

Report of the President

The invigorating energy of MIT and its tradition of thought, discovery, and innovation found a particularly important expression this year with the introduction of the online education ventures, *MITx* and edX. These ventures shifted the global conversation around affordability, access, and excellence in higher education. Even as MIT expanded its online educational activities in this critical way, it also continued to make advances in on-campus education, research, international engagements, and facilities expansion.

Undergraduate and Graduate Education

Student Enrollment

The Institute received 18,109 applications for the class of 2016, another all-time record high for the Institute. The Institute admitted 8.9 percent of those applicants for the class of 2016, and among them, 1,135 enrolled. The enrolling students include 46 percent women and 24 percent underrepresented minorities. Thirteen percent of enrolling students are the first generation in their families to attend college, 44 percent graduated as valedictorians from their high schools, and 92 percent graduated in the top five percent of their graduating high school classes.

Alumni Honors

Each year, MIT graduates are recognized for their achievements in a wide range of endeavors. While it is impossible to mention every award and major achievement, it is notable that this year the number of MIT-connected individuals to win the Nobel Prize reached 77. Adam Riess '92 shared the 2011 Nobel Prize in physics with Brian Schmidt of the University of California at Berkeley and Saul Perlmutter of the Australian National University. Riess was part of an international High-*z* Supernova Search Team that made important observations of distant supernovae. He was previously awarded a MacArthur Foundation "genius grant" in 2008 and is currently a professor of astronomy and physics at Johns Hopkins University. Riess returned to MIT this year to deliver the Department of Physics' Pappalardo Distinguished Lecture.

Faculty

Faculty Honors

MIT faculty members also regularly win honors and accolades for their contributions to the growth of knowledge and their groundbreaking contributions to their fields of study. This year, two MIT faculty members were recognized with particularly important awards for their contributions to science and society. Professor Rudolf Jaenisch, founding member of the Whitehead Institute for Biomedical Research and a member of the Department of Biology, was named one of seven winners of the 2011 National Medal of Science, the nation's highest scientific honor. Jaenisch was cited in the award for "improving our understanding of epigenetic regulation of gene expression" and leading the way toward "major advances in our understanding of mammalian cloning and embryonic stem cells." President Barack Obama named Institute Professor Emerita Mildred S. Dresselhaus as one of two winners of the Enrico Fermi Award, one of the government's oldest and most prestigious honors for scientific achievement. The award

citation notes that Dresselhaus was selected “for leadership in condensed matter physics, in energy and scientific policy, in service to the scientific community, and in mentoring women in the sciences.” In addition to her profound research contributions, Dresselhaus is widely recognized for her devotion to mentoring students, and for raising community awareness of, and promoting progress on, gender equity.

Online Education

MITx

MIT’s tradition of experimentation and innovation has affected the course of industries, nations, and the world. It has also opened up countless new fields of scholarship and created new ways of viewing and addressing complex issues. This year, the work of Institute pioneers in online education helped shift the global conversation about the affordability and accessibility of online education through the *MITx* online learning initiative and the edX online educational partnership with Harvard University. *MITx*, announced December 19, introduced a new MIT online learning initiative, which offers a range of MIT courses on a unique online interactive learning platform. Beyond its remote learning advantages, *MITx* will provide our faculty with a laboratory for pedagogical experimentation with digital technologies and enhance the educational experience of on-campus students with online tools that supplement and enrich classroom and laboratory experiences. *MITx* course material presentation enables students to learn at their own pace. It also features online laboratories, student-to-student communication, and gives individual assessment of student work. Students who study with *MITx* remotely and demonstrate a mastery of its subject matter will be able to earn an *MITx* certificate of completion. *MITx* operates on an open-source, scalable software infrastructure that will be made available to other educational institutions for development.

MITx expands the capabilities of MIT’s pioneering [OpenCourseWare](#) (OCW) initiative, a free online publication of nearly all of MIT’s undergraduate and graduate course materials. OCW was conceived in 2001 and reached a significant milestone in 2007 when it published the core educational resources for 1,800 MIT courses, making a vast amount of MIT’s educational material available to the public, free of charge. Using OCW, educators improve their courses and curricula, making their schools more effective; students find additional resources to help them succeed; and independent learners enrich their lives and have used OCW content to tackle challenges in sustainable development, climate change, and cancer. More than 100 million people explored the MIT-OCW resource in its first decade.

