ON THE COVER: Professor Fiorenzo Omenetto in the Ultrafast Nonlinear Optics and Biophotonics Laboratory uses silk proteins as a sustainable material in photonics, electronics and optoelectronic applications. Researchers have developed several techniques, such as nano imprinting, to transform silk film into optically iridescent biomaterial with applications in biological sensing and imaging. Learn more about Professor Omenetto’s research in silk technology on page 10.
Every breakthrough presents the next generation with a new set of problems to solve. As imaginative as artists, young engineers stand to turn present challenges into tomorrow’s breakthrough ideas. We are inventors and innovators. We improvise as readily as jazz pioneers. We share the same concerns about the future of humankind as poets and political philosophers. The difference is we don’t just think about the future. We make it.
Engineers Without Borders

Access to clean, fresh water is a global challenge that provides an acute and constant struggle to the developing world. Tufts’ Engineers Without Borders (EWB) is taking on this challenge in Shilongo Village in Uganda and in La Romana, Dominican Republic. Members of EWB are committed to working with community members to engineer sustainable solutions for the design and construction of potable water systems. Now in their sixth year of their partnership with the community of Shilongo and a local nongovernmental organization, Tufts students are addressing clean water scarcity with the recent implementation of a solar-powered water pump and water storage system. In the Dominican Republic, students are re-engineering the water distribution and purification system for a local hospital.

Engineering Week Every Week

While every week is engineering week for Tufts engineers, E-Week is special. Each day is jam packed with friendly competition between departments in events like Trivia Night and “pie the professor,” but our undergraduates also get down to business with a career fair and a “life after graduation” lecture. The best part by far, though, is when students and professors get together to figure out the most economical way to duct tape someone to a wall.

Music Apps for the iPad

Ever wanted to build a synthesizer? Or create your own digital drum set? There’s an app for that—or there soon will be, thanks to a course called “Music Apps for the iPad.” Computer science lecturer Ming Chow, music lecturer Paul Lehrman, and Professor Chris Rogers, a mechanical engineer, teamed up to create a course that would foster musical composition and competition, teach the basics of music and mobile development, and create commercially viable apps. The course sets talented students on the path to early business success.

What’s in Your Bag?

Chemical Engineering major Tyler Lueck E16 is the epitome of a Tufts engineer. That is to say, he’s busy. We asked him to give us a glimpse into a typical day in his life (a Wednesday, more specifically) through the contents of his backpack. Some things we could have predicted: the TI-84 Plus calculator, for example, and the engineering pad. But we were surprised to find that tucked next to the lab goggles were a pair of swim goggles for Tyler’s varsity practices, and crammed between his MCAT study book and water bottle was a novel by Gabriel García Márquez—“If by some crazy chance I have a moment of free time to read,” said the Spanish minor. The best find, though, was the dog leash tucked in the side pocket for when Tyler walks dogs for Animal Aid.
THINK LOCALLY, ENGINEER GLOBALLY
Tufts engineers can supplement the technical competency developed in the engineering classroom by gaining meaningful global experience through summer, semester, and year-long study abroad programs.

WOMEN IN ENGINEERING
Women routinely make up a third of the undergraduate class in the School of Engineering and the faculty is nearly a quarter female—figures well above the national average. Support for women engineers is a top priority. Through student-run organizations such as the Society of Women Engineers, students build the professional networks that are key to success.

SPOTLIGHT ON PARKING
Computer Science students Karan Singhal and Jaime Sanchez know that in a big city like Boston, people waste time, gas, and money looking for a parking spot—and for Boston businesses, that can mean big customer losses, too. Karan and Jaime helped code a solution as part of the winning team for the high-tech track at Tufts’ $100K New Ventures Competition. SpotLight Parking is an on-demand service that brings valet parking to the user’s fingertips through a mobile app. With the swipe of their thumb, SpotLight customers can drive directly to a destination and be met by a SpotLight-enabled valet who accepts pre-registered credit cards. Now drivers can find, reserve, and relax!

80,000
SUSTAINABILITY

Tufts engineers are changing the way we use the world’s finite resources. (Think water and fossil fuels.) The age of planned obsolescence is over. The age of responsible, ethical, and sustainable engineering practice has begun.
Professors Linda Abriola, Kurt Pennell, Andrew Ramsburg, and Eric Miller received the Department of Defense SERDP Environmental Restoration Project of the Year award for their work to understand and predict the behavior of contaminants, such as chlorinated solvents, in groundwater. The research, which combines electrical and environmental engineering principles with computational models, helps to explain why contamination persists, how long it will persist, and what the best options are for treating it. Determining the best treatment approach and design can reduce the time and cost to remediate polluted groundwater.
Professor Matthias Scheutz heads up the Human-Robot Interaction Lab, where engineers are blurring the line between human and machine. Scheutz and colleagues in psychology, occupational therapy, and cognitive science are exploring how robots might aid patients with Parkinson’s disease or make decisions in a medical emergency. Combining wireless technology research from electrical engineering professor Valencia Koomson, optical techniques from biomedical engineering professor Sergio Fantini, and programming expertise from computer science professor Rob Jacob, Tufts engineers are working on non-invasive devices to measure brain activity and help improve the connection between humans and computers.
HUMAN-TECHNOLOGY INTERFACE

Touch screens and implantable devices blur the line between technology and the body. Robotics takes inspiration from cognition and the human mind. Tufts engineers integrate knowledge of thought, sight, and touch into interfaces as intuitive as they are high-tech.
HEALTH ADVANCES

Tissue engineering. Genomics. Arterial grafts made of silk. When Tufts engineers think about human health advances, we think on every scale—from tracing the neurological effects of nano-sized pollutants to mapping patterns of disease transmission worldwide.
Professor Lauren Black engineers heart tissue to repair damage caused by cardiovascular disease. Black examines cells’ biophysical and biochemical environment to better understand how stem cells can be influenced to grow into cardiac muscle cells. He collaborates with Professor Irene Georgakoudi, who specializes in a non-invasive imaging technology to examine tissue damage caused by heart attacks in order to develop new therapies for repair.
BIOMEDICAL ENGINEERING

TUFTS BIOMEDICAL ENGINEERS DEVELOP TECHNOLOGIES CRITICAL TO HEALTH ADVANCES IN DIAGNOSIS AND TREATMENT. IMAGINE AN IMPLANTABLE DEVICE THAT COULD MONITOR GLUCOSE IN YOUR BLOOD FOR A YEAR, THEN HARMLESSLY DISSOLVE, OR AN EDIBLE OPTICAL SENSOR THAT COULD DETECT HARMFUL LEVELS OF BACTERIA IN A BAG OF PRODUCE AND THEN BE SAFELY CONSUMED. NEW TECHNOLOGY DEVELOPED AT TUFTS COULD ALLOW PHYSICIANS TO GROW NEW TISSUES TO REPLACE WORN-OUT BODY PARTS AND TO IDENTIFY DISEASE AT A PATIENT’S BEDSIDE USING ADVANCES IN OPTICS AND IMAGING.

