Engineers are addressing some of the biggest challenges faced by societies around the world—challenges such as developing affordable alternative energies, providing access to clean water and creating sustainable cities. Engineers innovate to solve problems, whether they’re developing nanotechnologies for use in industry or bringing basic radio service to a remote village in Peru. They are at the heart of companies and communities, making daily life more efficient, productive, safe, even fun.

The Francis College of Engineering at UMass Lowell provides an outstanding education to future engineers. As you read about our programs and people, you’ll see how we prepare students to succeed in the workplace and as vital members of communities around the world.
High Caliber and Hands-on
The Francis College of Engineering

The Francis College of Engineering at UMass Lowell has a great reputation, and we’re proud of it. We offer rigorous, hands-on instruction from highly dedicated faculty members in innovative programs across six major disciplines. Our graduates are hard-working, high-achieving engineers ready to make contributions in the field and to pursue a lifetime of learning for personal and professional growth. They also have the educational foundation necessary to succeed in high-level positions in the business, education, legal, health and government sectors.

A Home for High Achievers
The most recent class of incoming students in the College of Engineering included 15 Commonwealth Scholars—students who qualified for the prestigious, four-year full scholarship. The College of Engineering is also well represented in the Commonwealth Honors Program on campus. The program is available to students who have high aspirations from across the University. Offerings include special first-year seminars, honors courses, research opportunities and a host of activities and events that will enrich your education. Honors House is a dedicated hall with faculty in residence. www.uml.edu/honors

Bridging Disciplines
Our undergraduate majors cover an impressive array of disciplines in the field of engineering. Interdisciplinary minors further expand the scope of our offerings. Minor in business administration to sharpen your management skills and raise your industry profile. Or choose robotics, an interdisciplinary program offered jointly with Computer Science. New minors in energy engineering and biomedical engineering dovetail with existing M.S. and Ph.D. programs at UMass Lowell.

Answering the Call for Energy Engineers
Three of the 14 “grand challenges” cited by the National Academy of Engineering are directly related to energy engineering—the development of low-cost, sustainable energy. UMass Lowell recently created an interdisciplinary minor in this emerging discipline, a unique offering among engineering programs in New England. The Association of Energy Engineers reports that clean energy will be one of the world’s biggest industries by the year 2020. UMass Lowell graduates will be ready.

Hunter Sawyer: Testing Turbines
Hunter spent his freshman summer doing research to help evaluate the safety and durability of wind turbines. “As the renewable power movement is fairly young,” he explains, “people don’t really know how well a wind turbine built 10 years ago is going to be working 10 years from now.” In the lab, Hunter used high-resolution cameras and specialized software to digitally map areas of stress on turbine blades. His work will help others reinforce weak points so that blades will last longer and withstand higher winds. “To be able to get hands-on, actual engineering experience this early on in my career is unbelievable,” Hunter says.

All our engineering programs are accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.
Becoming Work Ready, Life Ready, World Ready
Engineering through Experience

You understand the concept. Are you ready to put it into practice? You’ll graduate with plenty of real-world experience thanks to co-ops, internships, service-learning programs and research opportunities integrated throughout our curricula. Work in professional settings, address real problems, develop real skills—and stand out from the crowd as a result.

Amber Zapatka ’11
plastics engineering
Umass Lowell

Co-ops and Internships: Learn at Work
Earn college credit, a salary and credibility with prospective employers. Professional co-ops place qualified students in positions with regional employers who provide meaningful, paid work, supervision of technical skills development and a formal written evaluation. They also include formal preparation and assessment courses offered by the Career Services and Cooperative Education Center. These help students evaluate what they have learned, update their credentials and begin planning for their next paid experience.

Paid co-ops on campus, such as those offered through the Co-op Scholars or the Research & Community Co-op programs, connect qualified students with faculty-supervised projects and research in areas of interest to them. These may take place as early as the summer following a student’s freshman year.

Amber Zapatka: Ready for Any Role

“I can run the machines, design a part and analyze the molecular structure of a material. I’m ready to step into any position in the industry.”

Since the summer following her freshman year, Amber has worked as a scholar-intern at Nypro, a company that manufactures medical devices and other consumer products in the United States and abroad. Amber’s work experience paid off in class, too; her colleagues at Nypro provided her with a real business challenge to tackle for her senior capstone project. Amber is working toward her master’s in plastics engineering.