With the successful precedent of OCW, MIT now aims to host a virtual community of millions of learners on *MITx*. The first *MITx* prototype course, 6.002x: Circuits and Electronics, ran free of charge for students worldwide from March 5 to June 8. Modeled after MIT’s 6.002, an introductory course for MIT’s undergraduate students, 6.002x is designed to serve as a first course in an undergraduate electrical engineering, or electrical engineering and computer science, curriculum. The course covers a broad range of topics from networks and switches to digital abstraction and analog and digital circuits and applications. More than 150,000 people registered for 6.002x. The course provided its students with many technological features, including an e-textbook and a discussion board. Each week, students watched video lectures and demonstrations,

worked with practice exercises, completed homework assignments, and participated in an online, interactive lab designed to replicate its real-world counterpart. Students also took exams (and checked their grades) as they progressed in the course. At the end of the prototype course, 1,500 students demonstrated their mastery and received a certificate of completion for free. The course was taught by Professor Anant Agarwal, director of the Computer Science and Artificial Intelligence Laboratory (CSAIL); Chris Terman, CSAIL co-director; Professor Gerald Sussman; and Piotr Mitros, CSAIL research scientist. While only 10 percent of the registered students completed the course, the 1,500 successful *MITx* students represent more students than have completed the on-campus course in its entire history at MIT.

edX

On May 2, MIT and Harvard University announced [edX](#), a groundbreaking partnership to enhance campus-based teaching and develop a global community of online learners. The *MITx* technology platform formed the foundation for this new learning system. As the edX partnership progresses, MIT and Harvard expect that other universities will join to offer courses on its platform. All of the edX schools will utilize a shared technology platform, while each school builds its own *schoolx* curriculum. Through the aggregation of educational content from many universities, learners worldwide will be able to access course content on one site, with a set of online educational tools shared by all participating universities. In the initial stage, MIT and Harvard will work cooperatively to offer a broad set of courses, commencing in fall 2012.

Research Initiatives

Advanced Manufacturing Partnership

Announced at the end of MIT's prior reporting year, the [Advanced Manufacturing Partnership](#) (AMP) continued its work this year, holding four regional workshops to gather insights into collaborative approaches to advance manufacturing competitiveness. A national effort, AMP will bring together federal agencies, industry, universities and other manufacturing stakeholders to identify emerging technologies that have the potential to both create high-quality domestic manufacturing jobs and enhance the global competitiveness of the United States. The northeast regional meeting included local business leaders and many distinguished guests, among them: Deval Patrick, governor of the Commonwealth of Massachusetts; Subra Suresh, director of the National Science Foundation; Patrick Gallagher, director of US Department of Commerce's National Institute of Standards and Technology and under secretary of commerce for Standards and Technology; Ken Gabriel, deputy director of Defense Advanced Research Projects Agency; Karen Mills, administrator of the US Small Business Administration; Desh Deshpande, chairman of Sparta Group; Raymond Stata, chairman and co-founder of Analog Devices; and Henry Kelly, principal deputy assistant secretary of the Office of Energy Efficiency and Renewable Energy at the US Department of Energy.

On March 7, President Hockfield co-chaired with Dow Chemical Company CEO Andrew Liveris an AMP Steering Committee meeting in Washington, DC. The meeting began with opening remarks by Liveris and Hockfield, followed by reports from John Holdren of the Office of Science and Technology Policy, Gene Sperling of the National Economic Council, and Secretary Bryson from the Department of Commerce. Later,

on April 16, President Hockfield and Andrew Liveris presented the AMP report to the President's Council of Advisors on Science and Technology and participated in a public conference call. The AMP report and discussion called out key policies and investments to accelerate progress in advanced manufacturing, highlighting the recommendations of its four workstreams: Technology Development, Policy, Education and Workforce Development, and Shared Facilities and Infrastructure.