01/ FIORENZO OMENETTO SPINS THE ANCIENT MATERIAL OF THE FUTURE

What biomaterial is sustainable, edible, and capable of being implanted in the body without causing an immune response? Silk. Two decades after Professor David Kaplan discovered how to reverse engineer silk cocoons, his colleague, Professor Fiorenzo Omenetto, is spinning out an array of useful materials that are a far cry from the silk tie. Imagine: a silk film sensor that can tell you if your bagged spinach is safe, a biodegradable silk coffee cup that takes the place of styrofoam, a silk disc that delivers medication like a pill, but fits in your wallet. And that’s only the beginning.

02/ LAUREN BLACK MENDS BROKEN HEARTS

Heart attack remains one of the leading causes of death in the United States. But Professor Lauren Black is working to change that statistic through cardiovascular tissue engineering. His focus: understanding the biophysical signaling mechanisms responsible for the development of healthy and diseased myocardium. He studies mechanical forces, electrical stimulation, and cell–matrix interactions. The ultimate goal is to design and develop new methods for repairing heart tissue—methods that will save and extend the lives of heart patients.

03/ IRENE GEORGAKOUDI SHEDS LIGHT ON DISEASE

When it comes to diagnostic techniques, no word eases a patient’s mind more than “noninvasive.” For more than 15 years, Professor Irene Georgakoudi has been conducting research related to the use of light in detecting and treating human diseases. Her main research areas are the development of novel optical biomarkers for early cancer detection, in vivo flow cytometry, and optical monitoring of cell–matrix interactions in engineered tissues. With funding from the NIH, the NSF, and the American Cancer Society, her work may make “biopsy” an anachronism.
THE WORK OF TUFTS CHEMICAL ENGINEERS TACKLES ISSUES CRUCIAL TO CREATING A HEALTHIER AND MORE SUSTAINABLE WORLD. SOME TUFTS PROFESSORS ARE FOCUSING ON CELLS’ CHEMICAL SYSTEMS TO EXPLORE THE ROLE OF FAT CELL METABOLISM. OTHERS ARE WORKING ON DEVELOPING ALTERNATIVE ENERGY SOURCES. STILL OTHERS ARE MANUFACTURING NANOMATERIALS TO REDUCE OR ELIMINATE TOXIC WASTE AND MAKE CURRENT ENERGY PRODUCTION GREENER. ULTIMATELY, THEIR WORK IMPROVES LIVES.

Obesity is an epidemic—a consequence of personal choices and the abundance of cheap, high-calorie foods—leading to health problems from diabetes to heart disease. But solving the problem will take a lot more than willpower and changes in agribusiness. Professor Kyongbum Lee is working to identify enzyme targets to reduce cellular lipid accumulation and the formation of new fat tissue. Computer Science Professor Soha Hassoun works with Professor Lee in his Tissue and Metabolic Engineering Laboratory to build computational tools to better understand these metabolic processes.

Professor Matthew Panzer engages his students in research on alternative energy—working to make the next generation of solar cells lighter, cheaper, and more flexible. By capturing ionic liquid in a gel, Professor Panzer can create a new generation of flexible electronics that could be used in inventive ways that today’s rigid and bulky batteries and supercapacitor devices can’t match. Think wallpaper lighting or touch screen t-shirts! These new supercapacitors could also be used to provide additional acceleration and charging power for electric vehicles.

Professor Maria Flytzani-Stephanopoulos, director of Tufts’ Nanocatalysis and Energy Laboratory, conducts research to solve problems in the production of clean energy. She investigates the properties of nanoscale metals and oxides as catalysts and sorbents for fuel processing and the production of hydrogen for fuel cell applications. In recognition of her work, she was elected to the National Academy of Engineering, one of the highest professional distinctions accorded an engineer. She was also named the Robert and Marcy Haber Endowed Professor in Energy Sustainability.
Roughly 800 million people don’t have access to an “improved” water source, like a piped system or protected well, designed to shield the water from microbiological contamination. What is the alternative? One short-term solution is to treat the water at home. Professor Daniele Lantagne specializes in developing, implementing, and evaluating household water treatment projects in developing countries and areas of emergency. In addition to her lab research, she has applied her knowledge to help make water treatment products more approachable and easier to use.

Even the tiniest pores in materials meant to contain wastes make it possible for pathogens, nanoparticles, and volatile contaminants to escape into the environment. Professor Kurt Pennell’s research aims to understand the fate and transport of environmental contaminants and their role in diseases such as Parkinson’s disease. His laboratory couples experimental results with mathematical models to determine processes that control the persistence of contaminants in the environment and to develop new technologies to treat contaminated soil and groundwater.

Skyscraping towers and vast suspension bridges are fixtures in urban American landscapes, even in cities prone to seismic shifts. Professor of the Practice Eric Hines explains why in courses that not only generate connections between academia and the professional world but also between engineering and the humanities. Professor Hines bases many of his assignments around building projects that he and his company are currently working on in Boston. He asks questions that challenge students to think not only as engineers but as artists, art historians, and students of architecture and design.
COMPUTER SCIENTISTS ARE KNOWLEDGEABLE PROGRAMMERS WHOSE WORK CAN DO FAR MORE THAN BUILD IMMERSIVE GAMES, INTERACTIVE WEBSITES, AND MOBILE DEVICES. COMPUTER SCIENTISTS CAN SAVE LIVES. THEY DESIGN SCHEDULING PROGRAMS TO MAKE EMERGENCY SERVICES MORE EFFICIENT. THEY MINE HEALTH DATA TO IMPROVE PATIENT CARE. THEY ENSURE THE SECURITY OF SENSITIVE INFORMATION. WITH EXTENSIVE EXPERIENCE WORKING IN INTERDISCIPLINARY TEAMS, GRADUATES BECOME INDUSTRY LEADERS IN ENGINEERING, TECHNOLOGY, SCIENCE, AND MEDICINE.

