Since its inception in 2012, UTeach UMass Lowell has earned a reputation on and off campus as a program for preparing effective math, science, and engineering teachers. Our teacher candidates, i.e., UMass Lowell undergraduate STEM majors, have worked in school districts such as Lowell, Methuen, Chelmsford, Tyngsborough, Tewksbury, Billerica, and Dracut, to either teach lessons in a classroom setting or tutor individual students needing extra help.

Over the last four years, our teacher candidates have designed and implemented unique explorations in various STEM areas to promote and develop students’ critical thinking and problem-solving skills. Through these exciting, engaging, and challenging lessons, they have touched the lives of hundreds, if not thousands, of elementary, middle, and high school students, motivating and inspiring them to pursue STEM education.

In the summer of 2015, in recognition of the work of our teacher candidates, faculty, and staff, Chancellor Moloney, Provost Pierson and Vice Chancellor Yestramski visited the UTeach Teaching and Learning Lab and awarded us with a plaque for our exemplary work in contributing to UMass Lowell’s capacity to advance STEM education in the Commonwealth of Massachusetts.

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As an instructor of the first UTeach course, STEP 1, it is always a delight, when students come to explore if teaching is for them. In exploring this extraordinary career the students learn about the basics of teaching. They learn to plan a lesson by identifying learning objectives and choosing appropriate activities, they manage students’ learning and behavior, and they begin their journey into becoming effective science or math teachers.

To date, UTeach UMass Lowell has graduated 11 teachers. Daniel Packard and Eduardo Beato, both math majors graduated in Spring 2014. Eduardo is employed at Chelmsford High School and Danny at Greater Lowell Regional Technical High School.

In Spring 2015, we saw math majors Nick Rossetti, Alex Pham, Stephanie Bellerose, Anna Baturin, Jessie Flynn and Erinn McLaughlin, and biology major Alicia Negron, graduate. Nick, Alex, Stephanie, Anna, and Alicia found employment at Lowell High School, Jessie decided to pursue a masters degree in mathematics before seeking employment, and Erinn began substituting at Wang Middle School in Lowell completing a post baccalaureate Practicum.

This year, we celebrated the graduation of David Entwistle (physics) and Adam Pandolph (biology). Both young men enrolled in STEP 1 with the goal of pursuing a career as high school science teachers and went on to successfully completed their Practicum at Chelmsford High School. David working with Betsy Nahas and Adam working with Carol Bruell.
Why Teach Physics?

Physics is the most fundamental branch of science, it creates the foundation for learning other natural sciences. It is the study of matter, energy, and the interactions between the two. In the broadest sense, physics explains how the ‘world works’. This is the reason that drew David Entwistle to study physics here at UMass Lowell.

David Entwistle just graduated with a physics degree and Initial Teacher License that enables him to teach physics at high school. David fits into the category of ‘shortage-subject’ teachers. It is a known fact for many years now that the United States is desperately short of highly qualified and effective physics teachers. In a recent article by Physics Teacher Education, it was emphasized that only 47% of physics classes are taught by a teacher with a degree in the subject. As a result, school districts are graduating too many students who lack the understanding of the most basic physics concepts. Since high school physics is a prerequisite to many STEM careers, this lack of understanding of basic physics concepts is a serious disadvantage for students studying a STEM subject at the University level. The ripple effect of this is an American STEM workforce lagging behind its global competitors in physics training.

David stated that the best part of teaching physics is “changing how the students view the world.” Throughout the UTeach program, David embraced enthusiastically what the program had to offer. He planned effective inquiry based lessons using his imagination and creativity to show students how they could relate to physics concepts in their every-day lives and understand the complex mysteries of the world. With his strong content knowledge he acquired through his physics courses at UMass Lowell, and the pedagogical-content knowledge courses from UTeach, David was more than ready to take on the role of a high school physics teacher.

