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Global Engagement

MIT's problem-solving ambitions are global, and we cannot solve the most important world problems alone. Our wide-ranging international collaborations allow us access to outstanding students and colleagues, and provide our students with hands-on preparation for worldwide careers. Just as important, our global engagements lead us to important research problems and to fresh ways of thinking. While we are eager to share what we know, we go out into the world to learn.

President L. Rafael Reif

MIT strives to encourage the free flow of people and ideas by engaging in international research collaborations, providing international study and research opportunities for its students, and hosting international students and scholars. The following are some of MIT's many international research collaborations.

Singapore

Singapore University of Technology and Design

In 2010, MIT and the Singapore University of Technology and Design (SUTD) officially began a partnership that includes both education and research components. Under the education component, MIT will share its expertise with SUTD in a broad range of areas, including pedagogy, curriculum development, and faculty recruitment and development. MIT will also assist in designing programs to encourage innovation and entrepreneurship. The first cohort has successfully finished its freshmen year. The second incoming class matriculated in May 2013. A key feature of the research component is the new SUTD-MIT International Design Centre (IDC). The IDC is a joint research project with facilities at both universities. The IDC aims to become the world's premier scholarly hub for technologically intensive design and serve as a nucleus for the growth of the MIT-SUTD Collaboration.

Singapore-MIT Alliance

The Singapore-MIT Alliance is a global partnership in graduate education created by MIT, the National University of Singapore, and Nanyang Technological University. Setting a new standard for international collaboration in graduate research and education, the alliance educates young engineers to serve as leaders in a technologically advanced economy, and creates a cohort of students and faculty with creativity and entrepreneurial spirit.

<http://web.mit.edu/sma/>

Singapore-MIT Alliance for Research and Technology Centre

The Singapore-MIT Alliance for Research and Technology (SMART) Centre is a research enterprise established by MIT in partnership with the National Research Foundation of Singapore. The SMART Centre serves as an intellectual hub for research interactions between MIT and Singapore at the frontiers of science and technology. This partnership allows faculty, researchers, and graduate students from MIT to collaborate with their counterparts from universities, polytechnics, research institutes, and industry in Singapore and throughout Asia. The SMART Centre is MIT's first research centre outside of Cambridge, Massachusetts, and its largest international research endeavor. See page 93 for information on Singapore-MIT Undergraduate Research Fellowships.

<http://smart.mit.edu/>

Russia

MIT Skoltech Initiative

In 2011, a multi-year collaboration began between the Skolkovo Foundation, the Skolkovo Institute of Science and Technology (Skoltech), and MIT to develop a new graduate research university. MIT will act as an advisor on programs, structure, and curriculum during the launch period. Located near Moscow, the new institution aims to break ground in bringing together Russian, U.S., and global research and technology, and in integrating research, teaching, innovation, and entrepreneurship. Research and education at Skoltech is organized around multidisciplinary technological challenges, rather than traditional academic disciplines. The institution focuses on the following themes: biomedical science

and technology, energy science and technology, information science and technology, nuclear science and technology, and space science and technology. Fifteen multidisciplinary and multi-institutional research centers—known as Centers for Research, Education, and Innovation—are being created under the Skoltech organizational umbrella to address critical scientific and technology challenges. The first three centers in the fields of energy and biomedicine are scheduled to launch in 2013. In each center, faculty, researchers, and students from one or more Russian universities will collaborate with teams from one or more universities outside Russia. A defining component being developed in collaboration with MIT, Skoltech's Center for Entrepreneurship and Innovation works to support a culture of entrepreneurship and innovation across the university.

<http://web.mit.edu/sktech/>

India

Tata Center for Technology and Design

The Tata Center for Technology and Design was launched at MIT in the summer of 2012 with a generous gift from the Sir Dorabji Tata and Allied Trusts. The Trusts are chaired by Mr. Ratan Tata, who recently retired as Chairman of Tata Sons, the well-known Indian industrial conglomerate. Mr. Tata is also a member of the External Advisory Board of the MIT Energy Initiative. The mission of the Center is to create a graduate education program that teaches graduate students how to apply deep technical knowledge to the challenges of the developing world - guided by direct experience in India. Each year, the Center will support between 30 and 40 Masters and Ph.D. students, known as Tata Fellows, from all Schools and Departments. These students are required to satisfy their departmental degree course and thesis requirements, and in consultation with their departmental supervisors, develop thesis projects that respond to large-scale opportunities to use technology effectively to improve the lives of those in the lower strata of Indian society. The Center provides travel funds that enable students to spend several months in India while earning their degrees—mainly during IAP and summer months. In the course of two years, students are expected to produce product or system designs that help to overcome the challenges presented by the context of developing India.