Imagine a future in which robots and human beings work on tasks together. What would the robot need to know? How would the two communicate? Professor Matthias Scheutz is researching ways to answer these fundamental questions and develop ways for humans and robots to interact more intuitively. To be successful, intelligent robots must perceive their environment, make useful inferences and decisions, and communicate effectively with humans. Outcomes will influence the design of assistive mobility technologies for people with various disabilities and support applications in telemedicine and search and rescue operations.

As robots increasingly become part of our lives, engineers connect cognitive science to computer science to make our interactions simpler and more natural. A laptop becomes a hands-on learning environment when Professor Ben Shapiro is at the keyboard. Computational biologists develop algorithms that can predict the structure and function of proteins, which are folded in complicated highly asymmetrical 3D shapes.

Educators have a name for the approach to learning that engineers love (i.e., hands-on learning). It’s called “constructionist.” As McDonnell Family Professor in Engineering Education and a member of the Center for Engineering Education and Outreach (CEED), Ben Shapiro focuses on designing virtual environments in which students learn by doing. He creates new technologies for learning and studies how engineering computational systems (e.g., video games, simulations, and social media) can help learners. The approaches he develops have the potential to transform engineering education for generations to come.

Professor Lenore Cowen studies all aspects of computational molecular biology as it relates to proteins, from sequence to structure to function, with particular interest in protein–protein interaction networks. Algorithms, machine learning, and even graphics/visualization are all part of the toolbox we need to solve problems in computational biology. Professor Cowen uses these tools to predict the presence of a protein-fold pattern called a “beta-helix” in proteins that cause disease. Innovations in vaccination and drug therapies are built on this kind of knowledge.
ELECTRICAL AND COMPUTER ENGINEERING

ELECTRICAL ENGINEERS APPLY CONCEPTS FROM PHYSICS AND MATHEMATICS TO CREATE A BROAD ARRAY OF ELECTRICAL DEVICES AND SYSTEMS. COMPUTER ENGINEERS DESIGN DEVICES AND SYSTEMS FOR THE MANAGEMENT OF INFORMATION IN DIGITAL FORM. TOGETHER THEY INVENT AND DESIGN THE INTEGRATED CIRCUITS, IMAGING TECHNOLOGY, INTERACTIVE MEDIA, COMPUTER SIMULATIONS, NANOSCALE SENSORS, PLASMA DEVICES, AND WIRELESS COMMUNICATION NETWORKS THAT HAVE BECOME INDISPENSABLE TO MODERN SOCIETY.

13/ VALENCIA JOYNER KOOMSON SPURS A REVOLUTION IN BIOLOGICAL IMAGING

MRIs, CT-scans, and X-rays have long represented the cutting edge of medical imaging technologies, but each has drawbacks because of the potential health risks they pose to patients. Professor Valencia Joyner Koomson, who directs the Advanced Integrated Circuits and Systems Lab, is working to change that with noninvasive technology that does not require the patient to lie still. Her goal is to develop sensor circuitry that can process multiple wavelengths of light passing through human tissue and send high-resolution images to neurologists and cardiologists wirelessly and in real time.

14/ SAMEER SONKUSALE BUILDS CIRCUITS FOR BIOMEDICAL MICRODEVICES

Pacemakers, cochlear implants, neurostimulators, and other wearable and implantable biomedical devices are nothing new. But engineers in labs such as Professor Sameer Sonkusale’s NanoLab are making advances that will enable the manufacturing of state-of-the-art electronic devices with even greater energy efficiency. The research group applies core expertise in integrated circuits and systems, nanotechnology, micro- and nano-fabrication, and metamaterials to challenges in new sensing and instrumentation technology.

15/ MAI VU AND SUSTAINABLE NETWORKED COMMUNICATIONS

When it comes to wireless communications, the only thing worse than a dead cell phone is an overloaded network. Blending knowledge and tools from information theory, communication theory, optimization, and signal processing for communications, Professor Mai Vu’s research looks at everything from keeping battery power optimized to enabling cooperation between resources to enhance network efficiency and reduce overload. Her work’s applications are far-reaching, touching cellular networks but also sensor networks and ad hoc networks in health care.
THE MECHANICAL ENGINEERING FACULTY AT TUFTS ARE VERSED IN MECHANICS, THERMAL AND FLUID SCIENCES, MATERIALS, ACOUSTICS, AND SYSTEM DYNAMICS AND CONTROL. BUT THEY ARE ALSO INVOLVED IN RESEARCH IN SUSTAINABLE DESIGN, ENERGY, MECHATRONICS AND ROBOTICS, BIOMECHANICAL SYSTEMS, HUMAN FACTORS, EDUCATIONAL TOOLS, AND EVEN MUSICAL INSTRUMENT DESIGN. THE STUDENTS THEY TEACH BECOME CREATIVE PROBLEM SOLVERS WHO ARE INVOLVED WITH JUST ABOUT EVERY ENGINEERED PRODUCT WE USE TODAY.

You might think military experts would be better than a group of novices at using tactical software to locate a fictitious enemy in a complex environment. But Professor of the Practice Dan Hannon would prove you wrong. An experimental psychologist by training, he recently led an experiment that shows that team performance can depend more on how information is provided—in terms of software design and experiment setup—than on prior knowledge or expertise. His research is one example of how the discipline of human factors engineering is clueing people in to the need to think about the end-user when designing products for real people.

In the Human Factors and Applied Cognitive Systems Engineering Laboratory, students research the “human element” of design, including team performance during software simulations. Mechanical engineers develop the control, navigation, and interface technologies to ensure autopilots and human pilots can safely share the roads and the skies. Using supercritical CO₂-based drying, mechanical engineers produce an energy-efficient insulation material called aerogel.

In the transportation infrastructure of the future, automated vehicles will operate alongside vehicles piloted by human beings. Making that safe presents a major engineering challenge that Professor Jason Rife’s Automated Systems and Robotics Lab is working to surmount. Their goal is to develop novel control, navigation, and interface technologies that ensure safe, reliable, and seamless interactions between human and machine. Currently, the group is investigating formal methods for detecting navigation faults to ensure that automated cars don’t violate the rules of the road.

