

## Dean, School of Engineering

The MIT School of Engineering's mission is to educate the next generation of engineering leaders, to create new engineering and scientific knowledge, and to serve society. By providing innovative ideas and practical technologies and educating the people who will help create solutions to the greatest technological and social problems of the 21st century, the MIT School of Engineering fulfills its obligation as a world-leading institution.

The School of Engineering's many academic departments, institutes, programs, centers, and laboratories, as well as its wide array of graduate programs, encompass a community of some of the world's most innovative thinkers. Approximately 37% of the Institute's faculty, 48% of graduate students, and about 72% of declared undergraduate majors collaborate in the School's 18 undergraduate degree programs and 87 graduate programs. The School's sponsored research expenditures were approximately \$394.2 million in FY2015, accounting for 57% of the on-campus total. The achievements of the faculty, staff, and students in the School's departments, laboratories, centers, and programs are extensive and impressive. Separate reports highlight the activities and accomplishments of people in each of these units over the past year.

In 2014–2015, there were several leadership transitions and new appointments involving faculty from the School.

- In September, Asuman Ozdaglar of Electrical Engineering and Computer Science (EECS) was named director of the Laboratory for Information and Decision Systems (LIDS).
- In October, Dava Newman of Aeronautics and Astronautics was nominated by President Obama to be the next deputy administrator of the National Aeronautics and Space Administration; her nomination was unanimously confirmed by the US Senate in April.
- Also in October, Ali Jadbabaie, a LIDS visiting scientist from the University of Pennsylvania, was appointed interim director of the Sociotechnical Systems Research Center.
- In November, Dennis Whyte of Nuclear Science and Engineering was named director of the Plasma Science and Fusion Center.
- In January, Silvio Micali was named EECS associate department head, succeeding Bill Freeman.
- In March, Klavs Jensen announced that he will step down as department head in Chemical Engineering.
- In April, Munther Dahleh of EECS was named director of the newly formed Institute for Data, Systems, and Society (IDSS, described below).
- In May, Richard Lester, department head in Nuclear Science and Engineering, was named associate provost for international activities, a new position within the Office of the Provost.

As a result of this year's faculty searches, 16 candidates accepted faculty appointments in the School of Engineering, including four women. Their appointments will add to the excellence and energy critical to maintaining the School's high standards.

### Awards and Honors

Every year, members of the MIT engineering community receive numerous honors in recognition of their research, scholarship, service, and overall excellence. This year was no exception. The reports of the School's departments, divisions, laboratories, centers, and programs make note of many of these awards. The following is a small sample of the honors and awards garnered by the School of Engineering in AY2015:

- Mildred Dresselhaus was awarded the Presidential Medal of Freedom, the nation's highest civilian honor. Dresselhaus, an Institute Professor Emeritus, received the award at a White House ceremony. Dresselhaus also received the Institute of Electrical and Electronics Engineers (IEEE) 2015 Medal of Honor—IEEE's highest honor, given since 1917. Cited for her "leadership and contributions across many fields of science and engineering," Dresselhaus is the first woman to earn the prestigious award.
- Robert Langer, the David H. Koch Institute Professor, was awarded the Queen Elizabeth Prize for Engineering for his revolutionary advances and leadership in engineering at the interface of chemistry and medicine. The award credits Langer with improving more than 2 billion lives worldwide through the disease treatments created in his lab. Langer received the prize from Queen Elizabeth II.
- Ioannis V. Yannas from Mechanical Engineering was named to the National Inventors Hall of Fame at the group's 2015 ceremony. With this honor, which recognizes his invention of what has become known as "artificial skin," Yannas joins a small group of approximately 500 renowned Hall of Fame inventors.
- Edward Merrill of Chemical Engineering was elected to the Institute of Medicine.
- Michael Stonebraker from the Computer Science and Artificial Intelligence Laboratory (CSAIL), who has revolutionized the field of database management systems and founded multiple successful database companies, won the Association for Computing Machinery's A.M. Turing Award, often referred to as "the Nobel Prize of computing."
- MIT president L. Rafael Reif; Hari Balakrishnan, Sangeeta Bhatia, Emery N. Brown, Anantha Chandrakasan, and Daniela Rus from EECS; Karen K. Gleason from Chemical Engineering; and Eric D. Evans from Lincoln Laboratory were all elected to the National Academy of Engineering.
- Paula Hammond from Chemical Engineering received the Alpha Chi Sigma Award from the American Institute of Chemical Engineers.
- Sangeeta Bhatia of EECS and Robert E. Cohen of Chemical Engineering were elected to the American Academy of Arts and Sciences. In addition, Bhatia was the recipient of the 2014 Lemelson-MIT Prize and the 2015 Heinz Award for Technology, the Economy, and Employment.