PROFESSIONAL CO-OP INDUSTRY PARTNERS
The more than 20 professional co-op employers in the region with whom UMass Lowell has a formal partnership include:

- Boston Scientific
- Corning Life Science
- Freudenberg-NOK
- Johnson & Johnson, Dupuy-Mitek
- Medtronic
- Nypro
- Pfizer
- Proctor & Gamble
- Siemens
- Sterilite
- U.S. Army, Natick Center

“The coaching I received from the Career Services and Cooperative Education Center included mock interviews and a résumé review and put me in the right mindset for the co-op interview process.”

— Matt Burke, Plastics Engineering
Undergraduate Research: Learn Through Discovery

Research at UMass Lowell happens through creative collaborations among academic departments, through more than 30 interdisciplinary research groups and with sponsorship from corporations and leading national research institutes. Our researchers place an emphasis on moving inventions toward new products in areas like the medical device industry.

If you’re ready to try your hand at research, you can do so as early as your first year of college. Opportunities for undergraduates exist in many areas, including nanomanufacturing, biomanufacturing, sustainable infrastructure, assistive technology and baseball research.

Molly Clay: Scholar Athlete

A strong math and science student in high school, Molly was looking for a college with a high-caliber engineering program. At the same time, she wondered, “what if engineering is not for me?” She found her answer at UMass Lowell, where she had meaningful alternatives if she changed her major.

At UMass Lowell, Molly discovered that engineering was just right. And thanks to support from her professors and peers, she also played competitive Division II field hockey while keeping up with the demands of her major. “There is a real sense of unity and helpfulness, and you need that teamwork as an engineer in the real world,” she says.

Molly worked in a nanotechnology research lab as an undergraduate and loved the experience. Now she’s exploring new sensing techniques for use in health care. “Slight changes in the concentration of biomolecules and related chemicals found in our bodily fluids can signal diseases, cancers and other health concerns,” she explains. “Working at the nano-scale increases surface area-to-volume ratios and can help increase the sensitivity of sensors and translate into earlier detection of diseases.” Molly hopes the ideas she is testing on a small scale now will lead to getting new techniques to consumers in the future.

“Companies are looking for UMass Lowell grads,” she says. “The reputation is a plus.”

Service-Learning: Learn while Helping Others

With support from the National Science Foundation, UMass Lowell has become a service-learning leader in higher education. Thanks to SLICE (Service Learning Integrated throughout the College of Engineering), approximately 40 courses, from fundamentals to advanced topics, integrate ambitious service-learning projects into the curriculum.

The Assistive Technology Program

Students in the Assistive Technology Program take on challenging problems identified by clients—partner organizations and individuals in the community. Through senior capstone projects, students interact directly with their clients, propose solutions, then design, construct and deliver the final products. Recent projects include a wheelchair controlled by head movements, a voice-activated alarm clock system, a motion-activated CD player, and interactive sound and light boards and an aromatherapy unit for use in Snoezelen therapy (multisensory environmental therapy) for those with Alzheimer’s, autism and other developmental disabilities.

#64

The London Times ranks the UMass System at #64 among the top 400 universities in the world.
An honors student and valedictorian of his high school class, Peter arrived at UMass Lowell determined to get the most from his college experience. That included getting involved in research, living in Honors House and spending a semester abroad in Wales. “I had an amazing experience,” he says. Swansea University is three hours from London on the Gower Peninsula, known for its spectacular beaches. Peter lived on campus with peers from around the world, visited local sights and traveled throughout Europe. “I learned about European culture by experiencing it,” he says. Through planning expeditions and meeting new people, he became more independent.

At Swansea, final exams and projects, not homework, were the basis for most grades. Some assignments assumed a familiarity with engineering concepts that are encountered later in U.S. programs. Peter and his project teammates—who were from Nigeria and Mongolia—had to adapt to their educational differences and make use of their respective strengths. “That helped my teamwork skills,” Peter says, adding that it gave him valuable experience in working as part of a global team.

Peter Trearchis: Teamwork in Wales

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International Collaborations

Imagine a “mind mouse” that uses brain waves to allow people with Lou Gehrig’s disease and other neurodegenerative disorders to communicate using a computer. That was the topic of a poster presented by electrical and computer engineering students Erin Webster and David Harrington (pictured at right) at an international workshop in Turkey last summer. The interdisciplinary gathering, supported by the National Science Foundation, explored ways American and Turkish educational institutions could establish joint AT programs and how these could be used to increase service learning in both undergraduate and graduate engineering programs.

Erin and David have also visited India twice to work with developing assistive technology programs at two major universities.
Talent and Teamwork
A Community of Engineers

Engineering at UMass Lowell combines the resources of a comprehensive research university with a small-college sense of community. Effective teamwork is an important part of the engineering profession; it’s an important part of our curricula, too.