Buildings account for roughly 40 percent of total global energy consumption. And heating and cooling systems account for 40 percent of their energy use. How can engineers reduce buildings’ energy consumption? One way is to improve insulation. By extracting alcohol from a silica gel, engineers can produce aerogel—or frozen smoke—that is twice as effective as insulation commonly used today. Professor Marc Hodes is performing experiments to create more cost-effective processes that will make aerogels the sustainable insulation material of the future.
TUFTS ENGINEERING AT A GLANCE

TUFTS SCHOOL OF ENGINEERING COMBINES THE CHALLENGE OF A RESEARCH UNIVERSITY AND THE INTELLECTUAL CHARGE OF A LIBERAL ARTS COLLEGE ATMOSPHERE. STUDENTS HAVE AN ABUNDANCE OF OPPORTUNITIES TO PARTICIPATE IN FACULTY RESEARCH AND TO BENEFIT FROM OUTSTANDING TEACHING. READ ON FOR A GLIMPSE INTO THE LIFE OF A TUFTS ENGINEER, BOTH IN AND OUT OF THE CLASSROOM.
ACADEMICS: DEPTH AND BREADTH

CENTURIES AFTER LEONARDO DA VINCI STARTED THE TREND, TODAY’S MULTIFACETED ENGINEERS ARE MIXING ENGINEERING MAJORS WITH MUSIC, ECONOMICS, BIOLOGY, GEOLOGY, FOREIGN LANGUAGES, AND MORE. OUR ENGINEERS CROSS BOUNDARIES AT TUFTS AND AROUND THE GLOBE.

MAJORS AND MINORS
STUDENTS CHOOSE AN ENGINEERING MAJOR BUT ALSO HAVE THE OPPORTUNITY TO TAKE CLASSES OR EVEN DOUBLE MAJOR WITHIN THE SCHOOL OF ARTS AND SCIENCES.

Professional Degrees
> Biomedical Engineering
> Chemical Engineering
> Civil Engineering
> Computer Engineering
> Computer Science
> Electrical Engineering
> Environmental Engineering
> Mechanical Engineering

Additional Degree Options
> Architectural Studies
> Engineering
> Engineering Physics
> Engineering Psychology/Human Factors
> Engineering Science
> Environmental Health

Five-Year Engineering Master's Programs
Exceptional engineering students have the option of pursuing five-year combined degree programs.
> Bachelor of Science and Master of Science (B.S.–M.S.)
> Bachelor of Science and Master of Engineering (B.S.–M.Eng.)

School of Arts and Sciences Majors
*available only as a double major
> Africana Studies
> American Studies
> Anthropology
> Applied Mathematics
> Applied Physics
> Arabic
> Archaeology
> Architectural Studies
> Art History
> Astrophysics
> Biochemistry
> Biology
> Biomedical Engineering Sciences*
> Biopsychology
> Biotechnology*
> Chemical Physics
> Chemistry

Professional Degrees
> Child Study and Human Development
> Chinese
> Classical Studies
> Cognitive and Brain Sciences
> Community Health
> Computer Science
> Drama
> Economics
> Education*
> Engineering Psychology/Human Factors
> English
> Environmental Studies*
> Film and Media Studies
> French
> Geological Sciences/Earth and Ocean Sciences
> Geology/Earth and Ocean Sciences
> German Language and Literature
> German Studies
> Greek
> Greek and Latin
> History
> Interdisciplinary Studies
> International Literary and Visual Studies
> International Relations
> Italian Studies
> Japanese
> Judaic Studies
> Latin
> Latin American Studies
> Mathematics
> Middle Eastern Studies
> Music
> Peace and Justice Studies
> Philosophy
> Physics
> Political Science
> Psychology
> Psychology/Clinical Concentration
> Quantitative Economics
> Religion
> Russian and Eastern European Studies

Five-Year Combined Degree Programs
> Tufts/New England Conservatory: BA or BS and Bachelor of Music
> Tufts/SMFA (School of the Museum of Fine Arts): BA or BS and Bachelor of Fine Arts

Minors
> Africana Studies
> Arabic
> Architectural Engineering
> Architectural Studies
> Art History
> Asian American Studies
> Astrophysics
> Biotechnology Engineering
> Chemical Engineering
> Child Study and Human Development
> Chinese
> Cognitive and Brain Sciences
> Colonialism Studies
> Computer Science
> Dance
> Drama
> Economics
> Education
> Engineering Education
> Engineering Management
> English
> Entrepreneurial Leadership
> Film and Media Studies
> Finance
> French
> Geology
> Geosystems/Earth and Ocean Sciences
> German
> Greek
> Greek Archaeology
> Greek Civilization
> Hebrew
> History
> Italian
> Japanese
> Judaic Studies
> Latin
> Latin American Studies
> Latino Studies
> Leadership Studies
> Linguistics
> Mathematics
> Medieval Studies
> Music
> Music Engineering
> Philosophy
> Physics
> Political Science
> Religion
> Roman Archaeology
> Roman Civilization
> Russian
> Sociology
> Spanish
> Studio Art
> Urban Studies
> Women’s, Gender, and Sexuality Studies

PETER WU E17
MAJOR: Electrical Engineering; MINOR: Music
ENGINEERING; HOMETOWN: Seattle, WA; RESEARCH PROJECT: Rebuilding 1970s synthesizers with modern circuitry to maintain their classic analog sound while ensuring they stay in tune. “I get to spend the summer working almost completely independently on a funded project I am passionate about.”
TUFTS AROUND THE WORLD

Study Abroad
Like their counterparts in the School of Arts and Sciences, Tufts engineering undergraduates may participate in full-year or semester-long foreign study programs. Opportunities include a summer at Tufts’ campus in Talloires, France, a semester or year abroad at one of more than 200 pre-approved programs, or one of Tufts’ study abroad programs in Chile, China, England (London or Oxford), France (Paris), Germany, Ghana, Hong Kong, Japan, or Spain.

