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*On the Cover: Working in Assistant Professor James Van Deventer’s lab as a summer scholar, Greg Berumen, E19, prepared samples and researched inhibitors that can target enzymes that play crucial roles in tumor progression.*
Dean's Message

From a highly successful Engineers Week celebration to the launch of three new academic degrees and the approval of seven more, 2017-18 has been a stellar year for the School of Engineering. It is my pleasure to share with you some of the year’s accomplishments and highlights. This year, we came closer than ever before to enrolling a first-year class that is half women: 49 percent of the incoming Class of 2022 are women. Women engineers constitute 40 percent of our total undergraduate population, which, I am proud to say, positions Tufts as having one of the most gender-balanced engineering undergraduate programs in the country. We continue to believe that the diversity of our students enriches our community and provides multiple perspectives that strengthen the academic and social experience at Tufts, and to warmly welcome and support all students.

Tufts engineering students are exceptionally well-rounded, excelling both in and out of the classroom. This year, students published research in peer-reviewed journals like Proceedings of the National Academy of Sciences, received prestigious national graduate fellowships, and created research images that will be used as tools to engage the public and members of Congress on the importance of federal funding to sustain biomedical research. They organized successful events that provided fellow students with invaluable hands-on experience and networking opportunities, including the annual Polyhack hackathon and the inaugural Women in Technology Conference. Teams of students also won entrepreneurial pitch competitions and firefighting robot contests, and one student earned All-American honors as one of the top five finishers in the country in her event at the NCAA Division III Indoor Track National Championship.

Our faculty conduct groundbreaking research in our three strategic research areas: human health, the human-technology interface, and sustainability. This year, faculty developed a non-invasive optical imaging method that detects early, subtle changes in cellular metabolism that can herald chronic conditions like cancer and cardiovascular disease. They created an improved algorithm for self-localizing and tracking mobile devices – a development that could meet the demands of a projected 50 billion connected products in the Internet of Things by 2020. They discovered a breakthrough process for methane conversion that could lead to more energy-efficient production of methanol or acetic acid, and developed new and highly selective membrane filters that could enable manufacturers to separate and purify chemicals in ways that are more energy efficient and less wasteful.

Our students, faculty, staff, and alumni are coming together to build community, innovate undergraduate education and transform graduate education, connect people and ideas for innovation, enhance financial resources to support our mission, and empower scholarship, discovery, and invention. Read on, and pay a visit to engineering.tufts.edu or our Medford and Somerville campus, to learn more about the past year in the School of Engineering and the exciting times ahead.

Sincerely,

Jianmin Qu
Dean, Tufts School of Engineering
Karol Family Professor
Selected Faculty Achievements

This year, School of Engineering faculty received international recognition for their expertise. Professor Fiorenzo Omenetto of the Department of Biomedical Engineering (BME) was selected as one of four new Tällberg Global Leaders. Professor Maria Flytzani-Stephanopoulos of the Department of Chemical and Biological Engineering (ChBE) was named an Honorary Professor at Beijing University of Chemical Technology. Professor Diane Souvaine of the Department of Computer Science (CS) was appointed Chair of the National Science Board, the governing body of the National Science Foundation.

Professor and Dean of Graduate Education Karen Panetta was elected the incoming president of IEEE-Eta Kappa Nu. Assistant Professor Kristen Wendell of the Department of Mechanical Engineering (ME) was named to ASEE Prism’s list of pace-setters in the field of engineering education.

Six faculty members were named Fellows of professional societies, including Dean Jianmin Qu (ME) in IEEE and Professor Sergio Fantini (BME) in the Optical Society of America.
Faculty received Tufts awards for their teaching prowess and innovation in the classroom, including Professor Steven Chapra of the Department of Civil and Environmental Engineering (CEE), Professor of the Practice Ronald Lasser (ECE), Associate Professor Sam Guyer (CS), Director Merredith Portsmore of the Center for Engineering Education and Outreach (CEEO), and Professor of the Practice James Intriligator (ME).