China

MIT-China Low Carbon Energy Leaders

In early 2011, at the recommendation of the MIT Greater China Strategy Committee, MITEI launched a novel executive education program on energy technology and policy designed to share the U.S. perspective on low carbon energy technology and policy with senior Chinese officials from government and business. MITEI collaborates with a faculty team from Shanghai Jiao Tong University to present three program sessions per year, each attended by between 25 and 30 Chinese SOE executives, and senior provincial and national government officials. The intent of the MIT-China Low Carbon Energy Leaders Program (LCELP) is to equip Chinese energy leaders to develop effective strategies to balance through policy, investment and practice the competing demands of economic growth and environmental stewardship in China. Each intensive seven-day session is made up of lectures, panel discussions and tours featuring many of MIT's best known energy faculty. In 2013, the LCELP was the top-ranked university led executive education program in China.

China Leaders for Global Operations (CLGO)

The China Leaders for Global Operations (CLGO) program was started in 2005 as a collaboration between MIT and the Shanghai Jiao Tong University (SJTU). The program was launched at the request of LGO industry partners to strengthen LGO global content for faculty and students, help partner companies' operations in China, and promote global manufacturing. CLGO offers China's only dual-degree, graduate-level academic program. The CLGO program is jointly offered by SJTU's two engineering schools, the SJTU Antai College of Economics and Management, and a dedicated group of CLGO industry partners. Graduates of the CLGO program receive the MBA degree from Antai, an S.M. degree from one of two SJTU engineering schools, and a certificate from the MIT LGO program. MIT supports the China LGO program by hosting SJTU faculty (28 to date) at MIT for extensive mentoring in courses that they in turn lead for the CLGO program, and by providing the all-English language CLGO curriculum. In addition, a review committee of MIT faculty makes periodic visits to meet CLGO stakeholders and assess the program's quality.

MIT China Educational Technology Initiative

The MIT-China Educational Technology Initiative (CETI) is MISTI-China's educational technology internship program. Since 1997, MIT-CETI has trained small teams of MIT students to work with numerous universities and high schools in China, building cross-cultural understanding between Chinese and American students through the application of technology. Approximately 20 MIT students participate in CETI each year in full summer and longer internships. CETI has established educational technology programs with Chinese universities through partnerships with MIT OpenCourseWare (OCW) and MIT-iCampus. CETI university partners include Dalian University of Technology, Huazhong University of Science and Technology (Wuhan), Fuzhou University, Xi'an Jiaotong University, Yunlin University (Shaanxi Province), Qinghai University, Sichuan University, Kunming University of Science and Technology, Institute of Vocational Engineering (Hong Kong), and YuanZe University (Taiwan). In recent years, CETI has also held several educational technology summer camps at Tsinghua and Zhejiang universities in the departments of information technology.

Middle East

MIT and Masdar Institute Cooperative Program

In 2006, MIT began collaborating with the government of Abu Dhabi to establish a graduate research university focused on alternative energy, sustainability, and advanced technology. Since then the Masdar Institute has attracted over 75 outstanding faculty and over 300 graduate students, built the first phase of a state-of-the-art campus and laboratories, and launched more than 50 joint collaborative research projects with MIT. The MIT and Masdar Institute Cooperative Program supports Abu Dhabi's goal of developing human capital for a diversified knowledge-based economy. By ensuring high-quality, graduate education and advanced research, Masdar Institute prepares a high-caliber workforce to keep pace with ever-increasing technological changes and a growing research and development culture. The Cooperative Program offers MIT and Masdar Institute faculty and students access to new talent, ideas, and rich research and educational collaborations.

<http://web.mit.edu/mit-mi-cp/>
<http://www.masdar.ac.ae/>

CSAIL-Qatar Computing Research Institute

The CSAIL-Qatar Computing Research Institute (QCRI) research collaboration, called the Computer Science Research Program, is a medium for knowledge transfer and exchange of expertise between MIT-CSAIL and QCRI scientists. Scientists from both organizations are undertaking a variety of core computer science research projects with the goal of developing innovative solutions that can have a broad and meaningful impact. The agreement also offers CSAIL researchers and students exposure to the unique challenges in the Gulf region. Through the Computer Science Research Program, researchers are focusing on several critical areas in the field of computing including distributed systems, data analytics, social computing, and Arabic language technologies. Scientists at QCRI are benefiting from the expertise of MIT's eminent faculty through joint research projects that will enable QCRI to realize its vision to become a center of computing research internationally and a global recognized leader in Arabic language technologies.

Center for Clean Water and Clean Energy at MIT and KFUPM

A group of Mechanical Engineering faculty have entered into an eight-year research and educational collaboration with King Fahd University of Petroleum and Minerals (KFUPM) in Dhahran, Saudi Arabia, housed within the Center for Clean Water and Clean Energy. The Center's research focuses on water desalination and purification and on low-carbon energy production from both solar energy and fossil fuels. Additional research activities involve design and manufacturing, with a focus on technologies related to water and energy production. This collaboration began in fall 2008. The collaboration includes more than 150 faculty and students at the two institutions. During the first 4.5 years, more than 200 publications have been produced and dozens of patent applications have been filed. In addition, the Center includes a program to bring postdoctoral Saudi Arabian women to MIT for research activities. The Center is directed by Professor John H. Lienhard V and co-directed by Professor Kamal Youcef-Toumi.