Engineers Without Borders
Tufts’ Engineers Without Borders (EWB) works with its national parent organization to design sustainable development projects for communities around the world. EWB currently manages engineering initiatives in Uganda and the Dominican Republic with past completed projects in Ecuador and Tibet. The organization pursues two goals: creating sustainable solutions for community challenges around the globe and instilling Tufts engineers with an abiding sense of social responsibility.

Institute for Global Leadership
Tufts’ Institute for Global Leadership provides international projects and programs for students across disciplines. For example, through IGL’s Building Understanding through International Learning and Development (BUILD) program in India, students work with partners in rural communities to research and implement sustainable initiatives, such as creating a library complete with computer technology and installing low-water usage sanitation systems.

ALUMNI LEADERS

Ellen Kullman E78, Chair of the board and CEO of DuPont, was recently elected to the National Academy of Engineering. “Tufts helped me understand the importance of adhering to sound values—respect for people, ethics, safety, and the environment,” she said.

CENTER FOR STEM DIVERSITY
Tufts University’s Center for STEM Diversity is addressing the need to increase diversity in the STEM (science, technology, engineering, and math) fields. The center works with both undergraduate and graduate students from diverse backgrounds and experiences by helping them navigate science and engineering disciplines from an academic and social perspective.

Bridge to Engineering Success at Tufts (BEST)
In conjunction with Undergraduate Admissions, the Center for STEM Diversity coordinates BEST, a six-week summer program for incoming first-year engineering students from underrepresented groups. The program gives nominated students an opportunity to take two courses for credit and to learn about the breadth of engineering majors at Tufts. Students also participate in workshops designed to assist students in the transition from high school to college.

DANIELLA DIPAOLA E16
MAJOR: Engineering Psychology; HOMETOWN: Smithfield, RI; INTERNSHIP: Department of Transportation Safety and Operations Intern ACTIVITIES: Student Teacher Outreach Mentorship Program (STOMP)
“I feel like I’m making a difference when ten-year-olds tell me they want to be engineers one day.”

BARTON LIANG E16
MAJOR: Civil Engineering; MINOR: Engineering Management; HOMETOWN: Hong Kong; ACTIVITIES: Theta Chi fraternity, rugby, Tufts Dance Collective, LGBT peer education
“At Tufts I learned to always [look beyond] the physical aspects of a project [to] social, cultural, environmental, and economic factors.”
OUTCOMES

TUFTS ENGINEERS ARE PREPARED FOR MASTER’S AND DOCTORATE PROGRAMS, PROFESSIONAL SCHOOLS, AND FOR TODAY’S HIGHLY COMPETITIVE JOB MARKET. TUFTS ALUMNI ACHIEVE SUCCESS IN FIELDS FROM MEDICINE TO LAW TO EDUCATION, AND THEY LEAD TOP COMPANIES IN AND AROUND BOSTON, ACROSS THE NATION, AND WORLDWIDE.

INTERNSHIPS

INTERNSHIPS ABOUND. TUFTS HAS RELATIONSHIPS WITH TOP COMPANIES THAT PROVIDE EXCELLENT HANDS-ON TRAINING AND RESUMÉ-BUILDING OPPORTUNITIES THAT HAVE LED TO FULL-TIME EMPLOYMENT.

> Apple
> Abbott Bioresearch Center
> Advent Software
> Allergan Medical
> Analog Devices
> BioGen Idec
> Bose
> Bridge-22
> Casco Bay Engineering
> Columbia University
> Charles River Analytic
> Clark Construction
> Dow
> Elmet Technologies
> EMC
> Federal Energy Regulation Commission
> FLEXcon
> FMC Technologies, Inc.
> Fuss and O’Neill
> G.E. Aviation
> General Motors
> Genzyme
> Google
> Harley Davidson
> Harpoon Brewery
> Hyundai
> iRobot
> Kayak
> Listen
> Lockheed Martin
> Lyric Semiconductor
> Mars Foundation
> Massachusetts Department of Health
> MathWorks
> Mercedes-Benz Research and Development, North America
> Microsoft
> Millipore
> MIT Lincoln Laboratory
> Morgan Stanley
> Myers Power Products, Inc.
> Nicholson Construction Company
> Palantir Technologies
> Physicians for Human Rights
> Proctor and Gamble
> Rise
> SA Robotics
> SGST
> SPEC Process Engineering and Construction
> Textron
> Trophos Energy
> Turner Construction Company
> University of California–Santa Barbara
> Volpe National Transportation Systems Center
> Zigelbaum+Coelho

EMPLOYMENT

TUFTS ENGINEERING GRADUATES EXCEL IN COMPANIES OF EVERY SIZE AND CONFIGURATION, FROM SMALL START-UPS TO MULTINATIONAL CORPORATIONS. OUR GRADUATES INCLUDE FOUNDERS AND CEOs. YOU WILL FIND JUMBOS IN THEIR DREAM JOBS, BUILDING FLYING CARS AT TERRAFUGIA OR WORKING AS EFFECTS ARTISTS AT DREAMWORKS.

> Ad Astra Rocket Company
> Agen
> Apple
> Avon Products
> Bose
> Continental Tires (Germany)
> Convergence Medical Devices
> Draper
> DreamWorks
> DuPont
> G.E. Aviation
> Howard Hughes Medical Institute
> iCreate to Educate
> Johnson & Johnson
> MC10
> Millipore
> MIT Media Lab
> Newell Rubbermaid
> Nuvera Fuel Cells
> Phillips Academy
> Plantir Technology
> Raytheon
> SAP North American Sales Delivery
> Second Wind Inc.
> SolidWorks
> The Dannon Company
> U.S. Department of State
> Unilever

JACOB BERLINER E16

MAJOR: Chemical Engineering; HOMETOWN: Philadelphia, PA; INTERNSHIP: Solar Energy Lab intern; PROFESSIONAL MEMBERSHIP: American Institute of Chemical Engineers

“Tufts …makes you realize the importance of what you’re learning in order to apply it to real-world issues and innovations.”

NIKHIL SHINDAY E16

MAJOR: Computer Science; HOMETOWN: Santa Barbara, CA; ACTIVITIES: Tufts theatre club technical director; Tufts Drama Department shop hand; CEO of SmartShield, an automobile software design company

“There’s no easier place than Tufts to be a well-rounded engineer, in and out of the classroom.”
PROFESSIONAL SOCIETIES AND ORGANIZATIONS
JOINING TUFTS STUDENT CHAPTERS OF PROFESSIONAL ORGANIZATIONS GRANTS STUDENTS ACCESS TO NETWORKS THAT OFFER SUPPORT AND OPEN DOORS. PROFESSIONAL SOCIETY CONFERENCES, NETWORKING EVENTS, AND COMPETITIONS ENHANCE THE CLASSROOM AND LAB EXPERIENCES IN PREPARING ENGINEERS FOR INTERNSHIPS, CAREERS, AND GRADUATE SCHOOL.

