

Dean, MIT School of Engineering

The MIT School of Engineering's mission is to educate the next generation of engineering leaders, to create new knowledge, and to serve society. We are dedicated to creating an environment that addresses today's most pressing challenges while fostering the advancement of knowledge and the education of students. With the Institute's values in mind, we spearhead projects that enhance life and learning, attracting the most talented engineers, welcoming people from all backgrounds on campus, leading the next revolution in engineering education, and offering varied avenues that inspire students.

The largest of the Institute's five schools, the [MIT School of Engineering](#) comprises about 54% of undergraduate majors and 47% of 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 total volume of research expenditures in FY2020 was \$202,546,000.

Leadership

Academic year 2020 saw a number of leadership transitions and new appointments in the school.

- Ali Jadbabaie, the JR East Professor of Engineering, was named head of the Department of Civil and Environmental Engineering, effective September 1, 2020.
- Arvind, the Charles W. and Jennifer C. Johnson Professor in Computer Science and Engineering, was named head of the faculty of computer science, effective January 1, 2020.
- Jim Collins, the Termeer Professor of Medical Engineering and Science in MIT's Institute for Medical Engineering and Science and the Department of Biological Engineering, was named faculty lead of the new MIT-Takeda Program, effective January 1, 2020.
- Jeffrey Grossman, the Morton and Claire Goulder and Family Professor in Environmental Systems, was named head of the Department of Materials Science and Engineering, effective January 1, 2020.
- Hae-Seung "Harry" Lee, professor of electrical engineering and computer science, was named the director of MIT's Microsystems Technology Laboratories, effective December 1, 2019.
- Antonio Torralba, the Thomas and Gerd Perkins Professor of Electrical Engineering and Computer Science, was named head of the faculty of artificial intelligence and decision making, effective January 1, 2020.
- Joel Voldman, professor of electrical engineering and computer science, was named head of the faculty of electrical engineering, effective January 1, 2020.

Tenure

The School of Engineering continues to work diligently to maintain the excellence of its faculty. This year the school granted tenure to eight members of its faculty:

- Lydia Bourouiba, in the Department of Civil and Environmental Engineering, the Department of Mechanical Engineering (MechE), and the Institute for Medical Engineering and Science (IMES), focuses her expertise as a physical applied mathematician on problems at the interface of fluid dynamics and infectious disease transmission.
- Fikile Brushett, the Cecil and Ida Green Career Development Professor in the Department of Chemical Engineering (ChemE), focuses his research on advancing the science and engineering of electrochemical technologies for a sustainable energy economy.
- Thomas Heldt, in the Department of Electrical Engineering and Computer Science (EECS) and IMES, focuses his research on signal processing, mathematical modeling, and model identification to understand the physiology of the injured brain and to support real-time clinical decision making, monitoring of disease progression, and titration of therapy.
- Asegun Henry, the Robert N. Noyce Career Development Professor in the Department of Mechanical Engineering, focuses his research on heat transfer, with an emphasis on understanding the science of energy transport, storage, and conversion at the atomic level, along with the development of new industrial-scale energy technologies to mitigate climate change.
- William Oliver, in EECS, works with the Quantum Information and Integrated Nanosystems Group at Lincoln Laboratory and the Engineering Quantum Systems Group at MIT, where he provides programmatic and technical leadership for programs related to the development of quantum and classical high-performance computing technologies for quantum information science applications.
- Michael Short, the Class of 1942 Career Development Professor in the Department of Nuclear Science and Engineering, develops new materials and measurement methods to usher in the next generation of safe and scalable nuclear power.
- Vivienne Sze, in EECS, focuses her research on designing and implementing computing systems that enable energy-efficient machine learning, computer vision, and video compression for a wide range of applications, including autonomous navigation, digital health, and the internet of things.
- Caroline Uhler, in EECS and the Institute for Data, Systems, and Society (IDSS), focuses her research at the intersection of machine learning, statistics, and genomics.

Awards and Honors

Every year, academic and professional organizations honor numerous School of Engineering faculty members for their innovative research as well as their service to the community. Notable honors and awards are mentioned below.

