

Dean, School of Engineering

The mission of the [MIT School of Engineering](#) is to educate the next generation of engineering leaders, to create new knowledge, and to serve society. The School strives to attract the most talented people in the world. Close-knit and collaborative, the School is embedded in a hub for technology innovation, Kendall Square, and surrounded by the old-world charm and cosmopolitan brio of Cambridge and Boston.

The largest of MIT's five schools, the School of Engineering comprises about 70% of MIT's undergraduates and 45% of its graduate students. Just over a third of MIT's faculty are in the School, and they generate more than half of the sponsored research at the Institute.

The School's total sponsored research expenditures were approximately \$502,125 million in FY2017 compared with \$487,553 million in FY2016.

The achievements of the faculty, staff, and students in the School's departments, laboratories, centers, and programs are extensive. Separate reports highlight the activities and accomplishments of people in each of these units over the past year.

In 2016–2017, there were some leadership transitions and new appointments in the Dean's Office and the School.

In July, Anantha P. Chandrakasan, head of the Department of Electrical Engineering and Computer Science (EECS) was appointed dean of engineering. He follows Ian A. Waitz, who served from 2011 to 2017. In April, Waitz was named to the new role of vice chancellor, overseeing the offices of undergraduate and graduate education.

- Asu Ozdaglar, associate department head of EECS, was appointed as interim department head of EECS; Nancy Lynch was named associate department head of EECS; and Anette "Peko" Hosoi was named associate department head for the Department of Mechanical Engineering.
- Professor Daniel Frey of Mechanical Engineering was named the new faculty director of the MIT D-Lab.
- Eboney Hearn '01 was named director of the MIT Office of Engineering Outreach Programs in July 2016.
- Elizabeth Sikorovsky was named executive director of the Institute for Data, Systems, and Society (IDSS).
- John Tsitsiklis was appointed director of the Laboratory for Information and Decision Systems, part of IDSS.
- In August, Mary Markel Murphy, assistant dean of the School of Engineering, responsible for administration and human resource issues within the School, will join the Office of the Vice Chancellor as senior associate dean.

The School of Engineering continues to work diligently to maintain the excellence of its faculty. This year, the School announced that 12 members of its faculty were granted tenure:

- Polina Anikeeva PhD '09, Class of 1942 Career Development Professor in the Department of Materials Science and Engineering, does research in bioelectronics, specifically the development of materials and devices that enable recording and manipulation of signaling processes within the nervous system.
- Cullen Buie, the Esther and Harold E. Edgerton Career Development Professor in the Department of Mechanical Engineering, works to exploit microscale electric-field driven transport phenomena for applications in biotechnology, fluid mechanics, and energy. His research is applicable to a diverse range of problems, from anti-biofouling surfaces and biofuels to energy storage and bacterial infections.
- John Hart SM '02, PhD '06, the Mitsui Career Development Professor in Contemporary Technology in the Department of Mechanical Engineering, works on carbon nanotubes and graphene, 3D printing, and other additive manufacturing processes—as well as origami-inspired engineering—to create new technologies ranging from consumer electronics and medical devices to art objects.
- Nuno Loureiro, in the Department of Nuclear Science and Engineering, has research interests that include the instability of magnetic reconnection and the formation of multiple magnetic islands, especially as they relate to the temperatures of plasma in nuclear fusion.
- Timothy Lu '03, SM '03, PhD '08, in the Department of Electrical Engineering and Computer Science, uses principles inspired by electrical engineering and computer science to develop new techniques for constructing, probing, modulating, and modeling synthetically engineered biological circuits.
- Bradley Olsen '03, in the Department of Chemical Engineering, focuses on engineering new biofunctional and bioinspired materials, as well as on understanding the novel polymer physics required to control the nanoscale structure and properties of these complex systems.
- Katharina Ribbeck, in the Department of Biological Engineering, focuses on basic mechanisms by which mucus barriers exclude or allow passage of different molecules and pathogens, and the mechanisms pathogens have evolved to penetrate mucus barriers.
- Yuriy Roman, in the Department of Chemical Engineering, works at the interface of heterogeneous catalysis and materials design to apply a wide range of synthetic, spectroscopic, and reaction engineering tools to study the chemical transformation of molecules on catalytic surfaces.
- Noelle Selin of the Institute for Data, Systems, and Society uses atmospheric chemistry modeling to inform decision-making on air pollution, climate change, and hazardous substances such as mercury and persistent organic pollutants.

