

Dean, School of Engineering

MIT's School of Engineering has a four-part mission: to lead the profession by setting new directions through innovative models for education and research, to create new engineering knowledge and technologies, to transform society through engineering practice and research, and to produce and train the next generation of pioneers in engineering education, research, and industry. To advance this mission, the MIT School of Engineering has a vision and a set of strategies for its implementation that move forward all of these components as a single, interconnected objective.

The faculty, students, and staff in the School of Engineering perform cutting-edge research that advances scientific frontiers, solves complex technological and social problems, and serves to train future engineering, science, and technology innovators and leaders who will transform society. We continue to compete successfully against a growing number of institutions that aspire to MIT's leadership position in science, technology, and engineering.

The 2009–2010 academic year saw some welcome stabilization in world financial markets, but MIT's need to manage its resources cautiously remains a priority. The School of Engineering was a willing partner in the Institute's response to the financial crisis, and its deans, faculty, and staff participated in MIT's recovery efforts. As the Institute emerges more fully from the crisis, we expect our efforts will have helped to maintain the School's standing and to support our need to conduct activities that are capable of touching the broadest range of fields, researchers, and disciplines. Our period of economic uncertainty has corresponded with a time during which it has been crucial to create systems, spaces, and opportunities to nucleate and broaden interdisciplinary activities while simultaneously solidifying and enhancing deep disciplinary programs and activities.

Currently, the School of Engineering's eight academic departments and one division, its many research centers and laboratories, and its rich array of interdisciplinary graduate degree programs encompass a community of some of the world's most inventive thinkers. About 36 percent of the Institute's faculty, more than 45 percent of MIT graduate students, and about 45 percent of MIT's undergraduate majors collaborate in the School's 17 undergraduate degree programs, 95 graduate programs, and faculty research base of nearly \$307 million in FY2010. The achievements of the School's departments, laboratories, centers, and programs are extensive. Separate reports that highlight the activities and the accomplishments of the faculty and researchers in each of these units over the past year follow this report.

As a result of this year's faculty searches, 13 candidates have accepted faculty appointments in the School of Engineering. We are confident that their appointments will add to the excellence, excitement, and energy critical to maintaining the School's high standards. Of particular note among this year's new faculty is the fact that five, or almost 40 percent, of them are women. The School has made significant efforts to recruit the best young faculty to MIT from the broadest range of backgrounds. We are gratified to see such positive results.

Faculty Awards, Honors, and Transitions

There were a number of important leadership transitions, some within the School of Engineering and some outside MIT, involving School faculty in the 2009–2010 academic year. External transitions involving engineering faculty included the following:

- President Barack Obama nominated dean of engineering Subra Suresh to be the next director of the National Science Foundation (NSF).
- Institute Professor and former dean of engineering Thomas Magnanti was named the first president of the Singapore University of Technology and Design.
- Fred Moavenzadeh, professor of civil and environmental engineering, was named president of the Masdar Institute of Science and Technology, the world's first graduate research institution dedicated to alternative energy, environmental technologies, and sustainability.

Important leadership changes within the Institute included the following:

- Andrew J. Whittle, a geotechnical engineer who served on the panel reviewing the hurricane protection systems in New Orleans after Hurricane Katrina and on the Massachusetts governor's safety review of Boston's "Big Dig" tunnels, was named head of the Department of Civil and Environmental Engineering.
- Christine Ortiz, professor of materials science and engineering, was named MIT's dean for graduate education.
- Hamlin Jennings, known for his influential work on the fundamental chemistry of cement, was named the inaugural executive director of the Concrete Sustainability Hub (CSH), a research center established last fall at MIT.
- Warren P. Seering, professor of mechanical engineering, and Steven D. Eppinger, professor of management, were named codirectors of the Systems Design and Management Program.
- Professor of mechanical and ocean engineering John J. Leonard was appointed director of the Ford–MIT Alliance, succeeding professor John Heywood, who retired in June.

Every year, faculty members in the School of Engineering receive numerous honors in recognition of their research and service, many offered by professional societies or the faculty members' professional communities. This year was no exception. The reports of the School's departments, divisions, laboratories, centers, and programs make note of many of these awards. Several notable awards and School-based awards deserve additional mention here.