- Brad Olsen from Chemical Engineering won a DuPont Young Professor Award and the Allan P. Colburn Award for Excellence in Publications by a Young Member of the Institute from the American Institute of Chemical Engineers. Also, he was named one of Chemical and Engineering News's "Talented 12."
- Katharina Ribbeck of Biological Engineering was named as one of the "Brilliant 10 for 2014" by *Popular Science* magazine.
- John H. Lienhard from Mechanical Engineering won the prestigious 2015 American Society of Mechanical Engineers Heat Transfer Memorial Award in the "art of practice category."
- Richard Lester from Nuclear Science and Engineering received the 2015 American Nuclear Society Special Award for "demonstrating the value of nuclear energy to a wide audience."
- Joseph Sussman from Civil and Environmental Engineering and Engineering Systems was elected to the Intelligent Transportation Society of America Hall of Fame.
- Anne White of Nuclear Science and Engineering received the 2014 Katherine E. Weimer Award, which recognizes outstanding achievement in plasma science research by a female physicist in the early years of her career. She also won the Excellence in Fusion Engineering Award at the 35th annual meeting and symposium of Fusion Power Associates.
- Will Tisdale and Yuriy Roman from Chemical Engineering won CAREER Awards from the National Science Foundation.
- Stefano Brizzolara from Mechanical Engineering, director of the newly established Innovative Ship Design Lab (i-Ship), led three Naval Construction and Engineering students—Vasileios Georgiadis SM '14, Kyle Miller SM '14, and Leon Faison SM '14—in earning second place (honorable mention) in the 2013–2014 Mandles Prize for Hydrofoil Excellence competition.

### **Institute for Data, Systems, and Society**

In April, the deans of all five MIT schools announced the launch of the Institute for Data, Systems, and Society. The new institute will bring together researchers spanning the five schools to work in the mathematical, behavioral, and empirical sciences to capitalize on their shared interest in tackling complex societal problems. The inaugural director of IDSS will be Munther Dahleh of Electrical Engineering and Computer Science.

IDSS will be a home for new academic programs such as an undergraduate minor in statistics and a PhD program in engineering and social systems, and the institute will hire new faculty members and reorganize research activities to better support work in these areas across the five schools. It will also launch an external partnership program with industry, government, and academia. IDSS will become a central home for many faculty members from the Engineering Systems Division, which was retired on June 30, and a number of existing units, including the Laboratory for Information and Decision Systems and the Sociotechnical Systems Research Center. IDSS will also launch a new MIT center on statistics.

## Educational Activities

Several department-based programs in the School of Engineering were initiated or expanded in AY2015. Two new co-curricular programs in EECS—SuperUROP and Start6—have been extremely successful with students and faculty, and both are now scheduled for significantly broader implementation across the Institute in the coming year.

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. In 2015–2016, the SuperUROP program will be introduced in a number of other academic departments in the School of Engineering.

Start6 is a two-week program of seminars, workshops, and training offered during Independent Activities Period. The program immerses students in the subjects and details of entrepreneurship, and it provides them with the building blocks to translate their passions into needed technologies for the marketplace. This year, Start6 quietly welcomed students from any school at the Institute. In 2015–2016, it will relaunch officially as an MIT-wide program.

## MIT.nano

In AY2015 MIT started construction of MIT.nano, a new state-of-the-art cleanroom, imaging, and prototyping facility that will support research and education on nanoscale materials and processes. Facilitating utilities work and demolition of Buildings 12 and 12-A were completed on schedule and according to budgeted costs.

Associate dean of engineering Vladimir Bulović remains the faculty lead on the MIT.nano project. In AY2015, he hired a staff person to serve as the building's associate director of operations and remained very actively engaged in fundraising activities for the building. Professor Bulović played an integral role in the establishment of a formal relationship with Tecnológico de Monterrey, one of Latin America's largest universities, to bring students and faculty from Mexico to Cambridge for fellowships, internships, and research stays in MIT labs and centers, with a special focus on nanoscience and nanotechnology.

## Innovation Initiative

In December Vladimir Bulović and Fiona Murray, associate deans for innovation in the School of Engineering and the Sloan School of Management, respectively, released "The MIT Innovation Initiative: Sustaining and Extending a Legacy of Innovation." The report reflected contributions from a 19-member faculty advisory committee led by Bulović and Murray and including representatives from all five schools. Based on substantive research and input from stakeholders both inside and outside MIT, the report outlines a set of priorities to help the Institute in supporting innovation and a set of proposals to be prioritized and implemented over time. The Innovation Initiative's strategic priorities are as follows.