In 2017, Professor Laurie Baise was named the new chair of the Department of Civil and Environmental Engineering. Jack Derby of Tufts Gordon Institute (TGI) was appointed the Cummings Family Professor of the Practice in Entrepreneurship and named director of the Entrepreneurial Leadership Studies Program. Assistant Professor Jivko Sinapov was named the James Schmolze Assistant Professor in Computer Science, and Assistant Professor Liping Liu was named the Schwartz Family Assistant Professor in Computer Science.

Assistant Professor Robert C. Viesca (CEE) received tenure and was promoted to associate professor, and Associate Professor Marc Hodes (ME) was promoted to full professor. Professor Jeffrey Foster (CS) was hired as a tenured full professor.
Selected Student and Alumni Achievements

Engineering students and alumni stood out this year in areas that ranged from research to entrepreneurial ventures. Ph.D. candidate Tao Sun was first author on a paper, published in *Proceedings of the National Academy of Sciences*, that detailed successful tests of a method to help transmit medications across the blood-brain barrier. Ph.D. candidate Dimitra Pouli (EG18, BME) was selected to participate in the 68th Lindau Nobel Laureate Meeting for Young Scientists. Four Engineering students and alumni received NSF Graduate Research Fellowships or National Defense Science and Engineering Graduate Fellowships.

Four recent SOE and Computer Science alumni were listed in Forbes’ “30 Under 30” for 2018. One of those alumni, Earl St Sauver (E13, ChBE), also won first place in the Social Impact track at the Tufts $100k New Ventures Competition with his company Apollo Agriculture, which uses machine learning to help small farmers.

After tying for first place in the $100k Competition’s General & High Tech category, the ZwitterCo team — comprised of SOE alumni and TGI students, marketing nanofiltration membranes developed in Assistant Professor Ayse Asatekin’s lab (ChBE) — went on to receive funding from the Massachusetts Clean Energy Center. Lithio Storage, which was a runner-up in the 2017 $100k Competition and was co-founded by Ph.D. candidate Anthony D’Angelo (EG18, ChBE), won the $100,000 Grand Prize in the MIT Clean Energy Prize competition, with its batteries designed for large-scale storage.

When part-time M.S. student Peter Souders isn’t studying mechanical engineering, he’s competing with the U.S. Olympic Fencing Team.
CS alumni Henry Zhou and Jeremy Slavitz, E17, turned their senior capstone project into a virtual reality dog simulator called RoVR.

The ZwitterCo team tied for first place in their track at the 2018 $100k New Ventures Competition.

Ph.D. graduate Dimitra Pouli researched in the Optical Diagnostics for Diseased and Engineered Tissues Lab.

Senior Annalisa DeBari (ME) co-captained the women’s track and field team, and earned All-American honors in the 60-meter hurdles.

Members of the VASERA team (all Engineering seniors) celebrate their Ricci Prize win at the $100k Competition.

Ph.D. candidate Anthony D’Angelo co-founded Lithio Storage, which won the $100,000 Grand Prize in the MIT Clean Energy Prize competition.
In February, the School of Engineering hosted a newly expanded Engineers Week, inviting all students and the Tufts community to engage with engineering. The week included a number of opportunities for students to network with alumni and receive one-on-one career advice, and was capped off by a keynote Dean’s Lecture from inventor and entrepreneur Dean Kamen, founder of DEKA Research and Development Corporation. In the fall, the Dean’s Lectures were delivered by Dave Power, E75 and EG75, the president and CEO of Perkins School for the Blind, and Bin Lin, co-founder and president of Xiaomi.

**Undergraduate Education:** Tufts School of Engineering continues to attract a high caliber of undergraduate students. There were 4,063 applications this year, which is a record high and represents a 27.2% increase over the last five years. The acceptance rate was 15.4%, and the quality of accepted students continues to hold strong when considering mean ACT and SAT scores: 34.1 (out of a total possible score of 36) as the ACT mean and 1494 (out of 1600) as the SAT mean. The Class of 2022 is comprised of 49% women (another record), 41% Americans of color, 12% foreign citizens, and 17% first-generation college students. This year, the School of Engineering launched plans for a new B.S. in Data Science (CS) and for a new cooperative education pilot that will provide on-the-job experiences for BME undergraduates interested in learning more about career opportunities in the biomedical and biological sciences.