Portugal

MIT Portugal Program

The MIT Portugal Program was launched in October 2006 by the Portuguese Ministry of Science, Technology, and Higher Education as a large-scale international collaboration connecting MIT to government, academia, and industry in Portugal. The aim of the program is to transform the Portuguese economy by developing globally competitive higher education programs and critical-mass research in four critical engineering systems domains: bioengineering systems, sustainable energy systems, engineering design and advanced manufacturing, and transportation systems. These academic initiatives are complemented by an array of ecosystem-building activities, including a highly successful student venture competition. The partnership has recently been extended for a second 5-year phase, underscoring its importance for the Portuguese government and the value MIT brings to the country

Other Global Initiatives

Global Supply Chain and Logistics Excellence (SCALE) Network

The MIT Center for Transportation and Logistics (MIT-CTL) created the MIT Global Supply Chain and Logistics Excellence (SCALE) Network in 2003 as an international alliance of leading research and education centers dedicated to the development and dissemination of supply chain and logistics innovation. This international network now spans four continents with Centers in North America (MIT CTL), Europe (Zaragoza, Spain), South America (Bogota, Colombia), and Asia (Kuala Lumpur, Malaysia). Each SCALE Center fosters relationships between its local students, faculty, and businesses as well as those across the network. More than 100 graduate students are enrolled annually in the various SCALE supply chain educational programs; each of which includes a three week student & faculty exchange at MIT. The SCALE Network also features partnerships with close to a hundred global corporations, such as Procter & Gamble, UPS, BASF, and Wal-Mart, that sponsor research, participate in events, and recruit students. Research projects recently undertaken

by the SCALE network include projects on decision making under uncertainty, supply chain resilience, humanitarian logistics, sustainable supply chains, and global transportation reliability.

Center for Advanced Urbanism

The MIT Center for Advanced Urbanism's objective is to become the world's pre-eminent cultural center about the design of metropolitan environments, by articulating methods and projects to integrate separate disciplinary agendas in architecture, landscape, ecology, transportation engineering, politics and political philosophy, technology and real estate through a most eloquent design culture on scales ranging from the complex infrastructural intersection, to that of a neighborhood, on to the scale of an entire regional system.

Digital Learning

MITx and edX

edX is a not-for-profit enterprise established by founding partners MIT and Harvard University that features learning designed specifically for interactive study via the web. edX is the open-source platform of choice for MIT, Harvard, and over a dozen other universities to provide so-called Massive Open Online Courses (MOOCs). The MIT courseware for edX is produced by the MITx office and referred to as MITx courseware.

Massive Open Online Courses offered to date by MITx include 2.01x Elements of Structures, 3.091x Introduction to Solid State Chemistry, 6.00x Introduction to Computer Science and Programming, 6.002x Circuits and Electronics, 7.00x Introduction to Biology—The Secret of Life, 8.02x Electricity and Magnetism, and 14.73x The Challenge of Global Poverty. These courses have received approximately 400,000 enrollments.

<https://www.edx.org/>
https://www.edx.org/university_profile/MITx

Digital Learning

(continued)

OpenCourseWare

Launched in 2002, OpenCourseWare (OCW) makes materials for MIT's courses freely available on the Web. Materials from more than 2,100 MIT courses—including lecture notes, multimedia simulations, problem sets and solutions, past exams, reading lists, and selections of video lectures—are now posted on the OCW website. OCW records an average of over 70,000 visits a day, with 1.3 million unique visitors every month. In total, OCW materials are estimated to have reached 150 million individuals world wide.

About half of OCW usage originates outside of North America. OCW materials are used extensively in India (160,000 visits per month) China (90,000 visits per month), and the Middle East (77,000 visits per month). OCW materials have been translated into Chinese, Spanish, Portuguese, Persian, Korean, Arabic and Thai. OCW also distributes and maintains mirror copies of the site at universities in bandwidth-constrained regions, primarily Sub-Saharan Africa. To date, the OCW staff has distributed more than 320 such mirrors.

MIT is pursuing two missions with OCW—sharing its educational materials freely and openly, and, by creating a model other universities can follow and advance, promoting a universally available storehouse for human knowledge. About 43 percent of OCW's visitors identify themselves as self-learners, 42 percent as students enrolled in academic programs, and nine percent as educators.