- American Institute of Chemical Engineers (AIChE)
- American Society of Civil Engineers (ASCE)
- American Society of Mechanical Engineers (ASME)
- Association for Computing Machinery (ACM)
- Biomedical Engineering Society (BMES)
- Tufts Human Factors and Ergonomics Society (THFES)
- Institute of Electrical and Electronics Engineers (IEEE)
- National Society of Black Engineers (NSBE)
- Society of Latino Engineers and Scientists (SOLES)
- Society of Women Engineers (SWE)

TUFTS GORDON INSTITUTE
TUFTS GORDON INSTITUTE (TGI) PROVIDES STUDENTS WITH THE KNOWLEDGE AND SKILLS THEY NEED TO BUILD AND LEAD TEAMS, ORGANIZATIONS, AND ENTERPRISES. THE FACULTY WHO TEACH TGI’S UNDERGRADUATE AND GRADUATE COURSES HAVE EXCELLED IN INDUSTRY AND KNOW WHAT IT TAKES TO SUCCEED.

Engineering Management Minor
The Engineering Management minor is a rigorous, leadership-focused course of study that emphasizes real-life experience and engineering practice, not just theory. Through coursework and projects, students gain knowledge and directly applicable skills in the process of innovation, the management of people and organizations, leadership, and communications. Students graduate with a competitive edge, pushing the boundaries of innovation and making significant contributions as soon as they enter the workplace.

Master of Science in Engineering Management
Recognized by the National Academy of Engineering for excellence in engineering education, the Master of Science in Engineering Management (M.S.E.M.) is a unique graduate degree program designed to enhance technical experience with advanced management and leadership skills. Coursework emphasizes product innovation and development, supply chain management, sustainability, and global business strategy. Case studies and real-world projects relate directly to technology-based organizations.

Entrepreneurial Leadership Minor
In the Entrepreneurial Leadership minor, undergraduate students learn to develop business plans, to secure funding at each stage in the entrepreneurial process, and to formulate marketing strategies to successfully leverage these plans in the marketplace. With access to real-world business networks and internship opportunities, Entrepreneurial Leadership students bring excellence and innovation to the organizations they create or join.

COMPETE FOR $100K
Sponsored by the Entrepreneurial Leadership Program, TGI’s Annual New Ventures Competition offers $100,000 in cash and in-kind services to the teams with the best plans to fulfill either a business objective or a social mission.

JACQUELYN NWAGWU E18
MAJOR: Chemical Engineering; HOMETOWN: Los Angeles, CA; PROFESSIONAL MEMBERSHIPS: Society of Women Engineers, American Institute of Chemical Engineers
“My research on semipermeable membranes has exposed me to the many possibilities within chemical engineering.”

WATSON GIFFORD E16
MAJOR: Biomedical Engineering; MINOR: Engineering Management; HOMETOWN: Silver Spring, MD; INTERNSHIP: Tufts’ Silk Lab/Tissue Engineering Resource Center Intern
“The leadership skills we practice in engineering management have really enriched my work in the tissue engineering resource center.”
TUFTS OFFERS A SOCIAL SCENE SO LIVELY YOUR SCHEDULE WILL ALWAYS BE PACKED. PURSUE YOUR PASSION FOR JOURNALISM, DANCE, MUSIC, OR HARRY POTTER ON TUFTS’ 150-ACRE RESIDENTIAL CAMPUS, OR EXPLORE BOSTON, AMERICA’S BIGGEST COLLEGE TOWN, WHICH IS JUST FIVE MILES AWAY.

CLUBS AND ORGANIZATIONS
THE MAYER CAMPUS CENTER IS THE HUB OF STUDENT ENGAGEMENT IN ORGANIZED ACTIVITIES THAT INVOLVE EVERYTHING FROM POLITICS TO RELIGION TO CULTURE TO THE ARTS. HERE IS A SAMPLING:

**Engineering**
- Architectural Society
- Engineering Student Council
- Engineers Without Borders
- Tau Beta Pi (Engineering Honor Society)
- Student Teacher Outreach Mentorship Program (STOMP)
- Tufts Order of the Engineer
- Tufts Robotics Club
- Women in Computer Science

**Pre-Professional**
- American Chemical Society
- American Medical Student Association
- Child Development Association
- Economics Society
- Pre-Dental Society
- Pre-Legal Society
- Pre-Medical Society
- Pre-Veterinary Society
- Public Health at Tufts
- Tufts Financial Group

**Religious Student Organizations**
- Asian Christian Fellowship
- Baha’i Association
- Buddhist Sangha at Tufts
- Catholic Community at Tufts
- Hillel
- Muslim Student Association
- Orthodox Christian Fellowship
- Protestant Student Fellowship
- Tufts Christian Fellowship

**Cultural Organizations**
- African Student Organization
- Arab Student Organization
- Armenian Club
- Caribbean Club
- Chinese Student Association
- Filipino Cultural Society
- Hawaii Club
- Hellenic Society
- Hong Kong Students Association
- Indian Society at Tufts
- International Club
- Japanese Culture Club
- Korean Students Association
- Middle Eastern Student Society
- Multiracial Organization of Students at Tufts
- Pan-African Alliance
- Puerto Rican Association
- Queer Straight Alliance
- Russian Circle
- Taiwanese Association of Students at Tufts
- Thai Club
- Tufts Transgendered Lesbian Gay Bisexual Collective
- Vietnamese Student Club

**Performance/Arts Organizations**
- BEATS (percussion performance)
- Beelzebubs
- Chamber Singers
- Cheap Sox
- Chorale
- Irish Dance Team
- Gospel Choir
- HYPE Mime Group
- Jumbo Marching Band
- Pen, Paint, and Pretzels
- Sarabande
- Tomb Ticket II
- Tufts Capoeira
- Tufts Dance Collective
- Tufts Jazz Orchestra
- Tufts Symphony Orchestra
- Tufts University Wind Ensemble
- TURBO (break-dancing troupe)