**Graduate Education:** Our graduate programs continued to grow this year. There were a record number of M.S. and Ph.D. applications, resulting in a projected 23% increase in enrollment of new M.S. students and 21% increase in enrollment of new Ph.D. students for Fall 2018, over Fall 2017 enrollment. The School of Engineering launched three new graduate degrees this year, and an additional six graduate degrees were approved to move forward in the coming academic year.
Alumnus Dave Power delivered a Dean’s Lecture in the fall of 2017.

Bin Lin shared start-up lessons with students in a fall 2017 Dean’s Lecture.

Dean Kamen gave the Engineers Week Dean’s Lecture.

During Engineers Week, students practiced their architectural skills with some edible materials.

Engineers Week activities included a Sumo Bots competition.

New graduates, including this group from Tufts Gordon Institute, celebrated with faculty, family, and friends at the Engineering Graduate Programs Ceremony.
<table>
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<th>Engineering Program</th>
<th>2017-18 Enrollment</th>
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<td>Materials Science and Engineering***</td>
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<td>Mechanical Engineering*</td>
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<td>TOTAL (Engineering only):</td>
<td>884</td>
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</table>

*Engineering degree programs accredited by the Engineering Accreditation Commission (EAC) or the Computing Accreditation Commission (CAC) of the Accreditation Board for Engineering and Technology (ABET).

** Joint degree program. Students are only counted once for the sake of this chart, but are assigned to a home department.

*** For B.S. degrees, Civil Engineering and Environmental Engineering are two separate degrees. For graduate degrees, Civil and Environmental Engineering are listed together.

† Includes Civil Engineering degrees in Architectural Studies and Environmental Health

1 First majors, August 2017 to May 2018

2 In May 2018, 3 students completed the BS/MS program.

3 New program

Ph.D. candidate Jannatun Nawer (ME) writes out a math problem in the Science and Engineering Complex.
The School of Engineering’s research productivity continues to climb. Total annual externally sponsored research expenditures exceeded $28.4 million, the highest in our school’s history. The faculty submitted 343 proposals, including new and supplemental funding requests. The Tufts Office of Technology Licensing and Industrial Collaboration reports that for the ninth consecutive year, Tufts Engineering has led all schools in invention disclosures, accounting for 56% of the university’s total tech transfer activity.

**Engineering the Human-Technology Interface:** Professor Matthias Scheutz (CS) received a National Science Foundation (NSF) award to develop explicit norm representations and planning algorithms in intelligent autonomous systems, with the goal of imbuing the systems with the types of social and moral norms that are deeply ingrained in human cognition and behavior.

**Engineering for Human Health:** Associate Professor Valencia Koomson (ECE) received an NSF award to develop a frequency domain spectrometer for tracking of bacteria in floodwaters in real time. This EAGER research project, proposed in the wake of Hurricane Harvey, will advance fundamental research on sensing technology for the characterization of pathogenic bacteria in floodwater created by catastrophic events. Assistant Professor James Van Deventer (ChBE) was awarded an NIH R21 grant to establish a platform for the discovery of highly specific enzyme inhibitors in high throughput. The research has implications in the study of cancer-promoting activities of extracellular proteases and peptidases in the tumor microenvironment.

**Engineering for Sustainability:** University Professor Linda Abriola (CEE) was awarded a Strategic Environmental Research and Development Program (SERDP) grant, in collaboration with Brown University, for the development and laboratory validation of mathematical modeling tools for the prediction of per- and polyfluoroalkyl substances (PFAS) formation, transport, and retention in aqueous film forming source areas. The research will be relevant to hundreds of Department of Defense fire training area sites with PFAS contamination. Assistant Professor Jeffrey Guasto (ME) was awarded an NSF grant to study how fluid flow modifies flagellar motion through a combination of direct imaging and mathematical modeling. The work has broad applications for the development of medical devices and treatments, the improvement of bioreactors and biofuel production efficiency, and understanding ecosystem dynamics in bodies of water.
Professor Sameer Sonkusale (ECE) and a research team developed a new method to make microneedles without cleanrooms, using readily available materials and equipment.