The following are examples of ways educators, students, and self-learners in the international community use OCW content:

Nasik, India

Tuhin Bagi is captain of his school's badminton team (the reigning champs), plays classical Indian music, frequently competes in regional science fairs, and follows a full curriculum of advanced courses in physics, chemistry and biology. His parents are strong supporters of his academic interests but found themselves challenged by his curiosity. "Tuhin is an eager learner," explains his father, an industrial automation engineer, "and his interests took him far beyond his school syllabus. I tried to answer his

questions and have regular sessions with him, but I could not always be home." One day, while looking for online resources to help Tuhin answer a question in physics, his mother came across MIT OpenCourseWare. At first she worried that its material might be too advanced for a high school freshman, and wrote to OCW for advice. To her surprise, she received a personal response from revered MIT professor Walter Lewin, who suggested that Tuhin give his lectures a try. Tuhin loved the lectures immediately, and every day after school his mother would find him watching them on the computer (both 8.01 Physics I: Classical Mechanics and 8.02SC Physics II: Electricity and Magnetism). He sometimes needed to watch a single lecture several times to really capture everything, but acknowledges that it's a big achievement for someone his age to follow a university-level science course. "It is a bit unusual," he admits with a smile, "I don't know anyone else at my school who is doing this."

Ankara, Turkey

Ziya Deniz Eralp worked for several Turkish defense technology companies, first as a systems engineer and later as a project manager, before he discovered MIT OpenCourseWare (OCW). Deniz was thrilled to find course material within OCW that corresponded to his exact needs—it was a perfect opportunity to update his understanding of technology systems design at a key moment in his career: "In college, you take the classes to get the grades, but you don't really understand the application. When you finally need the information, you have mostly forgotten about what they taught in the class. OCW is a great way of refreshing your knowledge." Deniz admits with a smile that he may have gone a little overboard upon first discovering OCW on the Web. He downloaded dozens of hours of engineering and physics lectures and viewed them constantly. "It became a bit of a habit. While I was in the bus or waiting somewhere, I would watch course videos. It began to drive my wife a bit crazy because I was always watching them." He eventually tamed his "addiction," but credits OCW with exposing him to several new concepts that guided his approach for designing complex defense systems: "The area that I specialize in, systems engineering and architecture, is an emerging field that has not really settled down yet. The MIT approach offers a new way that is still hard to find in books."

<http://ocw.mit.edu/>

International Study Opportunities

There are a broad range of global activities for students to choose from. These run the gamut from traditional study-abroad programs to innovative short term projects, but most are infused with the Institute's philosophy of *mens et manus*. In the spring of 2012, 39 percent of students graduating with a bachelor's degree, and 31 percent of students graduating with a master's degree reported having educational experiences abroad.

The following are examples of programs that provide students with experiences abroad:

Cambridge-MIT Exchange

Undergraduate MIT students can spend their junior year studying at the University of Cambridge in England through the Cambridge-MIT Exchange Program (CME). The University of Cambridge consists of 31 colleges where students live and study in a supportive educational environment. The fourteen participating MIT departments are Aeronautics and Astronautics; Biology; Brain and Cognitive Sciences; Chemical Engineering; Chemistry; Civil and Environmental Engineering; Earth, Atmospheric, and Planetary Sciences; Economics; Electrical Engineering and Computer Science; History; Materials Science and Engineering; Mathematics; Mechanical Engineering; and Physics.

Departmental Exchanges

The Department of Aeronautics and Astronautics offers study at the University of Pretoria in South Africa. The Department of Architecture has two exchange programs, one with Delft University of Technology in the Netherlands and the other with the University of Hong Kong. The Department of Materials Science and Engineering has an exchange program with Oxford University. The Department of Political Science has started an exchange program with Sciences Po in Paris, France.

MIT-Madrid Program

The MIT-Madrid Program gives students the opportunity to study in Madrid for the spring term during their sophomore or junior year. Depending upon major and interests, students can choose science and engineering courses at the Universidad Politécnica de Madrid and/or humanities, arts, and social sciences courses at the Universidad Complutense de Madrid; instruction and coursework are in Spanish. These are leading universities in Spain, each with its distinguished tradition and history. In addition to academic courses, students can participate in an internship during this program.

Singapore-MIT Undergraduate Research Fellowships (SMURF)

The SMART Centre has established a summer research internship programme: the SMURF programme (Singapore-MIT Undergraduate Research Fellows programme). It is open to all undergraduates at MIT, NTU, and NUS and gives them the opportunity to engage in research at the SMART Centre over the summer. The SMURFs work in MIT Faculty supervisors' labs, actively participate in the research projects, and engage with postdoctoral scholars, graduate students, and other researchers. SMART hopes this opportunity excites them about research and they consider a career in research. Their academic experiences are supplemented with numerous social activities that are arranged for them. Based on feedback from the students, the SMURFS greatly value their experiences at SMART and the community that forms among them.

Other Study Abroad Options

MIT students may also apply for admission directly to foreign institutions that offer study abroad programs or to a study abroad program administered by another U.S. institution or a study abroad provider. Examples of such opportunities include study at l'École Polytechnique in France, a year-long or summer program at the London School of Economics, and programs at Australian universities.