- Jessika Trancik, the Atlantic Richfield Career Development Associate Professor in Energy Studies in the Institute for Data, Systems, and Society, evaluates the costs, expected changes, and environmental impacts of energy-related technologies to accelerate their improvement by relating performance to design and manufacturing decisions.
- Ryan Williams, in the Department of Electrical Engineering and Computer Science, works on the theoretical design and analysis of efficient algorithms and in computational complexity theory, focusing mainly on new connections between algorithm design and logical circuit complexity.
- Xuanhe Zhao, the Robert N. Noyce Career Development Professor in the Department of Mechanical Engineering, does research that has led to the design of extremely tough adhesive and biocompatible hydrogels and hydrogel-solid hybrids, the discovery of new failure mechanisms in dielectric polymers, and controlled crumpling and unfolding of large-area 2-D materials into functional nanostructures.

For FY2017, 15 candidates (three of whom were women) accepted faculty appointments in the School.

Awards and Honors

Every year, members of the MIT engineering community receive numerous honors in recognition of their research, scholarship, service, and overall excellence. The following is a small sample of the honors and awards garnered by the School of Engineering in AY2017:

- Michael J. Mitchell, a National Institutes of Health Ruth L. Kirschstein postdoc in the lab of Robert Langer at the Koch Institute for Cancer Research at MIT, has won a Burroughs Welcome Fund Career Award at the Scientific Interface.
- Kwanghun Chung, the Samuel A. Goldblith Career Development Assistant Professor in Chemical Engineering; a core faculty member of the Institute for Medical Engineering and Science; a core member of the Picower Institute for Learning and Memory; and an associate member of the Broad Institute, was selected to receive a 2016 National Institutes of Health New Innovator Award for his project “Proteome-Driven Holistic Reconstruction of Organ-Wide Multi-Scale Networks.”
- Paula Hammond, the David H. Koch Professor in Engineering and head of MIT’s Department of Chemical Engineering, has been elected to the National Academy of Medicine in recognition of her distinguished contributions to medicine and health.
- Gregory Stephanopoulos, the Willard Henry Dow Professor of Chemical Engineering and Biotechnology, has been selected to receive the Eric and Sheila Samson Prime Minister’s Prize for Innovation in Alternative Fuels for Transportation.

- Angela Belcher (Biological Engineering), Betar Gallant (Mechanical Engineering), Karl Berggren (Electrical Engineering and Computer Science), Domitilla Del Vecchio (Mechanical Engineering), and Ron Weiss (Biological Engineering) were awarded Professor Amar G. Bose Research Grants, which support innovative projects that may be unlikely to receive funding through traditional means.
- Erik Demaine, Fredo Durand, William Freeman, and Daniel Jackson—all of the Computer Science and Artificial Intelligence Laboratory (CSAIL)—were named Association for Computer Machinery fellows.
- Tomás Palacios, professor in the Department of Electrical Engineering and Computer Science, was named a 2017 fellow of the Institute of Electrical and Electronics Engineers (IEEE) for the advancement of engineering, science, and technology.
- Maher Damak, a PhD candidate in the Department of Mechanical Engineering and a fellow in the MIT Tata Center, was named the winner in the environment category at the World Technology Awards on December 8, 2016 in Los Angeles.
- Alexander Feldstein '15, G (aerospace engineering) and Kristen Railey '13, G (mechanical engineering) and former technical staff member in MIT Lincoln Laboratory's Advanced Undersea Systems and Technology Group, were selected as two of Aviation Week Network's "20 Twenties" for 2017.
- Hannah Diehl, an undergraduate pursuing a joint bachelor and master's degree in computational biology within the Department of Electrical Engineering and Computer Science, received a 2016–2017 Barry Goldwater Scholarship Award for outstanding academic achievement.
- Ruonan Han, the E.E. Landsman (1958) Career Development Assistant Professor in the Department of Electrical Engineering and Computer Science; Luqiao Liu, the Robert Shillman Career Development Assistant Professor in the Department of Electrical Engineering and Computer Science; and Amos Winter, assistant professor in the Department of Mechanical Engineering were among the 156 researchers from around the US who were selected for the 2017 National Science Foundation Faculty Early Career Development (CAREER) program.
- Nicholas Fang, Department of Mechanical Engineering; Sanjay Sarma, Department of Mechanical Engineering; Martin Bazant, Department of Chemical Engineering; Heather Kulik, Department of Chemical Engineering; Youssef Marzouk, Department of Aeronautics and Astronautics; Konstantin Turitsyn, Department of Mechanical Engineering; Luca Daniel, Department of Electrical Engineering and Computer Science; Fikile Brushett, Department of Chemical Engineering; and Zachary Smith, Department of Chemical Engineering received MIT Energy Initiative fund grants for research.
- Klavs Jensen of the Department of Chemical Engineering was elected to the National Academy of Sciences in recognition of his "distinguished and continuing achievements in original research."
- Rachel Batista from the Department of Nuclear Science and Engineering; Beth Milnes from the Institute for Data, Systems, and Society; Ludmila Leopard from