When describing what they like best about UMass Lowell, students consistently point out the camaraderie within their majors, and the caliber of their professors and their willingness to help. Undergraduate courses are taught by full-time faculty members, not graduate assistants. A student-faculty ratio of 14:1 means you’ll work closely with your professors—experts in their fields with industry experience. More than a few have received prestigious honors, including National Science Foundation CAREER awards. And women make up 17.3 percent of our tenured and tenure-track faculty—the highest percentage among public universities in New England.

The joulecycle: pedal-powered games
UMass Lowell computer and mechanical engineering students were one of 24 teams competing for a $10,000 prize in a national embedded design competition hosted by Intel and Cornell University. Their entry, “JouleCycle,” is a gaming system designed to help people exercise regularly, achieve caloric balance and control obesity. The game player generates the electricity needed to run an Intel Atom board and its customized hardware and software by pedaling a bicycle.

A Professor and a Mentor
“Prof. Mil’shtein is highly regarded in the field of semiconductor technology. He acted as my boss and as my mentor, pushing me hard but also giving technical and personal guidance along the way. My undergraduate research experience with him helped put my name on two patents.”

Michael Baier ’10; ’11
B.S., M.S., Electrical Engineering

David Nader: Concrete Connoisseur
As the mix captain for UMass Lowell’s 2012 concrete canoe team, David is charged with devising a formula for concrete that can withstand being molded, transported and paddled—and stay afloat. “A project like this tests your knowledge and lets you own it,” says David.

Although the team placed third in the New England regional competition last year, David took away something more valuable than a win: he gained a new perspective on his education. “Not every team was pushing the limits of what’s possible like we were,” he says, noting an innovative gunwale design and the use of smog-eating titanium dioxide in the mix. (The UMass Lowell entry was named “The Green Monster.”) When David found himself having high-level discussions about the engineering involved with members of the winning team, he had a revelation. “I realized how much I’ve learned and how well our school stacks up against other engineering programs,” he says. “I have so much pride in my education.”

CLUBBING IT
There are more than a dozen ways to get involved in engineering-related student organizations. The student chapter of the American Society of Civil Engineers designs, builds and races concrete canoes. Members also participate in a regional steel bridge competition. The River Hawk Racing Club designs and builds race cars for Formula SAE (Society of Automotive Engineer) competitions. We also have chapters of the Society of Women Engineers, the National Society of Black Engineers, the Society of Hispanic Professional Engineers, as well as clubs for each field of engineering.
Learning in Lowell

Our Location is Your Opportunity

The birthplace of America’s Industrial Revolution remains a center for technical innovation and economic growth. Lowell was recently named one of the “geekiest” cities in America by the National Science Foundation because over 14 percent of the area’s workforce is employed in technology-focused jobs.

Lowell’s close proximity to Boston and to Routes 495 and 128—the region’s major business and technology corridors—puts you right in the center of the fastest-growing sector of the nation’s economy. The College of Engineering has strong ties to local industry, with many companies and government agencies in the region offering co-op positions and internships to students in all disciplines of engineering. UMass Lowell graduates are high on their lists of prospective employees.

Lowell is also a diverse cultural hub with an impressive array of ethnic restaurants and a thriving artist’s community. The urban renaissance that’s ongoing in the city is the gold standard that other communities strive to replicate.

A Local Sandbox for Innovation

Campus Catalyst is an experiential program sponsored in part by the Merrimack Valley Sandbox Initiative, which supports student efforts to develop entrepreneurial ventures based on their ideas. Two innovative student projects from UMass Lowell engineers were honored with “Most Likely to Succeed” awards during the 2011 Showcase. One was the “mind mouse” developed by electrical engineering majors David Harrington ’12 and Erin Webster ’13 (see page 10). The other winning project was “The Speech Assistant,” developed by William Gould ’12 (electrical engineering) and Erin Keaney ’12 (plastics engineering). The portable electronic device is designed for children with autism or other developmental disabilities that affect their ability to express themselves. When a child pushes any one of an array of picture buttons on the device, it plays a recording of someone close to the child saying what that picture represents.

The Center of Everything

Opening in the fall of 2012, the $70-million Emerging Technologies and Innovation Center is not just an impressive new gateway to the North Campus. It is also a powerful new hub for research, industry partnerships and new manufacturing technologies. The 84,000-square-foot facility is a green building that meets critical criteria for temperature, humidity and vibration. Facilities include Class 100, Class 1,000 and Class 10,000 cleanroom spaces, wet lab and engineering lab space, and a plastics processing high bay. The building’s first-floor lobby will serve as a new home for the National Plastics Museum.