MIT International Science and Technology Initiatives

MIT International Science and Technology Initiatives (MISTI), MIT's primary international program, connects MIT students and faculty with research and innovation around the world. Working closely with a network of premier corporations, universities and research institutes, MISTI matches over 680 MIT students with internships and research opportunities abroad each year. After several semesters of cultural and language preparation on campus, MISTI students participate in rigorous, practical work experience in industry and in academic labs and offices. Projects are designed to align the skills and interests of the student with the needs of the host. MISTI also organizes the MISTI Global Seed Funds, which encourage MIT students to work on faculty-led international research and projects. MISTI programs are available in Africa, Belgium, Brazil, Chile, China, France, Germany, India, Israel, Italy, Japan, Korea, Mexico, Russia, Singapore, Spain and Switzerland.

MISTI's approach to international education builds on MIT's distinctive traditions of combining classroom learning and hands-on experience in Undergraduate Research Opportunities (UROPs), cooperative programs with industry, practice schools, and internships. In contrast to other universities' internationalization programs that mainly involve study abroad, MISTI matches individual students with work or research opportunities in their own fields.

MISTI was awarded the 2013 Senator Paul Simon Spotlight Award by NAFSA: Association of International Educators. According to NAFSA Executive Director and CEO Marlene M. Johnson, winners of the Simon Award are "excellent models for how higher education across the country can and must innovate to prepare our students for the global economy we live in today."

<http://web.mit.edu/misti/>



Photo Credit: MISTI

Here are a few examples from the more than 4,000 students MISTI has placed since it began by sending a handful of interns to Japan at the end of the 80s:

Chemical Engineering student Nathalia Rodriguez worked on gene therapy for muscular dystrophy at Genpole, a French biotech cluster.

Matthew Zedler, a Mechanical Engineering graduate, examined Chinese auto growth and energy at Cambridge Energy Research Associates in Beijing.

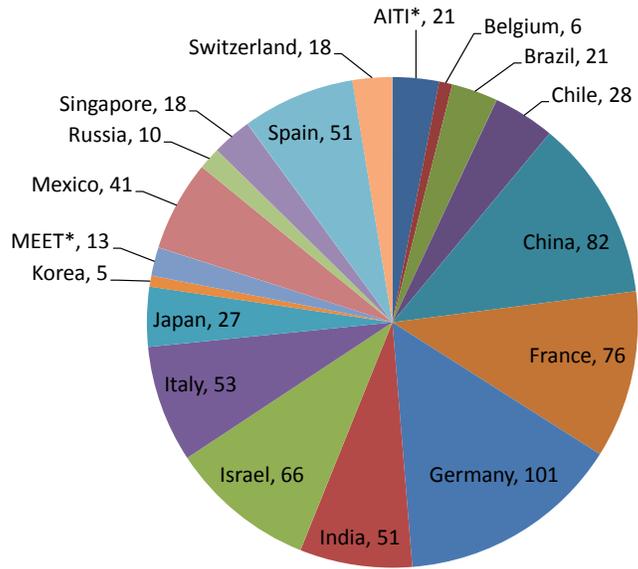
Physics major Jason Bryslawskyj designed superconducting magnetic bearings for electric motors at Siemens in German. He wrote two patents at Siemens.

Ammar Ammar, an EECS undergrad, designed and tested a Google/YouTube project at Google Israel.

MISTI Programs and Start Year

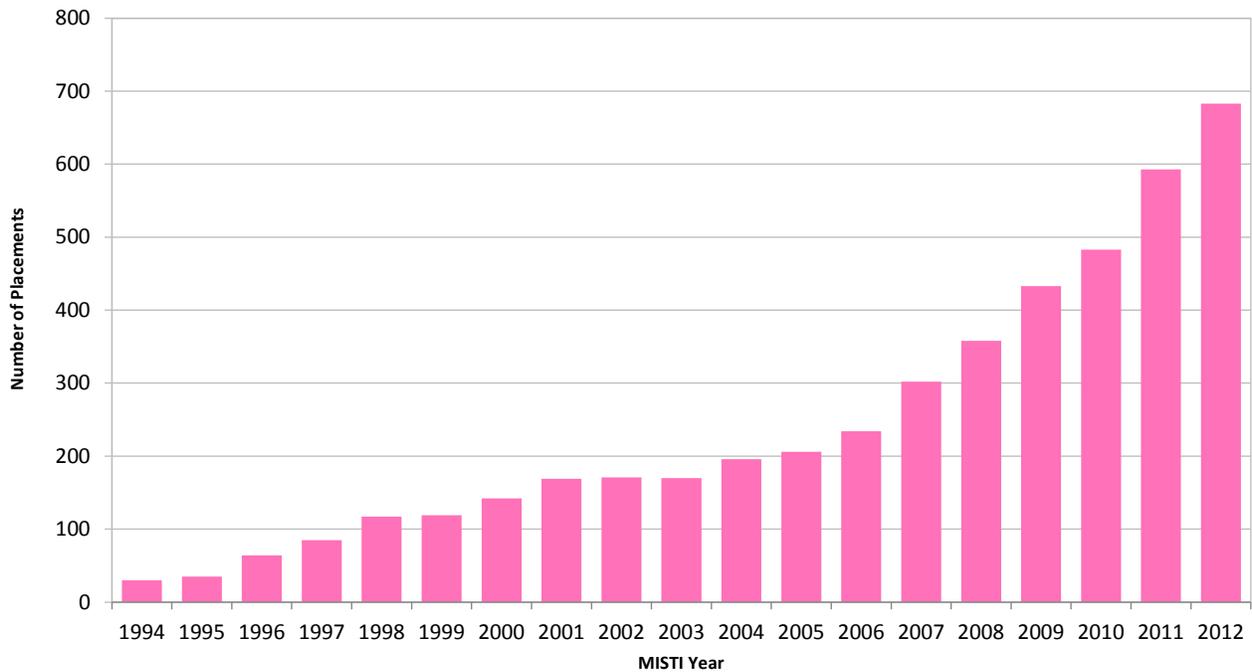
- Belgium, 2011
- Brazil, 2009
- Chile, 2011
- China, 1994
- France, 2001
- Germany, 1997
- India, 1998
- Israel, 2008
- Italy, 1999
- Japan, 1983
- Korea, 2012
- Mexico, 2004
- Russia, 2012
- Singapore, 2012
- Spain, 2006
- Switzerland, 2010