MIT Energy Initiative

MIT launched the [MIT Energy Initiative](#) (MITEI) five years ago and, since its founding, MITEI has gained considerable momentum. It has engaged nearly 300 faculty and senior research staff and attracted more than \$320 million in research funding. It produced a series of influential technically based policy reports that are helping to shape US policy on the future of key energy directions, including geothermal, nuclear power, natural gas, and coal. It also established a new approach to energy education with a five-School-based energy minor. MITEI's "walk the talk" efforts have inspired energy efficiencies across campus that are saving millions of dollars, and it precipitated the first visit by a US president to an MIT lab, with President Obama visiting campus and giving a major energy speech in October 2009. Given the scale of the global energy challenge, MITEI will play an important role in the years ahead. In this fifth anniversary year, MITEI held or cosponsored a variety of energy-related seminars, colloquia, and special events, including a visit by Todd Stern, special envoy for climate change at the US State Department, as part of the Earth Week Colloquium.

MIT Global Environment Initiative

The MIT Environmental Research Council (ERC) submitted its report, *Implementing the MIT Global Environment Initiative*, which outlined a vision for advancing sustainability and addressing environmental issues at MIT. The report, which includes input from a forum held on December 15, identifies strategic research themes that cross disciplinary boundaries and, like MITEI, it integrates scientific understanding, engineering solutions and social science research to design new approaches to the world's environmental challenges. The report also lays out a portfolio of educational offerings, including a new undergraduate minor in environment and sustainability. Professors John Lienhard and Maria Zuber will lead a planning team to prepare a proposal for consideration for implementation. They will focus on plans for the coordination of future activities across the Institute and fundraising.

China Energy and Climate Project

The [China Energy and Climate Project](#) (CECP) was launched this year to analyze the impact of China's existing and proposed energy and climate policies on technology, energy use, the environment, and the economy. Forecasts suggest that rapidly developing nations such as China will be responsible for most of the growth in carbon dioxide emissions over the next 50 years. CECP is expected to deliver a rigorous and transparent analysis of China's climate and energy policy options, and also to examine the global implications of those policies. CECP provides a framework for collaboration and personnel exchange between the MIT Joint Program on the Science and Policy of Global Change and the Institute for Energy, Environment and Economy at Tsinghua University in Beijing. The project will also involve the MIT Energy Initiative.

Center for Art, Science and Technology

A new [Center for Art, Science and Technology](#) (CAST) was established at MIT to advance the Institute's leadership in integrating arts into the curriculum. Supported by a \$1.5 million grant from the Andrew W. Mellon Foundation, CAST is a joint initiative of the Office of the Provost, the School of Architecture and Planning, and the School of Humanities, Arts and Social Sciences. The grant will provide awards to faculty, researchers, and curators who seek to develop cross-disciplinary courses, as well as new research or exhibitions, that span the arts, science, and technology. Mellon CAST funds will supplement MIT's existing visiting artists' program with the goal of embedding artist residencies into the curriculum and creating a platform for collaboration with faculty, students, and research staff. CAST will also support the participation of graduate students and postdoctoral fellows. A majority of MIT students arrive at the Institute with advanced training in the arts, along with their advanced aptitude in math, science, and engineering. The creation of this center follows in the Institute's traditions of incorporating the arts in the education of scientists and engineers, and of fostering a creative culture on campus.

International Initiatives

Singapore

President Hockfield participated in the groundbreaking ceremony for the [Singapore University of Technology and Design](#) (SUTD), Singapore's fourth university, on November 14. MIT is working in collaboration with Singapore to develop a new educational model for SUTD, founded on the principle of integrating concepts of design and innovation as a common thread in education, research and entrepreneurship. The SUTD campus will house the International Design Center as a focus for its research activities. As part of the groundbreaking events, President Hockfield participated in a panel discussion addressing the role of universities in technology and the innovation economy. While in Singapore, President Hockfield met with Dr. Tony Tan '64, the president of Singapore. She also met with several other Singaporean leaders, including Deputy Prime Minister Teo Chee Hean, who also serves as chairman of the National Research Foundation, and deputy chairman of the Research, Innovation and Enterprise Council. The SUTD plan includes a three-way collaboration among SUTD, MIT, and Zhejiang University in Hangzhou, China.

