept.

**Course Elective (Choose One)**

- BMBT.5000 Introduction to Biomedical Engineering & Biotechnology
- CHEN.5550 Biopharmaceutical GMP and Licensing
- PLAS.5030 Mechanical Behavior of Polymers
- PLAS.5060 Polymer Structure, Properties, and Applications
- PLAS.5100 Plastics Processing Theory I
- PLAS.5110 Polymer Blends and Multiphase Systems
- PLAS.5130 New Plastics Materials
- PLAS.5180 Plastics Product Design
- PLAS.5210 Lean Plastics Manufacturing
- PLAS.5230 Screw Design Principles
- PLAS.5240 Process Analysis, Instrumentation, and Control
- PLAS.5320 Adhesives and Adhesion
- PLAS.5330 Coatings Science and Technology I
- PLAS.5350 Rubber Technology
- PLAS.5360 Rheology of Polymers
- PLAS.5400 Commercial Development of Polymeric Systems
- PLAS.5410 Computer Applications in Plastics
- PLAS.5420 Colloidal Nanoscience & Nanoscale Engineering
- PLAS.5440 Advanced Plastics Materials
- PLAS.5480 Analytical and Numerical Methods in Plastics Processing
- PLAS.5470 Materials for Renewable Energy & Sustainability
- PLAS.5490 Product Design for Elastomers
- PLAS.5500 Processing with Elastomers
- PLAS.5510 Extrusion Die Design
- PLAS.5520 Machine Design
- PLAS.5530 Medical Device Design I
- PLAS.5540 Medical Device Design II
- PLAS.5650 Engineering Thermosetting Resins
- PLAS.5660 Polymeric Material Systems Solution
- PLAS.5670 Dynamic Mechanical Properties I
- PLAS.5680 Dynamic Mechanical Properties II
- PLAS.5750 Biomaterials I
- PLAS.5760 Advanced Mold Design
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLAS.5780</td>
<td>Advanced Plastics Process Engineering</td>
<td>F</td>
</tr>
<tr>
<td>PLAS.5790</td>
<td>Problems in Biomaterials - Directed Study</td>
<td>O³</td>
</tr>
<tr>
<td>PLAS.5850</td>
<td>Computer Aided Engineering and Design I</td>
<td>O³</td>
</tr>
<tr>
<td>PLAS.5890</td>
<td>Polymer Nanocomposites</td>
<td>I</td>
</tr>
<tr>
<td>PLAS.5900</td>
<td>Survey of Intellectual Property</td>
<td>F,S</td>
</tr>
<tr>
<td>PLAS.5950</td>
<td>Thermoplastic Elastomers</td>
<td>O³</td>
</tr>
<tr>
<td>PLAS.5960</td>
<td>Plastics, Elastomers and Additives from Renewable Resources</td>
<td>O³</td>
</tr>
<tr>
<td>PLAS.6020</td>
<td>Medical Device Development Regulation</td>
<td>F,S</td>
</tr>
<tr>
<td>PLAS.6100</td>
<td>Plastics Industry Development</td>
<td>I</td>
</tr>
<tr>
<td>PLAS.6110</td>
<td>Coloration of Engineering Thermoplastics</td>
<td>I</td>
</tr>
<tr>
<td>PLAS.6180</td>
<td>Structural Product Design</td>
<td>S</td>
</tr>
<tr>
<td>PLAS.6420</td>
<td>Characterization of Polymers and Plastics</td>
<td>F</td>
</tr>
<tr>
<td>PLAS.6750</td>
<td>Biomaterials II</td>
<td>I</td>
</tr>
<tr>
<td>PLAS.6780</td>
<td>New Developments in Polymer Manufacturing</td>
<td>S</td>
</tr>
<tr>
<td>PLAS.6820</td>
<td>Physical Polymer Science</td>
<td>O³</td>
</tr>
</tbody>
</table>
Plan of Study – Fall Start + 6-month Co-op
Cooperative Education Option in Plastics Engineering
Master of Science in Plastics Engineering

<table>
<thead>
<tr>
<th>Fall Start with 6-month Co-op</th>
<th>Fall</th>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 credits</td>
<td>10 credits + 1-credit Grad. Devel. for Engineer Course</td>
<td>1-credit Co-op Experience</td>
<td>12 credits</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Required**
- PLAS.5060
- PLAS.5440
- PLAS.5780
- PLAS.5740 (1 cr)
- PLAS.5xxx (1 cr)
- PLAS.5720 (1 cr)
- ENGN.6020
- PLAS.5030
- PLAS.5180
- ENGN.6030

**Electives**
- choose 1 certificate course or 1 elective

Plan of Study – Spring Start + 6-month Co-op
Cooperative Education Option in Plastics Engineering
Master of Science in Plastics Engineering

<table>
<thead>
<tr>
<th>Spring Start with 6-month Co-op</th>
<th>Spring</th>
<th>Fall</th>
<th>Summer</th>
<th>Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 credits</td>
<td>10 credits + 1-credit Grad. Devel. for Engineer Course</td>
<td>1-credit Co-op Experience</td>
<td>12 credits</td>
<td></td>
</tr>
</tbody>
</table>

**Required**
- PLAS.5060
- PLAS.5180
- PLAS.5440
- PLAS.5720 (1 cr)
- PLAS.5xxx (1 cr)
- ENGN.6020
- PLAS.5030
- PLAS.5180
- PLAS.5740 (1 cr)
- ENGN.5030

**Electives**
- choose 1 certificate course or 1 elective

Depending of previous fall selection:
- choose 1 elective and 3 certificate courses or 4 certificate courses