Professor Steve Chapra (CEE) and a team of researchers reported that harmful algal blooms in large freshwater reservoirs and lakes are projected to increase due to climate change.

Professor Irene Georgakoudi and Ph.D. candidate Dimitra Pouli’s image (BME) of white fat cells in a mouse was selected as a winner in the 2017 FASEB BioArt competition.

Invention Disclosures

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<th>FY01</th>
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<td>32</td>
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- **Engineering**
- **University-wide**
Faculty Recruitment

Due to faculty recruitment and attrition, Tufts Engineering’s number of tenure-track faculty held steady at 92 this year. Six new tenure-track faculty members, one professor of the practice, and one full-time lecturer joined the School in 2017 and 2018, and the School recruited four more tenure-track faculty in 2018. New arrivals and recruits include:

**Jeffrey Foster**
*Professor, Computer Science*

Jeffrey Foster joins Tufts from the Department of Computer Science at the University of Maryland, College Park. The goal of his research is to develop practical tools and techniques to improve software quality. He is interested in programming languages, software engineering, advanced static type systems, scalable constraint-based analysis, and building tools that implement his ideas.

**Michael C. Hughes**
*Assistant Professor, Computer Science*

Michael Hughes works on statistical machine learning, developing methods that find useful structure in large, messy datasets and help people make decisions in the face of uncertainty. His research interests include Bayesian hierarchical models, optimization algorithms for approximate inference, model fairness and interpretability, and applications in medicine and the sciences.

**Steve Jacques**
*Professor of the Practice, Biomedical Engineering*

Steve Jacques has worked in the field of photomedicine for over thirty years, focusing on novel optical imaging methods for biomedical research and clinical care. He has developed many tools for biomedical research, including the hand-held bilirubin spectrometer, designed to draw blood from the heels of infants without causing pain.

Students study outside the Science and Engineering Complex, which officially opened in the fall of 2017
Matias Korman
Visiting Assistant Professor, Computer Science
Matias Korman comes to the School of Engineering from Tohoku University in Sendai, Japan. He works in computational geometry, a field in between discrete mathematics and computer science, and focuses in the design of efficient algorithms.

Srivalleesha Mallidi
Assistant Professor, Biomedical Engineering
Joining Tufts from the Wellman Center for Photomedicine at Massachusetts General Hospital, Srivalleesha Mallidi studies molecular and functional ultrasound guided photo-acoustic imaging for cancer therapeutics and tissue engineering. Her focuses include fluorescence and luminescence imaging, light-based therapies, and drug delivery constructs.

Madeleine Oudin
Assistant Professor, Biomedical Engineering
Madeleine Oudin’s graduate research at King’s College London focused on understanding the interplay between multiple signaling pathways in driving neuronal cell migration in response to growth factors during adult neurogenesis. Her study of the tumor microenvironment uses an interdisciplinary approach that combines cell biology, microfluidics, intravital imaging, systems biology, and implantable devices.

Nav Nidhi Rajput
Assistant Professor, Chemical and Biological Engineering
Nav Nidhi Rajput’s research interests focus on predicting and understanding the unique physical properties of liquid solutions, nanoporous materials, and confined fluids—using computer simulations—for applications in nanostructured materials and energy storage. She joins Tufts from Lawrence Berkeley National Laboratory.

Deborah Sunter
Assistant Professor, Mechanical Engineering
After completing her doctoral studies at UC Berkeley, Deborah Sunter went on to be an AAAS Science and Technology Policy Fellow at the U.S. Department of Energy and a postdoctoral fellow in the Renewable and Appropriate Energy Laboratory at UC Berkeley. Using computational modeling and data science techniques, she explores the interface of technology innovation and policy for improved environmental sustainability.
Advancement and Outreach

Development: The School of Engineering raised $13.2 million in FY18, exceeding its goal of $7.905 million – a testament to the School’s transformative education and outstanding research efforts. More than 3,700 donors gave to the School this year, which is a 4.5% increase over last year. With 119 new donors, the Tufts Fund for Engineering tallied 3,451 individual gifts this year: an increase of 4%. We also welcomed 17 new members in the Charles Tufts Society, our community of philanthropists who have included Tufts in their estate or gift plans.