Taiwan

MIT signed a memorandum of understanding with the Ministry of Education in Taiwan to establish an academic exchange between top universities in Taiwan and MIT. As part of this agreement, MIT will join the Top University Strategic Alliance (TUSA), a consortium that promotes the exchange of scholars and the establishment of research cooperation between important universities in Taiwan and leading universities around the world. Since its establishment in 2006, TUSA has signed similar agreements with Harvard University, University of California at Berkeley, University of Chicago, and Imperial College London.

Russia

On October 26, MIT, the Skolkovo Foundation, and the [Skolkovo Institute of Science and Technology](#) (Skoltech), signed a collaborative agreement for building capacity in education, research, and entrepreneurship programs at Skoltech. President Susan Hockfield, Skolkovo Foundation President Viktor Vekselberg, and Skoltech founding President Edward Crawley held the signing ceremony at the RUSNANO International Nanotechnology Forum in Moscow. This agreement follows a preliminary agreement that had been signed on June 18, 2011, between MIT and the Skolkovo Foundation. The new agreement launches a three-year collaboration to develop a new graduate research university in the Moscow suburb of Skolkovo. Skoltech brings together Russian, US, and global research and technology resources and aims to integrate advanced research, education, and entrepreneurship based on academic excellence and the spirit of innovation.

Abu Dhabi

President Hockfield travelled to Abu Dhabi for a series of meetings and events. She attended the Eye on Earth 2011 Summit and Exhibition and delivered a plenary speech on the topic of collaboration in education and innovation. The Eye on Earth Summit is devoted to increasing access to environmental and societal data for enhanced decision-making, especially in emerging economies. President Hockfield also co-chaired a jury to select the winners of the Zayed Future Energy Prize, which celebrates innovations in renewable energy and sustainability. The competition received 1,103 nominations and 425 submissions from participants in 71 countries. President Hockfield also toured the [Masdar Institute of Science and Technology](#), which was established in collaboration with MIT as a graduate-level, research-driven university focused on advanced energy and sustainable technologies. She was received by Fred Moavenzadeh, president of the Masdar Institute, and briefed on the status of research projects and achievements across various disciplines.

Brazil

In December, MIT representatives joined Governor Patrick on the Massachusetts-Brazil Innovation Economy Mission. The mission was aimed at fostering job growth and partnerships between organizations in Massachusetts and Brazil and specifically focused on creating jobs in the areas of life sciences, information technology, clean energy, and education. Nearly 50 high-ranking leaders joined Governor Patrick, including representatives from Harvard University, University of Massachusetts Amherst, and Worcester Polytechnic Institute, as well as leaders from EMC Corporation, Akamai, and Cubist Pharmaceuticals. MIT representatives included Professor Ben Ross Schneider, director of [MIT-Brazil](#), and Karina Xavier, manager of MIT-Brazil. Later, on April 10, Brazilian president Dilma Rousseff visited the MIT campus, where she met with President Hockfield and signed letters of intent to amplify MIT's collaborations with Brazil.

Japan

The [MIT Association of Japan](#) celebrated its centennial anniversary this year. With approximately 1,900 members, it is the largest alumni association outside the United States. It is also among the oldest international alumni clubs at MIT. President Hockfield delivered an address at the centennial celebration in Tokyo.

Campus Development

Maseeh Hall and The Howard Dining Hall

This fall, MIT opened its newest student dormitory, [Maseeh Hall](#), a transformation of the 1901 Rivercourt Hotel and former Ashdown House into a magnificent undergraduate residence. With 462 new undergraduate beds, Maseeh Hall enables MIT to return to its historical standard undergraduate enrollment and to enhance the undergraduate living experience. The Howard Dining Hall, the centerpiece of the renewed residence, offers a full dining plan and has drawn students, staff, and faculty from across campus to enjoy its food and ambiance. Maseeh Hall, which increases the number of undergraduates who can receive an MIT education, is a significant achievement of the Campaign for Students.

Arthur D. Little Building

The renovation and restoration of the Arthur D. Little Building was completed in August. The historic masonry building, which was constructed in 1916, is now preserved and updated to meet the Institute's current needs. The renovation preserved the building's landmark historic qualities and added sustainable features, such as heat recovery, low-energy lighting, and high-performance spray foam insulation. The renovation and restoration earned the building a preservation award from the Cambridge Historic Commission.