At UTeach UMass Lowell, we recognize the need to prepare high quality, talented, and effective teachers like David. We work collaboratively with deans and department chairs at the Francis College of Engineering and the Kennedy College of Sciences to ensure that advisors and faculty are aware of the demands of the UTeach program and how they can help our teacher candidates achieve their career goal. David praised the work of the physics department at UMass Lowell, especially Professor Robert Giles for his support. David acknowledged that “the biggest support was altering my physics course load to allow me to take courses that better fit me as an educator.” This statement highlights how UTeach and the STEM departments work together to uphold the mission of UMass Lowell—preparing students to work in the real world.

Teaching high school physics is much more than making sure students learn formulas and carry out complex calculations. It involves helping students explore different phenomena through designing inquiry based lessons so that they are able to connect complex scientific concepts to their everyday lives. David described one such lesson: “I set up six stations around the room that displayed electromagnetic phenomena and had students go explore to discover the relationship between electricity and magnetism. They thought it was really cool how these totally different objects interacted.”

Upon graduation, David applied to three school districts to teach high school physics, all three school districts interviewed him, and all three offered him their open position. After careful consideration, he accepted the job at Wachusett Regional High School in Holden, Massachusetts because he believed that at Wachusett High, he could make the biggest difference. Teaching physics is a rewarding career. UTeach UMass Lowell is honored to have prepared a talented physics teacher like David, and we hope to prepare many more, to help the United States overcome the shortage of physics teachers.
It is well-known now that UTeach UMass Lowell has a presence on and off campus. The work done by the UTeach faculty and dedicated staff is recognized and appreciated by the local school districts, who often compete to hire our graduates. Yet, it is the support provided by the school districts themselves that is at the heart of our UTeach program.

Several of the UTeach courses involve UMass Lowell student teachers practicing the teaching methods we teach them in a real classroom. STEP 1 begins with student teachers experiencing teaching in elementary schools. In STEP 2 they work in middle schools, and finally in Classroom Interactions & Equity and Project-Based Instruction, they work in high schools. In all these cases, they work under the watchful eye of a professional teacher, their mentor teacher. It is the mentor teachers, and the school district administrators who make these partnerships and enable UTeach UMass Lowell to continue preparing effective teachers for Massachusetts schools. With this in mind, every year we celebrate the commitment of our partner school districts at the UTeach Community Dinner. This last academic year, we honored our partners by presenting a representative from each district with a plaque to recognize the strong bond that UTeach UMass Lowell has with them, and thanked the mentor teachers for their support and guidance in preparing the new generation of STEM teachers.

A plaque to recognize and thank our partner school districts for their support was awarded to school districts at the UTeach Community Dinner in November 2015. Administrator representatives, one from each school district, collecting the gift (from left to right) are Tony DiLuna (Billerica), Matthew Beyranevand (Chelmsford), Marti Cohn (Lowell), Brandi Kwong (Methuen), and David Hill (Dracut).

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recognizing UTeach Partners

The relationships we have with our partners goes beyond the school districts just providing us with effective teachers to work with UMass Lowell’s UTeach teacher candidates. Our partners assist us with the structuring of our program so we are able to meet the new Massachusetts state standards for teacher assessment. The UTeach Partners Advisory Board consists of school district administrators and teacher, who together advise us on how best to prepare our teacher candidates so they are classroom ready on their first day.

On our UTeach Partnership Board are:

- **Tony DiLuna** (STEM Curriculum Coordinator, Billerica Public Schools)
- **Matthew Beyranevand** (Math and Science Coordinator, Chelmsford Public Schools)
- **David Hill** (Director of Curriculum, Instruction, and Assessment, Dracut Public Schools)
- **Marti Cohn** (Coordinator for Science and Social Studies, Lowell Public Schools)
- **Amy McLeod** (Director of Curriculum & Instruction and Assessment, Lowell High School)
- **Libby Often** (Math Teacher, Greater Lowell Regional Technical High School)
- **Kathy Turmel** (Grade 5/6 Teacher, Comprehensive Grammar School, Methuen)
- **Cheryl Bradley** (Grade 5 Teacher, Comprehensive Grammar School, Methuen)
- **Melissa Akins** (Grade 3 Teacher, Campbell Elementary School, Dracut)
It is always exciting when our small space in Pasteur 106 receives very important visitors. It was an honor when in November 2015, Dr. Ronda Brandon, the vice president of teacher development and academic strategy for the National Math and Science Initiative (NMSI), made a guest appearance followed by James Peyser, Massachusetts Secretary of Education and Chancellor Jacqueline Moloney, in March 2016.