The National Academy of Engineering elected five MIT professors to membership in the academy this year. Cynthia Barnhart is the associate dean for academic affairs for the MIT School of Engineering, professor of civil and environmental engineering and engineering systems, and director of Transportation@MIT. She was honored for her professional leadership and for contributions to optimization and transportation models, algorithms, and applications. Gang Chen is the Carl Richard Soderberg professor of power engineering and director of the Pappalardo micro- and nanoengineering

laboratories in the Department of Mechanical Engineering. He was acknowledged for his contributions to heat transfer at the nanoscale and to thermoelectric energy conversion technology. Robert E. Cohen is the St. Laurent professor, codirector of the DuPont–MIT Alliance, and chair of the PhD CEP Steering Committee in the Department of Chemical Engineering. He was honored for his research on polymer morphology and surfaces, commercial products and processes, and successful entrepreneurship and novel educational programs. Andrew Whittle is head of the Department of Civil and Environmental Engineering and a research professor with the Singapore–MIT Alliance for Research and Technology. He was acknowledged for his development of soil models and numerical analyses that advance the design of braced excavations and offshore structures. Alan Willsky is the Edwin S. Webster professor of electrical engineering and computer science and codirector of the Laboratory for Information and Decision Systems. He was honored for his contributions to model-based signal processing and statistical inference. In addition, Art Gelb, a member of the School of Engineering Dean’s Advisory Council, president of Four Sigma Corporation, and cofounder, retired chairman, and chief executive officer of The Analytic Sciences Corporation in Belmont, MA, was honored for his leadership in applying Kalman filtering techniques to critical national aerospace problems. The National Academy of Engineering also honored MIT Institute Professor and professor of aeronautics Sheila E. Windall by presenting her with its Arthur M. Bueche Award for her leadership in expanding engineering opportunities for women and minorities.

Here is a small sample of the honors and awards garnered by School of Engineering faculty in AY2010 (please consult the reports from individual laboratories and centers for more comprehensive listings):

- Dana Weinstein of the Microsystems Technology Laboratories at MIT (and assistant professor in the Department of Electrical Engineering and Computer Science) and Kripa Varanasi, the d’Arbeloff assistant professor of mechanical engineering and leader of the Laboratory for Surface Science and Engineering in the Department of Mechanical Engineering, both received a 2010 Young Faculty Award from the Defense Advanced Research Projects Agency.
- Robert Liebeck, professor of the practice of aerospace engineering, was awarded the Daniel Guggenheim Medal.
- Ronald L. Rivest, a professor of electrical engineering and computer science, won MIT’s James R. Killian Jr. Faculty Achievement Award.
- The National Academy of Sciences awarded professor Sallie W. (Penny) Chisholm the Alexander Agassiz Medal for an original contribution in the science of oceanography.
- Amy Smith, founder of MIT’s innovative D-Lab and a senior lecturer in the Department of Mechanical Engineering, was named by *Time* magazine as one of the 100 world’s most influential people for 2010.
- Donald Rosenfield, director of the Leaders for Global Operations Program and senior lecturer at the MIT Sloan School of Management, was named the recipient of the 2009 Joseph A. Martore (1975) Excellence in Teaching Award.

- Nancy Ann Lynch, the NEC professor of software science and engineering and professor of electrical engineering and computer science, and Madhu Sudan, the Fujitsu professor of computer science and engineering, were elected members of the American Academy of Arts and Sciences.
- Markus J. Buehler, the Esther and Harold E. Edgerton career development associate professor of civil and environmental engineering, and Joel L. Dawson, the Mark Hyman, Jr., career development associate professor of electrical engineering, were among the recipients of the Presidential Early Career Award for Scientists and Engineers, the highest award bestowed by the US government on scientists and engineers in the early stages of their independent research careers.