Kendall Square, East Campus, and Holyoke

The life sciences sector in Massachusetts has grown into one of the leading research and innovation hubs in the world. Kendall Square, Massachusetts Avenue, and the greater area surrounding MIT are growing locations for that activity. This year, Pfizer broke ground on a 180,000 square-foot research center at 610 Main Street South in Kendall Square. President Hockfield provided remarks at the groundbreaking and was joined by Governor Patrick, Mikael Dolsten, president of Pfizer Worldwide Research and Development, and Cambridge Mayor David Maher. The facility will house Pfizer's Cardiovascular, Metabolic and Endocrine Disease, and Neuroscience Research Units. The relocation of these units will bring approximately 400 new research jobs to Cambridge. Pfizer researchers will focus on the next generation of medicines for conditions such as Alzheimer's disease, schizophrenia, diabetes, and cardiovascular disease. Pfizer considers this move a key component of its research and development strategy.

Further amplifying the life sciences business sector, Novartis broke ground for a new building at 181 Massachusetts Avenue. The new facility will add more than 400,000 square feet of laboratory, office, and retail space across the street from the company's existing research headquarters on Massachusetts Avenue. Provost L. Rafael Reif was joined by Governor Patrick, Cambridge city officials, and Novartis leadership for the groundbreaking event. This expansion is part of a \$600 million investment by Novartis that will add 300 new jobs over the next five years. The company currently employs more than 2,000 people in Cambridge, making it the largest corporate employer in the city.

Also in Kendall Square, the renovation of buildings E17 and E18 continued this year, promising key space to departments that are displaced by large-scale renovations.

At a far greater distance from campus, construction continued on the Massachusetts Green High Performance Computing Center (MGHPCC) in Holyoke, Massachusetts. MGHPCC is a state-of-the-art computing center that will support scientific discovery and attract and retain leading scientists to the growing Massachusetts innovation economy. The completion of MGHPCC construction is expected in the fall of 2012.

MIT's planning process for renovation of the area surrounding the Kendall Square T stop continued, with conversations on campus and with Cambridge city officials and citizens. The MIT plan would develop current parking lots and debilitated buildings into a vibrant area for the campus community and for the burgeoning activity in Kendall Square.

PEN New England Headquarters in Building 14

Members of the School of Humanities, Arts, and Social Sciences (SHASS) welcomed the [PEN New England](#) organization to MIT this year. PEN New England is the largest branch of PEN America, and affiliated with PEN International, the oldest human rights and literary organization in the world. The mission of the organization is to celebrate great writing and writers, and to defend the freedom of speech. PEN gives two distinguished annual literary awards: the PEN/Hemingway Award, for best American debut fiction, and the PEN New England/Winship Award for the best New England writers of fiction, poetry, and non-fiction. The new headquarters will be located in Building 14, near the Writing and Humanistic Studies Program headquarters.

Closing Thoughts

As last year's sesquicentennial celebrations demonstrated, in MIT's first 150 years, the passion and creativity of the many great minds of this community have helped to establish thriving industries, breakthrough medical treatments, planetary discoveries, new methods for meeting future environmental needs, and many more world-changing ideas and inventions. During the past seven years, we have continued the Institute's remarkable legacy: MIT has helped design the policy, technology, and education required to address the global need for sustainable energy; we have accelerated the convergence of science and engineering to fight disease and to address the country's future medical and health care challenges; and we have expanded the connections to other countries and educational entities worldwide. MIT has helped envision a new future for American manufacturing and has created a framework for the development of its campus and neighborhood. MIT has also fortified its own financial structures during the most serious global financial crisis since the Great Depression. All of these advances occurred while the Institute strengthened its culture of inclusion and increased the number of undergraduates it educates. With the recent introduction of *MITx* and *edX*, the Institute is setting new directions for affordability, access, and excellence in higher education. These considerable achievements are all reminders of how MIT continues to pursue and deliver upon its mission of service to the nation and the world.

Susan Hockfield
President