MISTI Placements by Country, 2011–2012



*Multi-regional

MISTI Annual Internship Placements
1994–2012†



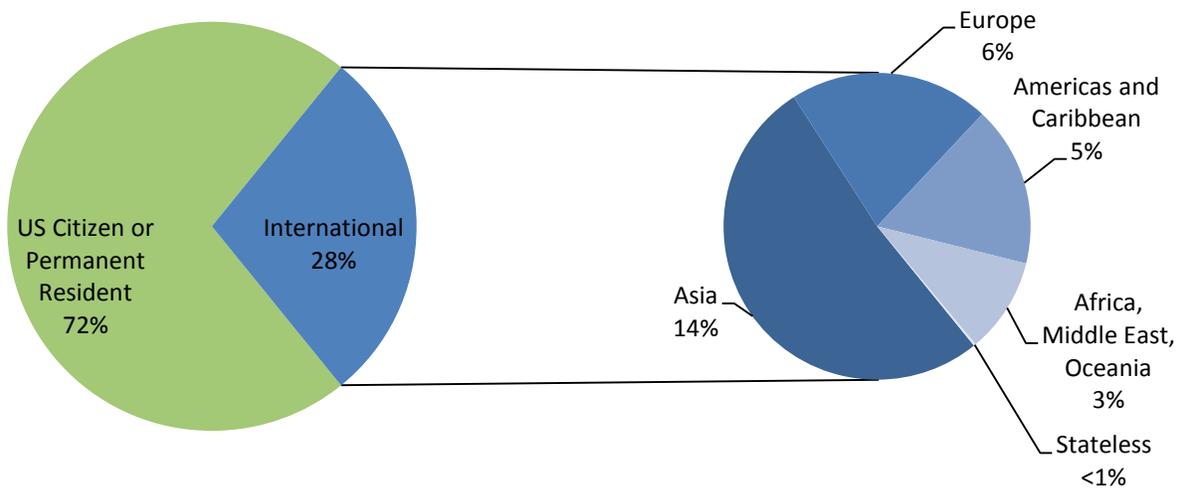
†MISTI year runs from September 1–August 31. 2012 represents the 2011–2012 year.

International Students

MIT has welcomed international students essentially since its inception. The first student from Canada came to MIT in 1866, the second year MIT offered classes. This student was followed by a steady stream of students from around the globe throughout the 19th century. By 1900, some 50 foreign-born students had traveled to Massachusetts for study; however, the number increased dramatically after World War II when an influx of these students began attending the Institute. The rapid rise of international students from East Asia, led by students from China, changed the demographics of this group beginning in the 1950s. Changes in immigration law in 1965 opened up the doors to a steadily increasing pool of international talent.

The United States has been the destination of choice for international students and scholars for the past 50 years. According to the Institute of International Education Open Doors 2012 report, the number of international students enrolled in U.S. colleges during the 2011–2012 academic year reached a record high of 765,000 students. MIT is ranked 33rd in the report’s “International Students by Institutional Type: Top 40 Doctorate Institutions, 2011/12” list. NAFSA: Association of International Educators produced an economic analysis based in part on Open Doors data that states that during the 2011–2012 academic year, international students contributed approximately \$21.8 billion to the U.S. economy through living expenses for themselves and accompanying dependents, as well as through expenditures on tuition, books, fees, and other education-related expenses.