- Hal Abelson of EECS received an honorary doctorate in education from the Education University of Hong Kong.
- Jesús del Alamo of EECS won the University Researcher Award from the Semiconductor Industry Association and the Semiconductor Research Corporation as well as the Indium Phosphide and Related Materials Award 2020.
- Mohammad Alizadeh of EECS won the 2019 VMware Systems Research Award.
- Saman Amarasinghe of EECS was named an Association for Computing Machinery Fellow.
- Brian Anthony of MechE won the Google Faculty Research Award 2019–2020.
- Robert C. Armstrong of ChemE was made member of the American Academy of Arts and Sciences.
- Hari Balakrishnan of EECS was named a 2020 fellow of the Institute of Electrical and Electronics Engineers (IEEE).
- Irmgard Bischofberger of MechE won the 2019 APS/DFD Milton van Dyke Award.
- Richard Braatz of ChemE won the AIChE 2019 Separations Division Innovation Award.
- Guy Bresler of EECS won a National Science Foundation CAREER Award.
- Michael Carbin of EECS was awarded a Sloan Research Fellowship in Computer Science.
- Vincent W. S. Chan of EECS was elected 2020–2021 president of the IEEE Communication Society.
- Adam Chlipala of EECS was named a distinguished member of the Association for Computing Machinery.
- Michael Cima of the Department of Materials Science and Engineering (MSE) won the W. David Kingery Award from the American Ceramic Society.
- James Collins of IMES won the 2020 Max Delbrück Prize in Biological Physics from the American Physical Society.
- Areg Danagoulian of the Department of Nuclear Science and Engineering won the 2019 Radiation Science and Technology Award from the American Nuclear Society.
- Peter Dedon and Eric Alm of the Department of Biological Engineering won the NIH Director’s Transformative Research Award.
- Esther Duflo of IDSS won the Nobel Prize in Economics on October 14, 2019.

- Joel Emer of EECS was elected to the National Academy of Engineering.
- William Freeman of EECS was named a fellow of the Association for the Advancement of Artificial Intelligence and won the Distinguished Researcher Award from the IEEE Computer Society's Technical Committee on Pattern Analysis and Machine Intelligence.
- Daniel Frey of MechE was awarded the Charles M. Manly Memorial Medal.
- Robert Gallager of EECS was named a Japan Prize Laureate by the Japan Prize Foundation.
- Shafi Goldwasser of EECS received an honorary doctorate of science from the University of Oxford and an honorary doctorate in mathematics from the University of Waterloo.
- Ming Guo of MechE was named the 2020 Sloan Research Fellow in Physics.
- Ruonan Han of EECS was named the 2020–2022 Distinguished Lecturer by the IEEE Microwave Theory and Technique Society.
- Song Han of EECS won a National Science Foundation CAREER Award.
- David Hardt of MechE was nominated to the 2020 Society of Manufacturing Engineers College of Fellows.
- Wesley L. Harris of the Department of Aeronautics and Astronautics was named a 2019 fellow of the American Association for the Advancement of Science.
- Jonathan How of the Department of Aeronautics and Astronautics won the 2020 American Institute of Aeronautics and Astronautics Intelligent Systems Award.
- Roger Kamm of MechE won the Shu Chien Achievement Award.
- David Karger of EECS was inducted into the American Academy of Arts and Sciences.
- Heather Lechtman of MSE won the Pomerance Award for Scientific Contributions to Archaeology.
- Charles Leiserson of EECS won the Test of Time Award for 1999 from the IEEE Symposium on the Foundations of Computer Science.
- Nancy Leveson of the Department of Aeronautics and Astronautics won the 2020 IEEE Medal for Environmental and Safety Technologies.
- Jae Lim of EECS was named a 2020 Ho-Am Prize laureate.
- Karthish Manthiram of ChemE won a National Science Foundation CAREER Award.
- Muriel Medard of EECS received an honorary doctorate from the Technical University of Munich and became a member of the National Academy of Engineering.
- Leonid Mirny of IMES was selected for the Chaires Blaise Pascal 2019.