New Collaborations, Centers, and Programs

Aside from the individual accomplishments of our faculty, the School of Engineering also enjoyed successes in its collective efforts in the 2009–2010 academic year. Again, these accomplishments will be covered in greater detail in the individual reports of the School's departments, laboratories, and centers. Here, however, are a few highlights:

- NSF awarded \$25 million to establish the Emergent Behaviors of Integrated Cellular Systems Center at MIT, the University of Illinois at Urbana-Champaign, and the Georgia Institute of Technology. Part of NSF's Science and Technology Centers Integrative Partnerships program, the new center will have its headquarters at MIT. Its objectives are to advance research in complex biological systems, create new educational programs based on this research, and demonstrate leadership in its involvement of groups traditionally underrepresented in science and engineering.
- MIT was named one of nine partners in a Nuclear Energy Innovation Hub announced by US Deputy Secretary of Energy Daniel Poneman. The Hub, also known as the Consortium for Advanced Simulation of Light Water Reactors, is a national partnership of universities and industry partners that will be led by Oak Ridge National Laboratory.
- MIT formalized an agreement with Singapore University of Technology and Design to collaborate on a broad range of areas, including pedagogy, curriculum development, and faculty recruitment and development, as well as the development of a range of research programs. Sanjay Sarma, professor of mechanical engineering, is the director of the MIT/SUTD collaboration.
- Sanofi-Aventis announced a strategic alliance with the MIT Center for Biomedical Innovation, a program of the Engineering Systems Division, which will be known as the Sanofi-Aventis Biomedical Innovation Program.
- The David H. Koch Institute for Integrative Cancer Research at MIT received funding from the National Cancer Institute (NCI) to become a Center for Cancer Systems Biology. These centers are part of NCI's Integrative Cancer Biology Program, which is NCI's primary effort in cancer systems biology, a field that is now seen as an essential component in the future of cancer research.

- CSH was established with the goal of accelerating emerging breakthroughs in concrete science and engineering and transferring that science into practice. Researchers from MIT's School of Engineering, School of Architecture and Planning, and Sloan School of Management are expected to participate in CSH's research activities.
- MIT launched a new Center for Gynepathology Research. About a dozen MIT researchers will participate in the center, whose scientific director will be Linda Griffith, professor of biological engineering and mechanical engineering.

Education Innovation and Assessment

The School of Engineering continues to make progress in the development of new programs to improve undergraduate engineering education. Building on the work of the School's 2008 Strategic Planning Council, the Dean's Education Committee, chaired by professor Ian Waitz, has developed a proposal that permits each department to tailor the key ideas of a flexible engineering degree and theme-based concentrations to their specific disciplines and interests. A secondary but nonetheless important goal is to make our educational programs more efficient by reducing the number of subjects that are taught.

The Office of Education Innovation and Assessment (EIA) continues to manage the Accreditation Board for Engineering and Technology reporting process for the School's 14 accredited undergraduate programs. EIA continues to administer the engineering senior, alumni, and employer surveys to support continuous program improvement. EIA also continues to support programs in development and administration of direct measures of student learning, including senior capstone review and focus groups.

Development and Communications

Engagement with the School's alumni community remains a priority for the School of Engineering and for its development and communications staff. Effective, timely, and compelling communications about MIT, the School, and engineering in general are crucial to these efforts and to the continued success of the School. More generally, as a leadership institution in engineering research and education, the School has a unique capacity to reach and inform the general public on issues related to science, technology, and education.

The primary communications vehicle and outreach mechanism for the School of Engineering remains its website. The School's site attracts approximately 40,000 visitors a month and has seen traffic from every country in the world. Very little (3.5%) of the site's traffic originates at MIT network locations, indicating that the site truly is operating as a gateway to engineering for audiences beyond MIT. The site has received numerous functional and aesthetic upgrades since its launch, and these updates will continue for the foreseeable future.

Statistics for 2009–2010

Undergraduate Enrollment

- 1,886 students
- 765 women
- 453 underrepresented minority members

Graduate Enrollment

- 2,794 students
- 670 women
- 145 underrepresented minority members

Degrees Awarded, 2010

- 598 bachelor's degrees
- 788 master's degrees
- 297 doctoral and professional degrees

Faculty

- 247 professors
- 79 associate professors
- 40 assistant professors

Subra Suresh

Dean

Vannevar Bush Professor of Engineering

More information about the School of Engineering can be found at <http://engineering.mit.edu/>.