**Total Enrollment by Citizenship
and Geographic Region of Country of Citizenship
2012–2013**



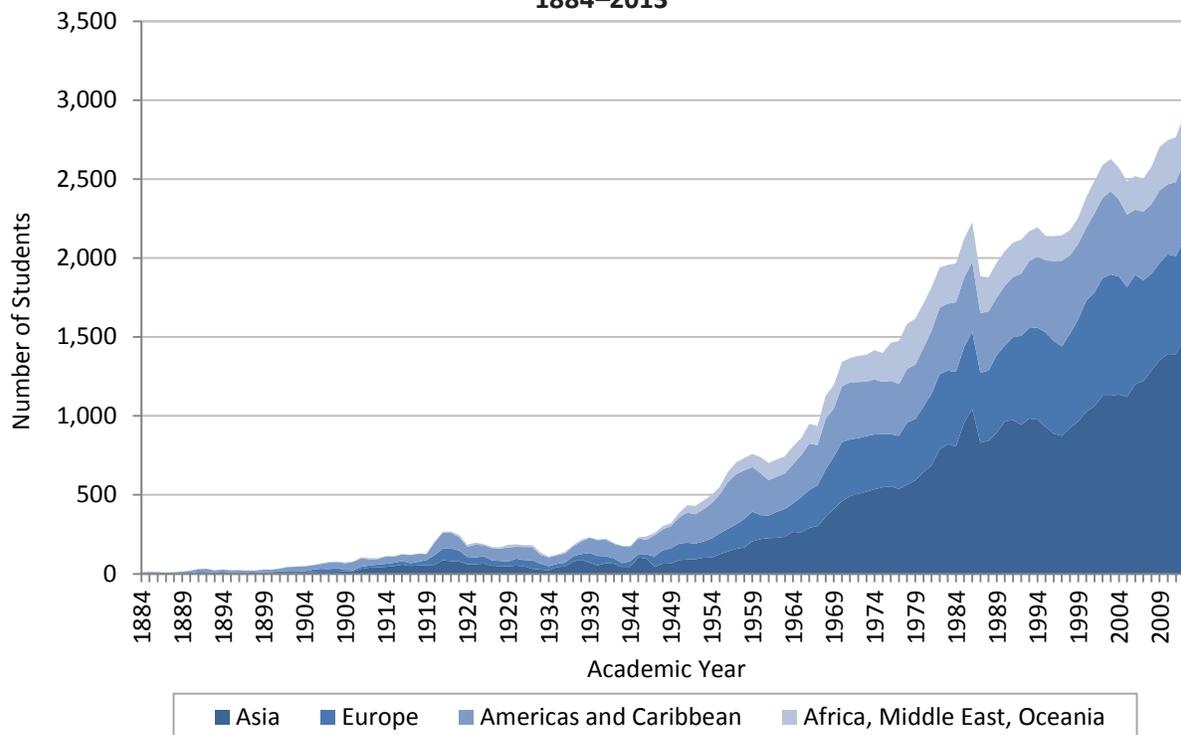
**International Undergraduate Students
Top Countries of Citizenship, 2012–2013**

Country	Count
China	56
India	30
South Korea	26
Thailand	22
Canada	22
Saudi Arabia	13
Vietnam	12
Taiwan	11
Pakistan	10
Brazil	10
Turkey	10
Singapore	10

**International Graduate Students
Top Countries of Citizenship, 2012–2013**

Country	Count
China	567
India	266
Canada	241
South Korea	238
Singapore	79
Taiwan	75
France	71
Japan	65
Germany	64
Israel	58
Brazil	57
Mexico	56

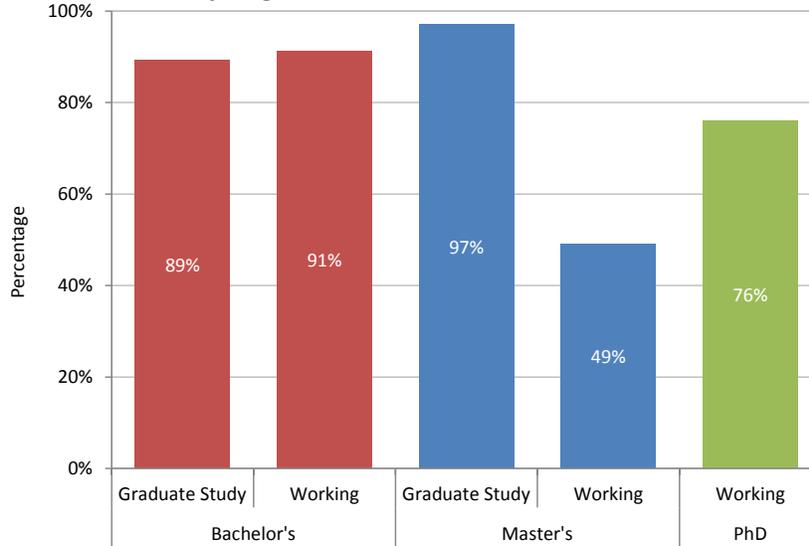
**International Students by Geographic Region of Country of Citizenship
1884–2013**



Many international students remain in the U.S. after graduation. The graph below shows the post-graduation plans of international students graduating in

2012, as reported in a survey administered by MIT. Overall, 76 percent of international students plan to remain in the U.S. after graduation.