the Microsystems Technology Laboratories; Bill Litant from the Department of Aeronautics and Astronautics; Melinda Lyman-Wright from the Institute for Medical Engineering and Science; Michelle Morrison from the Institute for Medical Engineering and Science; and Stacy Springs from the Center for Biomedical Innovation were awarded the MIT School of Engineering's Infinite Mile Award.

- Lisa Bella from the Department of Electrical Engineering and Computer Science and Beth Tuths from the Department of Chemical Engineering were presented Ellen J. Mandigo Awards for Outstanding Service by the School of Engineering.
- Elaine Cunha and Tess Hegarty, seniors in the Department of Civil and Environmental Engineering (CEE) received the CEE Best Undergraduate Research Award. Jillian Dressler received the CEE Leadership and Community Award. CEE senior George Varnavides was awarded the Juan Hermosilla (1957) Prize, CEE sophomore Mark Mockett received the Leo (Class of 1924) and Mary Grossman Award, senior Rebecca Sugrue was awarded the Paul L. Busch (1958) Prize, and senior Bryan Lilley received the Tucker-Voss Award. Also, graduate student Qingjun "Judy" Yang was awarded the Trond Kaalstad (Class of 1957) Fellowship, and Xiaojing "Ruby" Fu received the Maseeh Annual Award for Excellence as a Teaching Assistant. Anna Tarakanova was honored with the CEE Best Doctoral Thesis Award and Stefan Thiele, a postdoc in Professor Martin Polz's lab, received the CEE Postdoctoral Scholar Mentoring, Teaching, and Excellence Award.
- Joseph Sussman, the JR East Professor of Engineering in the Department of Civil and Environmental Engineering, received the CEE Distinguished Service and Leadership Award. In addition, he was honored for his 25 years of service as JR East Professor by the East Japan Railway Company.
- Jesse Kroll, associate professor of civil and environmental engineering and chemical engineering, received the Ole Madsen Mentoring Award—a new award for 2017.
- Lorna Gibson, the Matoula S. Salapatas Professor of Materials Science and Engineering and a professor of mechanical engineering, won the Bose Award for Excellence in Teaching, given to a faculty member whose contributions have been characterized by dedication, care, and creativity.
- Amos Winter, associate professor of mechanical engineering, won the Junior Bose Award for being an outstanding contributor to education among the junior faculty of the School of Engineering.
- John Hart, associate professor of mechanical engineering; Patrick Jaillet, the Dugald C. Jackson Professor in Electrical Engineering; R. Scott Kemp, the Norman C. Rasmussen Career Development Professor of Nuclear Science and Engineering; and Nir Shavit, professor of electrical engineering and computer science, each received the Ruth and Joel Spira Award for Excellence in Teaching.
- Mary Elizabeth Wagner, G (materials science and engineering), won the School of Engineering Graduate Student Award for Extraordinary Teaching and Mentoring.