Dr. Brandon visited UMass Lowell, taking a tour of the UTeach teaching and learning space before delivering her keynote speech at the UTeach Community Dinner. Dr. Brandon’s speech highlighted three important NMSI initiated and supported programs: the college readiness program, laying the foundation program (LTF), and the UTeach expansion program. The former is a three-year partnership with high schools that dramatically increases the number of students taking and earning qualifying scores on AP math, science, and English exams while expanding access to rigorous coursework to traditionally underrepresented students. LTF program is a hands-on professional development that is empowering educators of grades 3-12 with the strategies and resources they need to raise academic rigor and prepare students to think critically and creatively at advanced levels. Finally the UTeach expansion program is a nationwide replication of the innovative UTeach STEM teacher preparation program that is recruiting and training a new generation of highly qualified math and science teachers. Dr. Brandon explained that NMSI’s programs have impacted more than a million students, over 50000 teachers and 750 high schools, and 44 universities across 21 states and the District of Columbia.

Massachusetts is one of six states selected to partner with NMSI in the innovative college readiness program to address the decline in math science education in the United States. The Massachusetts program MMSI (Massachusetts Math Science Initiative) drives the school culture of high expectation thereby increasing participation and performance in Advanced Placement STEM courses, particularly among the underrepresented populations to ensure that they are college ready to embark on a STEM career.

Preparing effective STEM educators in Massachusetts is critical for implementing any state or national initiatives like MMSI. We were therefore delighted when the Secretary of Education for Massachusetts, James Peyser stopped by the UTeach teaching and learning space with Chancellor Moloney to see the process of teacher preparation in action. Dr. Eliza Bobek and her students, along with Dr. Greenwood explained to him how our program works. He asked the students what they liked about the program, and they were able to explain to him in detail how they explore ideas with students in the classroom during STEP 1 and 2. Secretary Peyser then asked them if they were all going to be teachers and all six students present on that day unanimously confirmed that they were.
UTeach owes its success as an effective teacher preparation program at UMass Lowell to many people. One group of people, who are not directly involved with the program, but contribute enormously to its success, are our sponsors. Our sponsors are absolutely critical to our program. Our sponsors range from individuals to large corporations. The funds donated to UTeach are used in many ways. We rely on the donations from our sponsors to pay the mentor teachers, to buy resources for use by the UTeach teacher candidates to prepare their lessons, to cover the teacher candidate expenses such as fingerprinting costs and travel costs to the schools, and towards awarding scholarships, internships, and other financial assistances. The donations we receive from **Cabot Corporation** funds the UTeach STARS (Student Teaching Apprentices Reaching out to Schools). This is a program where UTeach interns are involved in tutoring at local schools and the donations from **Kronos Inc.** funds are used to cover the costs for the UTeach course Project-Based Instruction, where a portion of the field work takes place at the Tsongas Industrial History Center. Our sponsors for the past academic year (2015—2016) were:

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- Mrs. Janis E. Raguin
- Mr. Edward J. Barrett
- Ms. Lucy Ragozzino’s Estate
UTeach Scholarship Recipients

Scholarships

UTeach Awards

Alexander Drolette  
(biology major)
Taylor Gannon  
(biology major)
Ralph Saint Louis  
(biology major)
Justin Killgoar  
(chemistry major)
Lynasy Heng  
(chemistry major)
Samuel Bouchard  
(math major)
Ariel Leva  
(math major)
Matthew Johnson  
(math major)
Mason Sirois  
(computer science major)
Jacob Stephens  
(computer science major)
Maxwell Nutter  
(chemical engineering major)
Clint Perry  
(electrical engineering major)