**Government/Political Groups**
- American Civil Liberties Union
- Amnesty International
- Debate Society
- Students for the Ethical Treatment of Animals
- Tufts Community Union Senate
- Tufts Council of International Affairs
- Tufts Democrats
- Tufts Feminist Alliance
- Tufts Republicans
- Tufts VOX

**Greek Organizations**
- Alpha Epsilon Pi
- Alpha Omicron Pi
- Alpha Phi
- ATO of Massachusetts
- Chi Omega
- Delta Tau Delta
- Delta Upsilon
- Kappa Alpha Theta
- Lambda Sigma Upsilon
- Lambda Upsilon Lambda
- Omega Phi Beta
- Sigma Nu
- Sigma Phi Epsilon
- Theta Chi
- Theta Delta Chi
- Zeta Beta Tau
- Zeta Psi

**Media**
- Hemispheres
- Observer
- Onyx
- Optimus Prime
- Outbreath
- Primary Source
- South Asian Literary and Arts Magazine
- Tufts Daily
- Tufts Film Series
- TuftsScope
- TuftsLife.com
- TUTV
- WMFO 91.5 FM
- Yearbook
- Zamboni

GARDY KEVIN LIGONDE E16
MAJOR: Mechanical Engineering
HOMETOWN: Port-au-Prince, Haiti
PROFESSIONAL MEMBERSHIP: National Society of Black Engineers
ACTIVITIES: Robotics Club
"Being involved in the Robotics Club has encouraged me to think creatively; I participated in a sumo-wrestling competition last semester!"

CAMILLE SAIDNAAWEY E17
MAJOR: Mechanical Engineering
HOMETOWN: Belmont, MA
ACTIVITIES: Society of Women Engineers Executive Board, Hippotherapy project with Tufts Institute for Human Animal Interaction
"My friends are fantastic motivators. They support me through the challenging parts of balancing activities outside of class."

GARDY KEVIN LIGONDE E16
MAJOR: Mechanical Engineering
HOMETOWN: Port-au-Prince, Haiti
PROFESSIONAL MEMBERSHIP: National Society of Black Engineers
ACTIVITIES: Robotics Club
"Being involved in the Robotics Club has encouraged me to think creatively; I participated in a sumo-wrestling competition last semester!"
SPORTS
TUFTS COMPETES IN THE NEW ENGLAND SMALL COLLEGE ATHLETIC CONFERENCE (NESCAC), ONE OF THE PROUDEST AND MOST COMPETITIVE CONFERENCES IN THE NCAA DIVISION III. TUFTS ALSO OFFERS INTRAMURAL AND CLUB SPORTS.

Division III Sports
Unless otherwise noted, sports offer both men’s and women’s teams:
> Baseball (M)
> Basketball
> Crew
> Cross country
> Diving
> Fencing (W)
> Field hockey (W)
> Football (M)
> Golf (Coed)
> Ice Hockey (M)
> Lacrosse
> Lightweight Crew (W)
> Sailing (Coed)
> Soccer
> Softball (W)
> Squash
> Swimming
> Tennis
> Track and Field
> Volleyball (W)

Sports Facilities
Tufts athletes train and compete in a complex of facilities featuring:
> The brand new Steve Tisch Sports and Fitness Center, a 42,000-square foot state of the art facility, with an expanded and reconfigured fitness and weight training area, new locker rooms, teaching and activity rooms, and coaches’ offices.
> A 70,000-square-foot indoor sports center, which includes a 200-meter track and four tennis courts. The center also features an 8,000-square-foot fitness center.
> One of New England’s best outdoor track and field facilities
> A boathouse on the Malden River with indoor training and meeting rooms for Tufts’ crew teams
> Indoor basketball, volleyball, and squash courts
> A yacht club on Medford’s Upper Mystic Lake
> A six-lane indoor pool and sauna
> Several well-groomed playing fields located across the Medford/Somerville campus
> Free weights, strength-training equipment by Cybex, Body Master, Samson, and Hammer Strength, and a team of full-time strength and conditioning specialists and sports medicine experts

Intramural and Club Sports
Intramural sports vary yearly based on interest level. Recent intramural sports have included badminton, basketball, dodgeball, flag football, softball, tennis, volleyball, and Wiffleball. Club sports offer a competitive schedule against regional and national teams including cycling, equestrian, fencing, rugby, skiing, table tennis, Ultimate Frisbee, volleyball, and water polo.

DAVIS AND MEDFORD
About a 15-minute walk or short shuttle ride from campus is Davis Square, a popular destination that offers plenty of coffee shops, restaurants, multiple live performance venues, and an independent movie theater. More than 250,000 college students live in and around the greater Boston area, so whether you are looking for live music, sports, entertainment, a dance club, or just a low-key spot to hang out with friends, the opportunities are endless.
The nice thing about living in Medford/Somerville is that while it is just a short T (subway) ride from downtown Boston, it is also right in the heart of an area perfect for biking and any number of outdoor activities.

For more on visiting Boston, please see us online at admissions.tufts.edu/visit.

JUMBOS FOR THE WIN
This year, pitcher Allyson Fournier E15, a chemical engineering major, was named DIII Honda Athlete of the Year for the second time in her career. Fournier led the Jumbos to three straight national titles in as many years, and led the nation this year in shutouts (22) and strikeouts (422). The Jumbos closed out 2015 with a perfect season: 51 wins in a row.

DAISY DRAPER E18
“Being a part of Engineers Without Borders is incredibly rewarding. You get to see how a project is developed from start to finish.”

SAM BRONER E16
MAJOR: Computer Science; HOMETOWN: New York, NY; SPORT: Rugby; OTHER: Theta Delta Chi
“I find that the more I do, the more organized I am. I played three sports in high school, so I was looking for a way to stay active at college. Joining the rugby team was a great way to jump into the Tufts community.”
APPLY
What We Look For
The admissions committee uses the following criteria to gain a sense of your academic accomplishments and potential:
> Rigor of courses, especially in core subjects (English, foreign language, math, science, and social studies)
> Grades achieved in high school
> Your high school environment
> Standardized test scores
> For students applying to the School of Engineering, an understanding of how your interest in studying engineering has developed.