- Alexander H. Slocum, the Pappalardo Professor of Mechanical Engineering, won the Capers and Marion McDonald Award for Excellence in Mentoring and Advising.
- Arinze C. Okeke, a biological engineering major, won the Henry Ford II Award, presented to a senior engineering student who has maintained a cumulative GPA of 5.0 at the end of their seventh term and who has exceptional potential for leadership in the profession of engineering and in society.
- John Ochsendorf, the Class of 1942 Professor of Architecture and a professor of civil and environmental engineering, won the Samuel M. Seegal Prize, awarded for excellence in teaching to a faculty member (or members) in the Department of Civil and Environmental Engineering and/or the MIT Sloan School of Management who inspires students to pursue and achieve excellence.
- DiOnetta Jones Crayton, associate dean for undergraduate education and director of the Office of Minority Education received a prestigious award from the Women in Engineering Pro-Active Network.
- Gregory Stephanopoulos, the Willard Henry Dow Professor of Chemical Engineering and Biotechnology, has been selected to receive the Eric and Sheila Samson Prime Minister's Prize for Innovation in Alternative Fuels for Transportation.
- Margaret Guo '16, a decorated swimmer and engineer, was named the 2016 National Collegiate Athletic Association Woman of the Year.
- Margaret H. Hamilton, a pioneering computer scientist and former head of the Software Engineering Division of MIT's Instrumentation Laboratory – who led the development of on-board flight software for the National Aeronautics and Space Administration's Apollo moon missions – was awarded the Presidential Medal of Freedom.
- Matthew Cavuto, Zachary Hulcher, Kevin Zhou, and Daniel Zuo are winners in this year's prestigious Marshall Scholarship competition. Charlie Andrews-Jubelt was named an alternate. The newest Marshall Scholars come from the Departments of Mechanical Engineering, Physics, Mathematics, and Electrical Engineering and Computer Science.
- Henry I. Smith, professor emeritus of electrical engineering, was awarded the 2017 IEEE Robert N. Noyce Medal in recognition of his "contributions to lithography and nanopatterning through experimental advances in short-wavelength exposure systems and attenuated phase-shift masks."
- Ahmed Ghoniem, the Ronald C. Crane Professor of Mechanical Engineering and director of the Center for Energy and Propulsion Research was selected as one of two honorees of the student-driven Committed to Caring program.
- Michael Cima, the David H. Koch Professor of Engineering in the Department of Materials Science and Engineering, and Edward W. Merrill ScD '47, a professor emeritus in the Department of Chemical Engineering, were named 2016 fellows

of the National Academy of Inventors. Both Cima and Merrill were recognized for contributions resulting in a tangible impact on quality of life, economic development, and the welfare of society.

- Martin A. York, a graduate student in the Department of Aeronautics and Astronautics and a cadet member of MIT's Air Force Reserve Officer Training Corps, Detachment 365, was named the 2016 Air Force Cadet of the Year.
- Maria Yang, assistant professor in the Department of Mechanical Engineering, was one of three professors selected as 2017 MacVicar Faculty Fellows, an award given to faculty members for exceptional undergraduate teaching, mentoring, and educational innovation.
- Tim Berners-Lee, a principal investigator at CSAIL with a joint appointment in the Department of Electrical Engineering and Computer Science, and the 3Com Founders Professor of Engineering, won the Association for Computing Machinery A.M. Turing Award, which comes with a \$1 million prize provided by Google.
- Hari Balakrishnan, the Fujitsu Professor in Electrical Engineering and Computer Science; Cynthia Barnhart, MIT chancellor, Ford Foundation Professor of Engineering, and professor of civil and environmental engineering; Daniela Rus, the Andrew and Erna Viterbi Professor of Electrical Engineering and Computer Science and director of CSAIL were elected to the American Academy of Arts and Sciences.
- William Tisdale, the Charles and Hilda Roddey Career Development Professor in Chemical Engineering, has been honored as a Camille Dreyfus Teacher-Scholar, an award that recognizes and supports the research and teaching careers of talented young faculty in the chemical sciences.

Education Highlights

Undergraduate Minors

New undergraduate minors became available for computer science and data science.