- Stefanie Mueller of EECS won the Sloan Research Fellowship in Computer Science and was named a Microsoft Research Faculty Fellow.
- Dava Newman of the Department of Aeronautics and Astronautics was elected to the Aerospace Corporation's Board of Trustees.
- Ellen Roche of MechE was named associate scientific advisor of Science Translational Medicine.
- Alberto Rodriguez of MechE won the IEEE Early Academic Career Award in Robotics and Automation and the Google Faculty Research Award 2019–2020.
- Devavrat Shah of EECS won the ACM Sigmetrics Test of Time Paper Award.
- Jeffrey H. Shapiro of EECS won the IEEE Signal Processing Society Best Paper Award.
- Suvrit Sra of EECS won a National Science Foundation CAREER Award.
- Collin Stultz of EECS was named a Fellow of the American Institute for Medical and Biological Engineering.
- Vivienne Sze of EECS won the inaugural Rising Star Award from the Association for Computing Machinery Council on Women in Computing.
- Kripa Varanasi of MechE, won the 2019 APS/DFD Milton van Dyke Award.
- Anne White of the Department of Nuclear Science and Engineering was named a fellow of the American Physical Society.
- Alan Willsky of EECS won the IEEE Jack S. Kilby Signal Processing Medal.
- Cathy Wu of IDSS won the first prize in the Best PhD Dissertation Award from the IEEE Intelligent Transportation Systems Society.
- Maria Yang, Sang-Gook Kim, and Caitlin Mueller, all of the Mechanical Engineering Department, won the National Science Foundation LEAP HI Award.
- Dick K.P. Yue of MechE was elected to the National Academy of Engineering.
- Xuanhe Zhao of MechE won the Thomas J.R. Hughes Young Investigator Award.

Initiatives and Programs

Launching the MIT-Takeda Program

On January 6, 2020, the School of Engineering announced the MIT-Takeda Program to fuel the development and application of artificial intelligence (AI) capabilities to benefit human health and drug development. The new program leverages the combined expertise of both organizations and is supported by Takeda Pharmaceuticals Company's three-year investment (with the potential for a two-year extension).

This collaboration provides MIT with extraordinary access to pharmaceutical infrastructure and expertise and helps to focus work on challenges with lasting, practical

impact. A new educational program offered through the Abdul Latif Jameel Clinic for Machine Learning in Health (Jameel Clinic) provides Takeda with the ability to learn from and engage with some of MIT's sharpest and most curious minds, and to offer insight into the advances that will help shape the health care industry of tomorrow.

Established within Jameel Clinic, a nexus of AI and health care at MIT, the MIT-Takeda Program focuses on the following:

- Funding 6–10 flagship research projects per year in the areas of machine learning and health, engaging MIT faculty and Takeda researchers in areas of mutual interest to both organizations, including diagnosis of disease, prediction of treatment response, development of novel biomarkers, process control and improvement, drug discovery, and clinical trial optimization
- Providing 11 annual fellowships supporting graduate students working at the intersection of AI and health, creating substantial, value-added programming for young scholars
- Offering educational programs for Takeda employees to bolster individual and organizational learning in integrating AI and machine learning technologies into practical and applied solutions

The nine inaugural research projects of the MIT-Takeda Program were announced in June 2020, as were the program's first 10 fellows.

Jim Collins is the MIT-Takeda Program faculty lead. Regina Barzilay, Delta Electronics Professor of Electrical Engineering and Computer Science, is the program's educational lead.

Restructuring of the Department of Electrical Engineering and Computer Science

In December 2019, the MIT School of Engineering, together with the MIT Stephen A. Schwarzman College of Computing, announced the restructuring of the Department of Electrical Engineering and Computer Science. As part of the founding of the Schwarzman College of Computing, EECS—which is the largest academic unit at MIT—has been restructured to provide a stronger base for enhancing existing programs, creating new opportunities, and increasing connections to other parts of the Institute.

A joint part of the School of Engineering and the Schwarzman College of Computing, EECS is now composed of three overlapping subunits: electrical engineering, computer science, and artificial intelligence and decision-making. These bring together computer science-heritage AI and machine learning with electrical engineering-heritage information and decision systems to exploit their significant synergies. The department will remain responsible for Course 6.

