

SCHOOL OF ENGINEERING

Never have the challenges and opportunities of engineering been more exciting or more critical to the long-term well-being of society than they are today. An engineering education from MIT provides students with exceptional opportunities to define and impact the future.

Technology's enormous influence on society is creating an increasing demand for engineering graduates. Engineers provide important leadership to society through their central role in scientific and technological innovation. By creating, developing, and managing complex technologies and products, engineers contribute directly to the betterment of humanity and to shaping our world. Seeking solutions to the most difficult challenges of our day in the context of physical, economic, human, political, legal, and cultural realities makes engineering a tremendously rewarding endeavor.

The first-year curriculum for all MIT undergraduates includes physics, chemistry, mathematics, biology, and the humanities, arts, and social sciences. An undergraduate student normally becomes affiliated with a particular department or course of study at the beginning of sophomore year and works closely with an advisor from that department or program to shape their course of study. Students who would like to explore an engineering major are encouraged to seek out and get involved with one of the engineering departments during their first year. Every department offers exciting subjects that introduce first-year students to engineering; they also offer First-Year Advising Seminars that bring students together in small groups to discuss their field with department faculty. The Undergraduate Research Opportunities Program (UROP) (<http://catalog.mit.edu/mit/undergraduate-education/academic-research-options/undergraduate-research-opportunities-program>) is a great way to delve into cutting-edge engineering research.

Once a student chooses an undergraduate major, there are many opportunities for individual initiatives. For example, the New Engineering Education Transformation (NEET) (<http://neet.mit.edu>) program aims to reimagine and rethink what and how undergraduate engineering students learn by focusing on preparing them to develop the new machines and systems that they will build in the middle of the 21st century. Also, the School's flexible engineering degree programs offer students in several departments the opportunity to satisfy department-based core requirements and declare an additional concentration, which can be broad and interdisciplinary in nature (e.g., energy, health, or the environment), or focused on areas that can be applied to multiple fields (e.g., robotics and controls, computational engineering, or engineering management). Students may also elect to create their own concentrations under supervision from department faculty. In addition, many undergraduates combine their primary major with a second one in another area, such as management, political science, economics, one of the sciences, or another area of engineering. Others organize their programs so they can receive both undergraduate and graduate degrees

simultaneously. A series of minor programs from across the Institute is also available.

Pioneering Programs in Engineering Education

Engineering education has been at the core of the Institute's mission since its founding in 1861. MIT created the contemporary model of engineering education grounded in a dynamic, changing base of science. It pioneered the modern model of the research university, with externally sponsored research programs and a matrix of academic departments and research laboratories working across various disciplines. MIT also contributed in significant ways to the creation of entire new fields, for example, chemical engineering, sanitary engineering, naval architecture and marine engineering, and soil mechanics; the Institute also offered the first course in aeronautical engineering. More recently, MIT has created new avenues for students to pursue concentrations in broad, interdisciplinary areas such as computing, energy, medical science and engineering, robotics, computational engineering, or poverty alleviation.

The School of Engineering has distinguished itself as a leader in engineering education, where the teaching of applied, hands-on engineering is of the utmost importance. In 1916, it created one of the first industrial internship programs, now the David H. Koch School of Chemical Engineering Practice. Over the last several decades, the School of Engineering has launched numerous pioneering programs, many in partnership with industry, such as Leaders for Global Operations (1988), System Design and Management (1997), the Deshpande Center for Technological Innovation (2001), the Undergraduate Practice Opportunities Program (2001), the Bernard M. Gordon–MIT Engineering Leadership Program (2008), MITx and edX (2011), SuperUROP (2012), StartMIT (2014), the MIT Sandbox Innovation Fund Program (2016), and the New Engineering Education Transformation program (2017).

The School of Engineering is constantly innovating in engineering education, developing novel pedagogical approaches, designing new subject offerings to strengthen current programs, and creating new disciplines, fields of study, majors, and graduate programs. Today, the School offers more than two dozen exciting engineering degree programs for its undergraduates. For example, the flexible SB in Engineering degree is offered by Mechanical Engineering, Aeronautics and Astronautics, Chemical Engineering, or Civil and Environmental Engineering.

The School of Engineering also offers a range of co-curricular activities designed to enhance students' academic and non-academic experiences at MIT. The MIT Sandbox Innovation Fund Program (<http://sandbox.mit.edu>) seeks to help students develop the knowledge, skills, and attitudes to be successful innovators and entrepreneurs by providing up to \$25,000 for student-initiated ideas and mentoring from within MIT and from a broad network of committed partners. The Undergraduate Practice Opportunities Program (UPOP) (<http://upop.mit.edu>) is a program

for sophomores that provides opportunities for students to learn first-hand about engineering practice outside the academic context through internships and intensive experiential-learning workshops that emphasize development of professional abilities and attitudes required in engineering work. And SuperUROP (<https://superurop.mit.edu>), an expanded version of UROP, was launched in 2012 for juniors and seniors to have the time, training, resources, and guidance necessary for deep scientific and engineering inquiry leading to publication-worthy findings.

The School of Engineering is generally ranked at the top of its fields by third-party rankings and surveys. *US News and World Report* has placed the School at the top of its engineering rankings every year they have run their survey, as has the QS World University Rankings. Nearly a third of the School's current and emeritus faculty and research staff have been inducted into the National Academy of Engineering.

Interdepartmental Research Programs

Within the School of Engineering, students may develop a program that satisfies their own intellectual and professional objectives. Those interested in an interdepartmental program should study the department descriptions and interdisciplinary program description for opportunities that combine disciplines from MIT's four other schools or the MIT Stephen A. Schwarzman College of Computing with those of the School of Engineering.

While the School's academic departments provide continuity and stability for the basic engineering disciplines, they increasingly share interests in the way their individual disciplines are expressed and applied. Interdepartmental centers, laboratories, and programs provide opportunities for faculty, students, and research staff to undertake collaborative research and engage in educational programs dealing with these and other interdisciplinary applications of importance to society.

Interdisciplinary centers and laboratories in which School of Engineering faculty play leading roles include the following:

- Center for Advanced Nuclear Energy Systems
- Center for Computational Science and Engineering
- Center for Ocean Engineering
- Center for Transportation and Logistics
- Computer Science and Artificial Intelligence Laboratory
- Deshpande Center for Technological Innovation
- Industrial Performance Center
- Institute for Data, Systems, and Society
- Institute for Medical Engineering and Science
- Koch Institute for Integrative Cancer Research
- Laboratory for Information and Decision Systems
- Laboratory for Manufacturing and Productivity
- Materials Processing Center

- Materials Research Laboratory
- Microsystems Technology Laboratories
- MIT Climate and Sustainability Consortium
- MIT Energy Initiative
- MIT Stephen A. Schwarzman College of Computing
- Research Laboratory of Electronics
- Singapore-MIT Alliance
- Sociotechnical Systems Research Center

More information on interdepartmental research programs (<http://catalog.mit.edu/mit/research>) is available under Research and Study.