Engineering Education Transformation

Over the past year, the Dean's Office in the School of Engineering spearheaded an effort to fundamentally rethink engineering education (what students learn and how students learn). Called New Engineering Education Transformation (NEET) and led by faculty members Edward Crawley (co-chair), Aeronautics and Astronautics, and Anette "Peko" Hosoi (co-chair), Mechanical Engineering, the program will build on established principles of MIT and address a need for a focus on new machines and systems (e.g., Internet of things, bio-devices, infrastructure, and the environment) via:

- A balanced approach to analysis and synthesis in the design and engineering of these new machines and systems, and innovation based on these systems.

- A foundation in modern engineering pedagogical approaches (e.g., digital learning; problem-based learning; engagement of students in managing their own learning; and the integration of leadership, service, and professional experiences, including entrepreneurship).

A working group will be broadly responsible for: determining the scope and plans for the activity, gathering evidence based on internal and external stakeholders and benchmarking, curating the learning outcomes and concepts for the program, and prototyping key elements of the new program. The ultimate outcome of the working group is the formal approval of the details of new NEET educational program(s) by the MIT faculty, the engagement of faculty in the implementation of these programs, the definition of the pathway to accreditation (if accreditation is deemed to be desirable by the committee), the development of a sustainable resource plan, the definition of metrics of success and an assessment plan, and implementation of an internal and external communications plan.

Mobius, MakerLodge, MakerBucks

Two new programs were created to get students making faster and earlier. In fall 2016, every MIT freshman was invited to the MakerLodge to learn about 3D printers, laser cutters, soldering, CNC milling machines, and all the other tools spread across MIT's 130,000 square feet of makerspaces. Once students prove they can operate the equipment safely and competently, they can gain access to 10 makerspaces and receive MakerBucks, a debit account of \$100 to purchase materials and time on the machines of their choosing around campus. They are also matched with communities of other students who have shared interests, such as in robots, glasswork, or woodworking. This program builds upon [Mobius](#), a recently launched mobile app that helps students navigate the maze of campus maker facilities. Future MIT makers will be greeted with a complete maker package.

6.002x Pilot

Last fall, the Department of Electrical Engineering and Computer Science and the Office of Digital Learning piloted a full-credit online course for a small cohort of residential students. The popular 6.002 Circuits and Electronics was offered as 6.S064, leveraging an existing massive open online course available via the edX platform and adding a private discussion forum for MIT students. The Teaching and Learning Lab conducted an assessment of this pilot, which is now published as an internal working paper. This preliminary assessment suggested that there are benefits to an online-while-on-campus course format. Specifically, the students who completed 6.S064 reported more flexibility with scheduling and less overall stress relative to their traditional classes. While the findings are based upon a small sample, the pilot bodes well for the possibility of allowing students more choice in terms of how and when they learn.

MIT Sandbox Innovation Fund Program

Now in its second year and accessible to all 11,000 MIT graduate and undergraduate students, MIT Sandbox provides seed funding of up to \$25,000 for student-initiated entrepreneurship ideas, mentoring from within MIT and a broad network of committed

partners, and tailored educational experiences. To date, the program has engaged over 1,400 participants on 411 teams. Thirty percent of participants had no prior experience with entrepreneurship and 42% of the teams had at least one female member.

Advanced Undergraduate Research Opportunities Program

In 2012, the Advanced Undergraduate Research Opportunities Program (or SuperUROP) was launched in EECS. SuperUROP is a specialized version of the Undergraduate Research Opportunities Program that involves a yearlong opportunity for students to tackle challenging problems and conduct publication-worthy research. Students are paired with a faculty member or MIT researcher and take a two-semester course on research methodology and best practices. At the end of the program, their projects evolve into graduate theses, startup plans, or industry positions.

Now a School-wide program, SuperUROP engaged more than 150 students last year across the Departments of Aeronautics and Astronautics, Biological Engineering, Civil and Environmental Engineering, Chemical Engineering, Electrical Engineering and Computer Science, and Nuclear Science and Engineering.

StartMIT

During the 2014 Independent Activities Period, EECS initiated Start6, a three-week entrepreneurship training program for MIT students. Start6, renamed StartMIT in AY2016 and adopted as a School-wide program, offers practical sessions to help students with the nuts and bolts of starting and operating a company. Since its inception, more than 100 projects have been developed through StartMIT, Professional Education, and other external programs.