- Enhance innovation practice opportunities to build capabilities: grow existing programs while creating select new programs of interest to MIT students and faculty
- Develop the science of innovation: study and promote the conditions that shape innovation outcomes, disseminate evidence-based knowledge about the innovation process, and translate that knowledge into tools and frameworks for use by practitioners in the initiative's Laboratory for Innovation Science and Policy
- Extend innovation communities: cultivate innovation communities across MIT and worldwide by connecting the MIT community more deeply with corporations, governments, and innovation hubs in Cambridge and around the world
- Revitalize innovation-centric infrastructure: create additional infrastructure by expanding maker and collaborative spaces across the campus and creating digital tools that connect them in a unified "innovation-centric" campus

The full version of the report is available [online](#), and a final revision is being prepared for release to the MIT community.

The Innovation Initiative made a number of programmatic advances during AY2015. Specifically, the initiative:

- Supported the Research Laboratory of Electronics (RLE) in its efforts to grow the Translational Fellows Program (TFP) from 5 to 16 fellows across RLE, the Microsystems Technology Laboratories, EECS, Biological Engineering, Mechanical Engineering, Materials Science and Engineering, and the Engineering Systems Division. TFP provides funding and mentorship for postdocs to focus at least 20% of their time on the commercialization of technologies originating in MIT research.
- Partnered on the design and launch of the MIT IMPACT Program for postdocs. The IMPACT program is pioneering ways to build a more problem-oriented, solution-focused rationale into postdoctoral activities.
- Built a collaboration among the Innovation Initiative, the MIT International Science and Technology Initiatives (MISTI), and the MIT Regional Entrepreneurship Acceleration Program to launch the MIT Innovation Diplomats Program. By providing frameworks and diplomacy skills for understanding and analyzing the as-is state of regional innovation ecosystems, this program helps students participating in global initiatives more meaningfully engage while they are abroad.
- Established the foundations for the Laboratory for Innovation Science and Policy and convened four "Challenges of the Innovation Economy" symposia that drew more than 300 attendees.
- Hosted former Massachusetts governor Deval Patrick as the initiative's first visiting innovation partner.

## **Institute for Medical Engineering and Science**

The Institute for Medical Engineering and Science (IMES) continued its work to build and coordinate the efforts of faculty and researchers from all over MIT who are working in the areas of health and health care.

The leadership of IMES played a key role in developing a new strategic partnership between MIT and Massachusetts General Hospital (MGH). Individual collaborations between MIT faculty and MGH investigators have existed for some time, but the newly formalized partnership, which was announced in October, is designed to accelerate the development of diagnostic tools and therapies. The first set of grants will support projects that address three major challenges in clinical medicine: improving the diagnosis of disease, developing new approaches to prevent and treat infectious and autoimmune diseases, and developing more accurate methods of diagnosing and treating major neurodegenerative and psychiatric diseases. The IMES partnership with MGH was a key element in the subsequent launch of a new interdisciplinary center at MIT. The Center for Microbiome Informatics and Therapeutics is dedicated to advancing understanding of the microbiome's role in human biology and harnessing this knowledge to develop treatments for related illnesses.

## **Communications and Development**

The development and communications staff in the School worked in close collaboration on a range of projects throughout AY2015.

- In collaboration with the MIT News Office, the communications office in central Resource Development (RD), and the Department of Facilities, School of Engineering development and communications staff coordinated the unveiling of the MIT.nano project to the public. This collaboration also generated communications and fundraising collateral for the project. School-based staff continue to coordinate communication activities on the project.
- The Dean's Advisory Council was revitalized in terms of its mission and membership; the group's fall meeting had over 15 members in attendance.
- School development and communications staff created a speaker series at which academic department heads describe the activities of their faculty and students and articulate their financial needs for frontline fundraisers in RD.
- Development and communications staff also collaborated closely with central RD staff members on planning and preparation for the upcoming capital campaign and completed a number of other smaller projects with them, including a new case for the renovation of Building 66.
- The communications office created and filled a new multimedia producer term position in the dean's office. This position has already proven very valuable in telling the School's story.

## **Statistics for 2014–2015**

### **Undergraduate Enrollment**

- 2,447 declared majors
- 1,108 women
- 205 international students

### **Graduate Enrollment**

- 3,294 students
- 924 women
- 1,393 international students

### **Degrees Awarded**

- 764 bachelor's degrees
- 713 master's degrees
- 348 doctoral and professional degrees

### **Faculty**

- 264 full professors
- 62 associate professors
- 52 assistant professors

**Ian A. Waitz**

**Dean**

**Jerome C. Hunsaker Professor of Aeronautics and Astronautics**