Corporate and Foundation Relations: This year, corporate and foundation achievement for the School totaled $1,105,802. The two largest awards were a $296,000 award from Save the Children UK for Associate Professor Daniele Lantagne (CEE) to study commonly implemented but severely under-researched water and hygiene interventions to prevent cholera transmission, and a $300,000 award from the Gates Foundation for Professor David Kaplan to carry out feasibility studies to develop a self-administered contraceptive delivery system for intradermal use. Additional notable gifts include a total of $180,000 in commitments from LEGO Education Systems and PTC, both to the CEEO. These awards will help the School of Engineering continue to usher in a new era of discovery and progress.
Alumni Outreach: In October 2017, the winners of last year’s Tufts Gordon Institute $100k New Ventures Competition traveled to San Francisco, where they presented their start-ups with micro-pitches and conversation at an intimate event generously hosted by Lou, E85, and Sue Pelosi. The winners also visited New York City in April 2018 for meetings with alumni. Engineering-affiliated attendees included team leaders from Tarseer, OnGuard, PowerPlay Technologies, and Lithio Storage. The Alumni Relations office saw its largest student turnout ever for the annual Engineering Career Networking Night, hosted at Engineers Week this year, and alumni attended the SOE Open House in May, hosted in the Science and Engineering Complex for the first time.

Career Center: This year, Associate Director Robin Kahan and Career Center advisors provided 1,278 in-person consultations to students; 258 of those appointments were for graduate students.1 Students received resume and cover letter critiques, assistance with the job and internship search, and networking advice. Seventy-eight SOE alumni took advantage of the lifelong services offered by the Career Center. The Class of 2018 reported acceptances at top graduate schools, including Cornell University, MIT, Stanford University, and Tufts, and positions with companies like Amazon Robotics, AECOM, and Johnson & Johnson.

1 In addition to all School of Engineering students, these numbers also include Arts & Sciences undergraduates majoring in computer science and engineering psychology.

In Assistant Professor Xiaocheng Jiang’s lab (BME), researchers like Han Nguyen, E20, work with micro- and nano-technology to uncover the inner workings of biological systems.
Diversity

The Center for STEM Diversity (CSD) continued to grow this year, hiring new Director Ellise LaMotte. The Bridge to Engineering Success at Tufts (BEST) Class of 2018 graduated eight scholars. The program provides crucial support to students from groups traditionally underrepresented in engineering. Ninety-six percent of first-year BEST students return for their second year at Tufts. Thanks to a generous gift from a donor, CSD was able to expand summer support for BEST scholars and double the number of students who participated in the Tufts in Talloires summer study abroad program. The gift also provided support for research experiences at Tufts, housing, and summer classes.

As part of the STEM Ambassadors program, 14 ambassadors received training and visited local science classrooms to provide presentations on science and engineering. They reached approximately 700 students during each semester. This year, the Redefining the Image of Science and Engineering (RISE) program provided advising opportunities to 16 students and created programming focused on time management, leadership development, identity awareness, and career counseling.

Twenty-one students actively participated as Louis Stokes Alliance for Minority Participation scholars as they conducted research in labs, both at Tufts and abroad, and the Center supported four National Graduate Education for Minorities (GEM) Consortium scholars as they continued with their graduate studies.

Seven BEST students attended the 2018 Tufts in Talloires summer program in the French Alps (photo courtesy of Talisa Watts, E21)

Members of the BEST Class of 2018, with the CSD's former associate director Kristin Finch

The 2017-18 STEM Ambassadors conducted hands-on activities and answered questions about college in local classrooms.
Engineering Education

During FY18, the CEEO graduated the second cohort of teachers from its online Teacher Engineering Education Program. The CEEO also worked with LEGO Education to present, in a congressional briefing in Washington D.C., on their industry-university partnership. Over two days in June 2018, the CEEO hosted the bi-annual LEGO Education Symposium and Tufts STEM Education Conference. The two events brought together teachers and education administrators from 29 countries to discover best practices, explore how students learn, and share ideas about teaching STEM subjects.