Each of the units—called a “faculty” to differentiate it from a traditional academic structure—is managed by a head of faculty. This head leads the respective area and is expected to contribute to the overall leadership of EECS, which is under the direction of the department head, who will continue to oversee intersecting matters. The three faculty heads and the EECS department head will each report jointly to the dean of the School of Engineering and the dean of the Schwarzman College of Computing.

Asu Ozdaglar, MathWorks Professor of Electrical Engineering and Computer Science, and the newly appointed deputy dean of academics for the College of Computing, remains the head of EECS, a position she has held since 2018. As of January 1, 2020, Joel Voldman, professor of electrical engineering and computer science and associate department head in EECS, is the head of the faculty of electrical engineering. Professor Arvind is the head of the faculty of computer science, and Antonio Torralba is the head of the faculty of artificial intelligence and decision making.

Educational Initiatives

Leaders for Global Operations

The MIT Leaders for Global Operations program (LGO), founded in 1988, is a dual-degree MBA and SM engineering program offered as a partnership of the School of Engineering, the MIT Sloan School of Management, and a group of more than 20 leading global industry partners focused in the technology, operations, and manufacturing sectors. The program's mission is to generate cutting-edge knowledge at the intersection of engineering and management, and to educate leaders to address the world's most challenging operations and high-tech problems.

In the past year, LGO welcomed as partner companies Delphi Technologies, ResMed, and Stryker, each of whose senior operations leaders or CEOs are LGO graduates. The LGO Class of 2022 (49 students) started its studies virtually in June 2020. Thanks to the strong support of LGO alumni (over 1,300 graduates) and industry partners, the Class of 2020 all secured employment.

LGO is led by Thomas Roemer, executive director, and Duane Boning, faculty co-director and Clarence J. LeBel Professor of Electrical Engineering and Computer Science.

New Engineering Education Transformation

The New Engineering Education Transformation (NEET) program launched in 2017 to reimagine engineering education at MIT. A cross-departmental endeavor with a focus on integrative, project-centric learning, NEET cultivates the essential skills, knowledge, and qualities to address the formidable challenges posed by the 21st century.

The program's offerings—known as threads—give students unprecedented opportunities to immerse themselves in projects that cross disciplinary boundaries while earning a degree in their chosen major. Threads include autonomous machines, living machines, advanced materials machines, renewable energy machines, and digital cities. Students are awarded a NEET certificate in their chosen thread within the usual four years.

NEET students are from eight School of Engineering departments and six departments in the School of Humanities, Arts, and Sciences, the School of Science, and the School of Architecture and Planning. Fully 64% of NEET students are women. In May 2020, the program graduated its first cohort of 26 students.

Babi Mitra is the executive director of NEET along with faculty co-leads Ed Crawley, professor of aeronautics and astronautics, and Mark Bathe, associate professor of biological engineering.

Program in Polymers and Soft Matter

The interdepartmental Program in Polymers and Soft Matter (PPSM) established in 1986, offers graduate education and community building for MIT's polymer and soft-matter science and engineering researchers. This includes a core graduate polymer curriculum, doctoral qualifying procedure, seminars by leading researchers, student-driven events, and the undergraduate minor in polymers and soft matter. PPSM is administered by faculty from the Departments of Materials Science and Engineering, Chemical Engineering, Mechanical Engineering, Biological Engineering, and Chemistry.

In fall 2019, PPSM welcomed eight new students: five through Chemistry, two through MSE, and one through MechE. Three students graduated from PPSM's doctoral course of study in AY2020: two from MSE and one from Chemistry. Enrollment remained at 40 students for AY2020. PPSM faculty consensus is that a sustainable annual number of about five to eight new students is desirable.

In 2020, PPSM graduates contributed vitally to numerous respected academic, industrial, and governmental organizations and entrepreneurial ventures in the United States and abroad. PPSM students and faculty won prestigious awards including National Science Foundation fellowships, National Academy of Sciences awards, MIT Committed to Caring awards, and several society awards.