Meghan Halpin  
(biology major)
Emily Jenkins  
(computer engineering major)
Connor McLaughlin  
(computer science major)
Meghan Messer  
(biology major)
Emily Rapoza  
(mechanical engineering major)
Nadica Spinhirn  
(civil engineering major)
Matthew Thomas  
(mechanical engineering major)
Zhongxiang Wen  
(computer science major)
Nia Yell  
(math major)
Rakesh Buchan  
(civil engineering major)
William Johnson  
(plastic engineering major)
Kara Kinz  
(math major)
Alexandria Panagiotakos  
(math major)
Caitlin Woodbury  
(math major)

Endowed Awards

Samantha Rosa  
(math major)
Mary Curtin Alden Endowed Fund
Samuel Bouchard  
(math major)
Nettie Ginsburd Alshuler Memorial Scholarship Fund
Bradley Marshall  
(math major)
Class of 1954 State Teacher's College Endowed Fund,
Jane '69 and Charles Gourlis Endowed Scholarship Fund, and
George Tsapatsaris '77 Endowed Scholarship Fund
Michael Manser  
(mechanical engineering major)
Eleanor Priestly '40 Memorial Endowed Scholarship Fund
Lizbert Acosta  
Samantha Grigg  
JoAnn Plante
Christine McCarthy  
Rachel Bryan  
(all math majors)
Alice Fleury Zamanakos Endowed Scholarship Fund for Teaching
Matthew D'Angelo  
(math major)
Joseph J. and M. Jean Donnelly Education Scholarship Fund
Alexander Eden  
(biology major)
Mary, Joan and Nancy Endowed Scholarship for Courage and Compassion

Raguin Fellowship Awards

Kelsey Brady  
(math major)
Zachary Buffone  
(computer science major)
Katherinne Castro Sola  
(civil engineering major)
Razaad Chhoeng  
(chemistry major)
Colin Eklund  
(chemical engineering major)
Anastasia Georgousis  
(biology major)

Spring 2016
Rakesh Buchan  
(civil engineering major)
Taylor Gannon  
(biology major)
Samantha Grigg  
(math major)
Lynasy Heng  
(chemistry major)
Thomas Heywosz  
(math major)
Andrea Larsson  
(biology major)
Bradley Marshall  
(math major)
Maxwell Nutter  
(chemical engineering major)
Alexandria Panagiotakos  
(math major)

Fall 2015
Alexander Eden  
(biology major)
Taylor Gannon  
(biology major)
Samantha Grigg  
(math major)
Bradley Marshall  
(math major)
Thalia Nunez  
(biology major)
STEP 1—The First UTeach Methods Course

STEP 1 (UTCH.1010) Inquiry Approaches to Teaching is a 1 credit course where UMass Lowell STEM undergraduates explore what it feels like to be a teacher. They meet once a week on campus to learn about planning inquiry lessons using the 5E strategy and they try out the lessons they planned in an elementary grade classroom under the watchful eye of their mentor teacher. STEP 1 is offered every semester, and every semester we see some great lessons by our potential teacher candidates. STEP 1 concludes with a competitive poster presentation where we get to see our undergraduates showcase their best lessons.

Highlights from STEP 1 Fall 2015 and Spring 2016

Nadica Spinhirn (civil engineering major) planned a lesson for Grade 3 students from Shaughnessy Elementary School in Lowell to construct anemometers and test them outside (Sp ’16).

Connor McLaughlin (computer science major) explored area and perimeter through street planning with Grade 3 students from Bailey Elementary School in Lowell (Sp ’16).

Anastasia Georgousis (biology major) took each one of the Grade 5 students from Comprehensive Grammar School in Methuen through a fossil excavation adventure when learning about the rock cycle. (Sp ’16).

Mason Sirois (computer science major) and Eoin O’Connell (biology major) Fall ’15

Rakesh Buchan (civil engineering major) Fall ’15

Alex Panagiotakos and Kara Kinz (both math majors) Fall ’15

Ariel Leva (math major) Fall ’15

Meghan Messer (biology major) Spring ’15

Emily Rapoza (mechanical engineering major) and Colin Eklund (chemical engineering major) Spring ’16

Meghan Halpin (biology major) Spring ’15

Being in the UTEACH program has taught me so much. I have always had a passion for teaching and this program has made it possible for me to follow that dream. Even with just being in Step 1, Dr. Lewis has been so helpful in answering my questions and giving teaching advice. I have gained real world teaching experience and it is through this program I am able to do that. While earning a degree in Computer Engineering, I now have the opportunity to earn my teaching certification, as well. I cannot wait to move forward in UTEACH!
Project-Based Instruction (PBI) (UTCH.3010) is the last UTeach course offered before the Practicum. This is where the teacher candidates synthesize the major principles and themes of the UTeach program and develop an intellectually challenging PBI unit with a field-based experience.