This year, the Student Teacher Outreach Mentorship Program (STOMP) — managed by the CEEO — visited 43 local classrooms in five school districts. Sixty-one Tufts students were hired as STOMP fellows and spent an hour a week in their assigned classrooms. In addition, the CEEO led a number of workshops on survival engineering, LEGO Robotics, and the Novel Engineering program.

Infrastructure Development

The new Tufts Epitaxial Core Facility is now fully operational in 200 Boston Avenue. Directed by Associate Professor Tom Vandervelde (ECE), the lab is one of very few such facilities in the country and is used for photonic material research to generate advanced semiconductors. The Tufts Advanced Microscopic Imaging Center (TAMIC), a core facility, also opened this year, offering a wide array of optical and spectral quantitative imaging techniques for the chemical and structural characterization of materials at submicron scales. Finally, the School of Engineering is completing the construction of a state-of-the-art lab for Assistant Professor Brian Timko (BME) in the Science and Technology Center, where he will conduct research on nanoscale interfaces between solid-state and biological systems.

Thanks to a $2 million gift from the Nolop Family, the Nolop Family Fabrication, Analysis, Simulation, and Testing (FAST) Facility is under construction in the basement of Robinson Hall. Construction on this interdisciplinary, project-based makerspace is expected to complete in September 2018. Planning for the construction of the new Joyce Cummings Center on the corner of Boston and College Avenues is also well underway. Made possible by a generous gift from Bill and Joyce Cummings, this multifunction facility is planned for completion in 2023.
Inspirational Gifts

» $2.25 million gift to the School of Engineering from the parents of members of the Classes of 2018 and 2020.

» $1.4 million trust gift from a Board of Advisors member and alumnus from the Class of 1967 and his spouse (parents of a member of the Class of 1988), to support a named endowed scholarship fund, an endowed graduate fellowship fund, and an endowed summer scholarship fund.

» $1 million pledge from a member of the Class of 1983 to support a named endowed scholarship.

» $1 million pledge from a member of the Class of 1983 and parent of a Class of 2013 alumnus, to name the Introductory Teaching Lab Suite in the Science and Engineering Complex (SEC).

» $750,000 gift from an alumni couple from the Class of 1983, to create a named professorship supporting junior faculty from traditionally underrepresented populations within the School of Engineering.

» $508,000 trust and outright gifts from a member of the Class of 1979 and his spouse, to support the School of Engineering and undergraduate financial aid.

» $300,000 pledge from a Board of Advisors member from the Class of 1976, to name the Advanced Machining Area within the new Nolop FAST Facility, support an existing endowed scholarship in Mechanical Engineering, and support Bray Lab.

» $250,000 pledge from a Board of Advisors member from the Class of 1977 and her spouse, to support the Dean’s Discretionary Fund for the School of Engineering and the Center for Engineering Education and Outreach (CEEO).

» $250,000 gift from a Board of Advisors member from the Class of 1969 and his spouse, to name the Genius Bar space within the Nolop FAST Facility.

» $200,000 gift from an alumnus from the Class of 1991 and parent of members of the Classes of 2017 and 2019, to create a named endowed scholarship.

» $125,000 gift from Tufts alumni from the Classes of 1973 and 1974 and their sibling to create a named endowed scholarship in honor of their father (an alumnus from the Classes of 1937 and 1939) and mother, to benefit School of Engineering undergraduate students.

» $100,000 gift from a Board of Trustees and Board of Advisors member from the Class of 1978 (and parent of an alumna from the Class of 2012), to create a named term scholarship to benefit School of Engineering undergraduate students.

» $100,000 pledge from a Board of Advisors member from the Class of 1983 and his spouse, parents of a member of the Class of 2020, to support the Dean’s Discretionary Fund for the School of Engineering, the Dean’s Discretionary Fund for the School of Arts & Sciences, and the Nolop FAST Facility Equipment Fund.

» $100,000 pledged by an anonymous donor to create an endowed scholarship fund for School of Engineering undergraduates.