PPSM is led by Alfredo Alexander-Katz, associate professor in the Department of Materials Science and Engineering.

Sandbox Innovation Fund Program

Now in its fourth year and accessible to all 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 from a broad network of committed partners, and tailored educational experiences. To date, the program has engaged about 2,000 participants and funded over 1,000 ideas. Of the hundreds of teams funded by Sandbox, roughly 100 teams currently operate as impactful start-up companies.

Sandbox is led by Executive Director Jinane Abounadi.

SuperUROP

In 2012, the Advanced Undergraduate Research Opportunities Program (SuperUROP) was launched in EECS. SuperUROP is a specialized version of the Undergraduate Research Opportunities Program that involves a year-long 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. Their projects then evolve into graduate theses, startup plans, or industry positions.

In AY2020, SuperUROP engaged 102 students across the departments of Aeronautics and Astronautics, Biological Engineering, Civil and Environmental Engineering, ChemE, and EECS, as well as from the School of Humanities, Arts, and Social Sciences.

System Design and Management

System Design and Management (SDM) is an MS program in engineering and management jointly offered by the School of Engineering and the MIT Sloan School of Management that completed its 24th year in AY2020. SDM has also offered a graduate certificate for 19 years. The Integrated Design and Management (IDM) track began in 2015 and combined a studio environment with instruction in engineering, management, and design.

SDM enrolled 67 students, including 16 students co-sponsored by the MIT Energy Initiative, and 37 certificate students. IDM enrolled 26 students for a total of 215 students in the program. SDM graduated 53 students in AY2020. For the calendar year 2019, 100% of graduates seeking employment found employment within three months. IDM graduated 33 students in AY2020.

SDM is led by Joan Rubin, with Warren Seering, the Weber/Shaghness Professor of Mechanical Engineering, serving as faculty co-lead.

Communications and Development

In AY2020, the school's communications and development offices focused on the evolution of communication and fundraising activities, including stronger communications between the dean and the alumni of its academic programs, and an increase in development-related activities. Staff from both teams participated in the following activities:

- Collaboration on the new MIT Forefront events
- Presentations on key topics to fundraisers across MIT
- Support for Visiting Committee and Dean's Advisory Council meetings
- Support for the Campaign for a Better World
- Engagement with alumni through timely and compelling information (the dean's e-newsletter, specialized emails, and visits)

Highlights of the year included communications and planning for the launch of the MIT-Takeda Program. Additionally, the Infinite Series Symposium returned in February 2020 in Palo Alto, California. "Engineering Innovations and Impact" included five faculty speakers and a student showcase, and engaged alumni from the greater Palo Alto area.

The school hired a new director of communications in September 2019, who developed new lines of connection and engagement with the school's department communicators. This was especially helpful during the campus ramp-down in March 2020. Internal communications were a focal point in FY2020, and included the beginning of email communications from the dean to all faculty and staff within the school.

The school development officers, reporting jointly to the assistant dean for development and the academic department heads, led and/or supported a range of new programs, activities, and engagement opportunities for school alumni and friends, including urgent, targeted fundraising efforts for Covid-19 research projects in spring 2020. Their efforts were critically important to the success of the MIT Campaign for a Better World, which closed FY2020 with \$538 million in new gifts and pledges.

Statistics for AY2020

Undergraduate Enrollment

- Total: 2,451
- Women: 1,132
- International students: 219

Graduate Enrollment

- Total: 3,276
- Women: 1,024
- International students: 1,347

Degrees Awarded

- Bachelor of science: 794
- Master degree: 759
- Doctoral degree: 294

Faculty

- Full professors: 266*
- Associate professors with tenure: 44*
- Associate professors without tenure: 29
- Assistant professors: 51

*Please note: the Institute for Data, Systems, and Society faculty counts are included in this report, since IDSS remained part of the School of Engineering until January 1, 2020, when it moved to the MIT Schwarzman College of Computing.

Anantha P. Chandrakasan

Dean, School of Engineering

Vannevar Bush Professor of Electrical Engineering and Computer Science