Professional Education

MIT Professional Education, organized under the School of Engineering in 2002, provides continuing education courses and lifelong learning opportunities for science, engineering, and technology professionals at all levels.

Micromaster's in Supply Chain Management

Members of the first-ever cohort in MIT's inaugural online MicroMasters program—more than 1,100 learners who completed all five of the online courses in supply chain management—received their final MicroMasters certificates. This initial MicroMasters program, offered through the top-ranked MIT Supply Chain Management program, was the first such MicroMasters program created through MITx. There are currently more than 5,000 additional learners in the supply chain management MicroMasters pipeline who have successfully completed at least one of the five required courses. Last December, MITx launched a second MicroMasters program in data, economics, and development policy, and others are under consideration. Additionally, more than 10 other universities now offer MicroMasters certificates through the edX online platform, which was co-developed five years ago by MIT and Harvard University.

MIT ReACT

In May, the School supported the launch of the Refugee ACTion Hub (ReACT). MIT ReACT stems from the vision and personal journey of its faculty founder, [Admir Masic](#). MIT ReACT will focus on three main objectives: community engagement within MIT and beyond, the development of a certification system for displaced learners, and an outreach effort to connect with broader audiences. The founding team includes Hala Fadel MBA '01, founder and chair of the MIT Enterprise Forum of the Pan-Arab region; Said Darwazah, CEO of Hikma Pharmaceuticals; Thomas Ermacora, futurist, urbanist and humanitarian; and Riccardo Sabatini, scientist and entrepreneur.

Communications and Development

After developing and implementing a comprehensive communications and messaging plan focused on recruitment and building capacity in AY2016, the School's Communications Office was focused on fostering a stronger community among School communicators. Key aspects of the plan included shared messaging, key performance indicators, and implementation of a playbook; completing channel analysis and, where appropriate, developing shared channels for School of Engineering (SoE) departments, labs, and centers that magnify reach; enhancing SoE digital channels (website, social media, direct emails); developing a content plan and strategy for the School, with emphasis on video, short-form, and new kinds of engaging content; continuing to refine school messaging; and providing the dean and other leadership with opportunities to present to key stakeholders (e.g., the Accreditation Board for Engineering and Technology Symposium). In addition, there was an ongoing effort to look for ways to improve and better integrate alumni communications across SoE.

A few highlights of note included the development of nearly 75 stories and articles (primarily focused on life at MIT, teaching, and community) and 20 videos; the launch of a new engineering website; in collaboration with the Office of the Dean for Graduate Education and the Communications Lab, the creation of graduate blogs (including launch, publicizing, editing, and developing a long-term support plan); and the development of a beta audio tour (featuring students) to improve the visitor experience. The School's Communications Office also took a leading role in Institute-level activities, participating in the Marketing Group, Info Group, and a newly-formed Editorial Group, as well as presenting updates on the School's major strategic efforts.

School-based resource development activities remained paramount. Led by the assistant dean for development, the school development officers based in academic departments led and/or supported a range of new programs, activities, and engagement opportunities for School alumni and friends. Their efforts were fundamental not only to the significant fundraising totals, but to the successful first year of the MIT capital Campaign.

Staff from both communications and development remained in close collaboration during AY2017, with activities including:

- Support for the Campaign for a Better World (in particular, the traveling Road Show events)

- Presentations on key topics to fundraisers across MIT and key events (Dinner Under the Dome)
- Support for Visiting Committee and Dean's Advisory Council meetings
- Engagement with alumni through timely and compelling information (dean's quarterly e-letter, specialized events, and club-based visits)

Statistics for 2016–2017

Undergraduate Enrollment

- Declared majors: 2,479
- Women: 1,143
- International students: 222
- Underrepresented minorities: 629

Graduate Enrollment

- Students: 3,263
- Women: 957
- International students: 1,407
- Underrepresented minorities: 221

Degrees Awarded

- Bachelor's degrees: 825
- Master's degrees: 760
- Doctoral degrees: 332

Faculty

- Full professors: 261
- Tenured associate professors: 38
- Untenured associate professors: 25
- Assistant professors: 55

Ian A. Waitz

Dean

Jerome C. Hunsaker Professor of Aeronautics and Astronautics