What to Submit
> Common Application with Tufts Supplemental Writing Prompts
> High School Transcripts
> SAT and Two Subject Tests or ACT Test with Writing
For students applying to the School of Engineering, if you submit the SAT please submit one math and either chemistry or physics for Subject Tests.
> Letters of Recommendation
As your senior year approaches, you should identify one or two teachers from core academic subjects to write on your behalf. We require only one teacher recommendation (sending two is fine) along with a letter from your guidance or college counselor.

Optional Admissions Materials
> Alumni Interview
First-year applicants to the university will be able to request a personal interview in their local area with a member of the Tufts Admissions Network. More information is available on our website under Interview.

Early Decision
The Early Decision (ED) Program is a binding option for students who have decided that Tufts is their first choice and that they will enroll if accepted. Read more about this option on our website in the Apply section.

Transfer Admission
The School of Engineering considers transfer applicants in good academic and disciplinary standing at accredited two- and four-year institutions. For more information, visit the Information for Transfer Applicants section of our website, email us anytime at transfer.admissions@ase.tufts.edu, or call 617-627-3170.

International Student Admission
Requirements for international students are the same as for all other first-year applicants. Students for whom English is not the primary language, or not the language of instruction in their secondary school, should take the Test of English as a Foreign Language (TOEFL). The minimum required TOEFL score is 100 on the Internet-based test. We also accept the IELTS, with a minimum score of 7 required.

Application Deadlines and Notification Dates

Early Decision I
Application Deadline: Nov. 1
Notification Deadline: Dec. 15

Early Decision II
Application Deadline: Jan. 1
Notification Deadline: Early Feb.

Regular Decision
Application Deadline: Jan. 1
Notification Deadline: Apr. 1

Transfer Admission
Application Deadline: March 15
Notification Deadline: Mid-May
Financial Aid
Tufts meets 100 percent of the demonstrated need of all accepted financial aid applicants. All undergraduate financial aid is based solely on financial need as determined by an analysis of family finances.

Determining Need
Your family contribution: Financial need is the difference between the cost of attending Tufts for one year and our estimate of what the family can contribute toward those costs.

Students and their families are expected to contribute to the undergraduate expenses to the extent that they are able. In order to determine the family contribution, our financial aid office carefully reviews the information reported on the Free Application for Federal Student Aid (FAFSA), the CSS Profile, and the family’s tax returns. Use the Tufts Financial Aid Calculator at uss.tufts.edu/finaid to get an estimate of the expected family contribution and gain insight into your financial aid eligibility.

Types of Aid
Financial aid awards typically include a combination of student loans, work-study, and grants. Students may use Army, Navy, and Air Force ROTC scholarships at Tufts.

Scholarships: Tufts does not offer any merit, academic, or athletic scholarships. The only exceptions are Tufts National Merit Scholarships (which range from $500 to $2,000, depending on financial need).

Application Procedures
Financial aid applications cannot be considered until all required documents have been received. In completing these forms, use the best figures available to you, and estimate if necessary to meet deadlines. Please refer to the Financial Aid website for information on how to submit the required documents: uss.tufts.edu/finaid.

Required Documents
> The Free Application for Federal Student Aid (FAFSA). The Tufts code is 002219.
> College Scholarship Service (CSS) PROFILE Form. The Tufts code is 3901.
> Signed copies of all pages, schedules, and W-2’s of the parents’ and student’s most recent federal tax returns.

Financial Aid Application Deadlines
Early Decision I Dec. 1
Early Decision II Feb. 1
Regular Decision Feb. 15

Financial Aid Notification
Students who are offered admission to Tufts and submit all of the financial aid application materials on time will be notified of their financial aid decision within a week of receiving their admissions acceptance.

TUITION AND FINANCIAL AID
Comprehensive Fee and Estimated Costs, 2015–2016

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<th>Item</th>
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<tr>
<td>Tuition and Fees</td>
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<td><strong>Total</strong></td>
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Can’t Make an Open House?
We understand that not everyone can attend an open house, so we encourage you to visit us on another day that’s better for you. We recommend signing up for an engineering information session, a general campus tour, and an engineering facility tour to receive the full engineering experience. For more information and specific dates and times, please see the Visit section of our website, admissions.tufts.edu.

ENGINEERING INFORMATION SESSION
Engineering information sessions pay particular attention to the teaching, research, and values of the School of Engineering. However, if you are unable to register for an engineering information session, we understand that engineering will be covered in the general information sessions held throughout the week. We request that you do not sign up for both a general and engineering information session.

ENGINEERING FACILITY TOURS
Current undergraduate engineering students lead facility tours on Mondays and Fridays in the fall and spring at 3:00 PM, after the general campus tour. The 45-minute facility tour offers the opportunity to learn more about Tufts from an engineering student’s perspective and walk through selected engineering and science facilities.

FALL OPEN HOUSE DAYS
From meeting Tom, the dancing robot chicken, to learning more about our intellectually powerful and playful community, our open houses invite you to experience life as a Jumbo engineer.

Each fall we host three Engineering Open House (EOH) programs to introduce you to everything engineering-related at Tufts. We also host Women in Engineering (WIE) at Tufts, an open house that celebrates the supportive community and opportunities for female engineers on our campus. These open houses are an opportunity for us to walk you through our curriculum, undergraduate research and internship opportunities, and what our engineers do outside of the classroom.

Schedule
Beginning with breakfast, we welcome you to speak with current engineering students and members of the admissions staff. Afterwards, Tufts professors and students lead interactive panels and tours of the engineering facilities and of campus so you can learn about what our engineers do both in and out of the classroom. Also feel free to join us for lunch in the dining hall before we answer your questions at the academic and admissions question-and-answer sessions.

VISITING TUFTS

Photography throughout by John Davis Photography or provided by Tufts Photo/Tufts University with the following exceptions: Firenze Omenetto cover, inside front cover, and back cover; Catherine Madden p. 2; Pennell Research Group pp.4–5; Alonso Nichols/Tufts Photography pp.6–7; Georgakousi and Black Labs pp. 8–9; Bruce Weller, pp. 24. Produced by Hecht/Horton Partners, Tufts School of Engineering, and the Office of Undergraduate Admissions at Tufts University.

Can’t Visit in Person?
Or just want a sneak peek? Customize a virtual tour at admissions.tufts.edu/virtual-tour.