“4D Home” Solar House is First Off the Block

UMass Lowell engineering students teamed up with architecture students from Mass College of Art to create the Team Massachusetts entry for the 2011 Solar Decathlon, an international competition sponsored by the U.S. Department of Energy. “4D Home” took ninth place overall and was the first model home to sell following the competition in Washington, D.C.
A Foundation for Advanced Study
Bound for Graduate School

UMass Lowell engineering graduates are well prepared to pursue advanced degrees here and at prestigious institutions across the country such as MIT, Stanford, Cornell, University of California Berkeley, Caltech, Northwestern, Princeton, Tufts and Yale. In many cases, the strength of a student’s experience at UMass Lowell translates into a full scholarship for graduate school.

UMass Lowell offers advanced degree programs that lead to master’s, professional master’s and doctoral degrees in six fields of engineering. Undergraduates benefit from the research opportunities, faculty expertise and industry partnerships these programs bring to campus.

**MASTER’S PROGRAMS**
- Biomedical Engineering and Biotechnology
- Chemical Engineering
- Civil & Environmental Engineering
  - Environmental & Geoenvironmental
  - Geotechnical
  - Structural
  - Transportation
- Computer Engineering
- Electrical Engineering
  - Information Systems
  - Opto-Electronics
- Energy Engineering
  - Nuclear
  - Renewable Energy
- Environmental Studies (PSM)
- Environmental Engineering Sciences (PSM)
- Mechanical Engineering (MSE)
- Plastics Engineering (MSE)

**DOCTORAL PROGRAMS**
- Biomedical Engineering & Biotechnology
- Chemical Engineering
- Civil & Environmental Engineering
- Computer Engineering
- Electrical Engineering
- Energy Engineering
  - Energy
  - Manufacturing
  - Mechanics & Materials
  - Thermofluids
  - Vibrations/Dynamics/Controls
- Mechanical Engineering
  - Energy
- Nuclear
- Renewable Energy
- Environmental Studies (PSM)
- Environmental Engineering Sciences (PSM)
- Mechanical Engineering (MSE)
- Plastics Engineering (MSE)

**Bachelor’s to Master’s Programs**
Bachelor’s to master’s programs allow students to enter the job market with a competitive advantage by earning both a bachelor’s and a master’s degree in as few as five years. There are dozens of options, including many interdisciplinary programs. Certain courses may be credited to both degrees, saving you time and money. Those with a qualifying GPA can skip the Graduate Record Exam (GRE) or the Graduate Management Admission Test (GMAT) and the graduate application fee. [www.uml.edu/bachelorstomasters](http://www.uml.edu/bachelorstomasters)

**Nicole Sambursky: Engineer and Entrepreneur**

What do chemical engineers do? Here’s one answer: “Chemists can tell you how to make a substance,” explains Nicole. “Chemical engineers can scale it from the lab to the plant.” Her most memorable undergraduate project involved creating a theoretical build of an entire plant, from parking lot to funding to the chemical engineering requirements. As a sophomore, Nicole worked during summer and winter breaks at the Shaw Group’s Stone & Webster, a nuclear consulting firm. “I got some really good hands-on managerial experience,” she says.

After finishing her bachelor’s, Nicole decided to broaden her areas of expertise by enrolling in the Master of Science in Innovation and Technology Entrepreneurship (MSITE) program at UMass Lowell. “It was too soon to be doing an M.B.A., but I’ve always been interested in business and in developing new products,” she says. Nicole is enjoying working on small teams on challenges such as creating a business plan for an innovative optical pressure sensor being developed by a UMass Lowell professor and designing new products around existing patents.

**“I’ve always been interested in developing new products.”**

Ready for the Ultimate Test?
UMass Lowell seniors consistently score well above the national average on the Fundamentals of Engineering exam, the first step toward professional accreditation.
Socrates Akpoyibo: A foundation for his life’s work

Socrates chose to study engineering in the United States in order to build a strong foundation for returning to Nigeria and working to improve the country. An electrical engineering degree will allow him to work in almost any industry there. “UMass Lowell met all my requirements: it had the major I wanted and is in a state with a lot of good educational institutions,” he says. An added benefit was being able to start school during the spring semester.

“UMass Lowell is a very diverse school, so blending in here has not been difficult,” says Socrates. “I have friends from all over the place.” When Socrates was new, his roommate helped him settle in and meet people. He also received support from staff members in the international and other offices on campus. “Everyone has been really open and helpful to me,” he says, adding that the hardest thing was getting used to the American accent.