In Fall 2015, Samantha Rosa and Marissa Asa focused on the question “Is the Merrimack River Healthy?” and during the field trip, with Tara Alcorn’s 9th Grade biology class from the Greater Lowell Regional Technical High School, the students tested the pH, oxygen levels and phosphate levels of various water samples taken from the Merrimack River and compared it to water taken from a nearby brook.

Michael Manser and Matthew D’Angelo led Libby Olen’s Grade 12 Applications of Algebra students from Greater Lowell Regional Technical High School through a challenge to design and develop a marketing plan for a car that would deliver bobbins to looms. During the field trip, students built and tested their designs while dealing with changing supplier prices.
The UTeach Ambassadors program, sponsored by United Technologies, was developed to assist in recruitment and retention. There are seven UTeach Ambassadors (six are shown in the photo above) at various stages of the UTeach program, and they are Rachel Bryan (mathematics), Samuel Bouchard (mathematics), Alex Eden (biology), Jacob Stephens (computer science), JoAnn Plante (mathematics), Clint Perry (electrical engineering), and Matthew D’Angelo (mathematics—not present in the photo above). Ambassadors have been involved in representing the UTeach program at UMass Lowell at events like Convocation and Open House. They have participated in careers fairs held in local school districts, visited classrooms, and held social and academic events, all with the intention of recruiting STEM majors into a career in teaching. UTeach Ambassadors are also the judges of the competitive STEP 1 posters.

Ambassadors Involvements in STEP 1 Judging Posters (F2015 & Sp2016)

Fall 2015 winners Ariel Leva (mathematics), Mason Sirois (computer science), and Eoin O'Connell (biology)

Spring 2016 winners Nadica Spinhirn (civil engineering) and Katherine Castro Sola (civil engineering)
The UTeach Ambassadors’ primary role is in recruitment. In November 2015, during the advisory period, the Ambassadors hosted a recruitment social for physics, chemistry, and engineer majors. The day was filled with engaging activities the Ambassadors came up with to demonstrate how science concepts can be taught through explorations.

As well as developing intellectual social events, the Ambassadors also put together more relaxing social events to bring together UTeach UMass Lowell students enrolled in different UTeach courses, and their friends, for games nights, quiz nights, and of course a Coffee House evening full of music, poetry, jokes, and laughter.
BECOME A SCIENCE OR MATH TEACHER WHILE COMPLETING A BACHELOR’S DEGREE

Sequence of Required Courses
(for incoming Freshman/Sophomore)

1st - 2nd Years at UML Fall/Spring Semesters
UTCH 1010 STEP 1: Inquiry Approaches to Teaching (1 credit)
*UTCH 2010 Knowing and Learning in Math and Science (SS) (3 credits)
UTCH 1020 STEP 2: Inquiry-based Lesson Design (1 credit)
*UTCH 2040 Perspectives on Math and Science (AH) (3 credits)
The above courses are the prerequisites to the STEM Teaching Minor.
*course also fulfills Core Curriculum requirement

(declaration of the STEM Teaching minor)

3rd Year at UML Fall Semester
UTCH 2020 Interactions and Equity (3 credits)
MATH 2100 Functions and Modeling (Math & CS majors only) (takes MTELs at end of semester or in summer)

3rd Year at UML Spring Semester
UTCH 3020 Research Methods (3 credits)
UTCH 4410 Teaching English Learners (3 credits)

4th Year at UML Fall Semester
UTCH 3010 Project-based Instruction (3 credits)
MATH 4270 Geometry (Math & CS majors only)

4th Year at UML Spring Semester
UTCH 4010 Practicum (6 credits)
Must have required GPA, completed the STEM Teaching minor and passed the required MTELs

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