Percentage of 2012 International Student Graduates Remaining in the U.S. by Degree and Post-Graduation Plans



International Alumni Entrepreneurs

A 2009 Kauffman Foundation report on the Entrepreneurial Impact of MIT found the following:

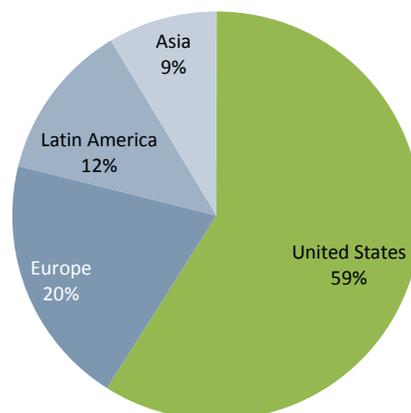
Alumni who were not U.S. citizens when admitted to MIT founded companies at different (usually higher per capita) rates relative to their American counterparts, with at least as many remaining in the United States as are returning to their home countries....

About 30 percent of the foreign students who attend MIT found companies at some point in their lives. This is a much higher rate than for U.S. citizens who attend MIT. We assume (but do not have data that might support this) that foreign students are more inclined from the outset to become entrepreneurs, as they had to seek out and get admitted to a foreign university, taking on the added risks of leaving their families and their home countries to study abroad. (MIT has only its one campus in Cambridge, Mass., and, despite collaborations in many countries, does not operate any degree program outside of the United States.) We estimate that about 5,000 firms were started by MIT graduates who were not U.S. citizens when they were admitted to MIT. Half of those companies created by "imported" entrepreneurs, 2,340 firms, are headquartered in the United States, generating their principal revenue (\$16 billion) and employment (101,500 people) benefits here.

Estimated Number of Companies Founded by International MIT Alumni

Location	Total
United States	2,340
Europe	790
Latin America	495
Asia	342

Location of Companies Founded by International MIT Alumni



International Alumni

MIT alumni and scholars have made extraordinary contributions in their home countries, the U.S., and the world. The following are some examples:

Kofi Annan, SM Management 1972

Kofi Annan, the seventh Secretary-General of the United Nations and recipient of the Nobel Peace Prize, was born in Kumasi, Ghana, and attended the University of Science and Technology in Kumasi before completing his undergraduate studies at Macalester College in St. Paul, Minnesota. He undertook graduate studies in economics at the Institut universitaire des hautes études internationales in Geneva, and earned his SM in Management as a Sloan Fellow at MIT. Annan worked for the World Health Organization and the Ghana Tourist Development Company, but has spent most of his career at the United Nations.

Mario Draghi, PhD Economics 1977

Mario Draghi is the president of the European Central Bank (ECB) which sets interest rates for the 17 countries in the Eurozone. He was previously the governor of the Bank of Italy and, in 2012, Forbes Magazine nominated him as the 8th most powerful man in the world. Shortly after becoming president of the ECB, he oversaw a €489 billion (\$640 billion), three-year loan program to European banks. He also stepped up the bond purchases from struggling Eurozone nations to help with the debt crisis. Draghi was born in Rome in 1947. He received a degree in economics from Università degli Studi, Rome in 1970 before attending MIT. While at MIT, he studied with Nobel winners Franco Modigliani and Robert Solow.

Benjamin Netanyahu, SB Architecture 1975, SM Management 1976

Current Prime Minister of Israel, Benjamin Netanyahu was born in 1948 in Tel Aviv, Israel and grew up in Jerusalem. He served as Israel's ambassador to the United Nations from 1984 to 1988, during which time he led the effort to declassify the United Nations' archive on crimes committed by Nazi Germany. Netanyahu, a member of the Likud party, was Israel's Prime Minister from 1996 until 1999. During his first term as Prime Minister, Netanyahu implemented policy that combined fighting terror with advancement of the peace process. Its cornerstone was the conclusion of

well-measured agreements with the Palestinians that insisted on reciprocity. During his three-year term, the number of terror attacks drastically decreased.

Ngozi Okonjo-Iweala, MCP 1978, PhD Planning 1981

Currently the Managing Director of World Bank, Ngozi Okonjo-Iweala was the first woman to hold the position of Finance Minister in Nigeria. During her term from 2003 to 2006, she launched an aggressive campaign to fight corruption. She implemented a series of economic and social reforms, including a zero-tolerance policy for corruption; international and local governmental contract bidding; privatizing state-owned refineries; and the Extractive Industry Transparency Initiative, which aims to bring openness to the oil sector. Under her leadership, the country has tripled its reserves from \$7 billion to \$20 billion; the annual GDP grew at 6 percent; and inflation is down from 23 percent to 9.5 percent. Okonjo-Iweala started her career at the World Bank, where she was the first woman ever to achieve the positions of vice president and corporate secretary.

I. M. Pei, SB Architecture 1940

Ieoh Ming Pei, influential modernist architect and founder of the firm Pei Cobb Freed & Partners, was born in China in 1917. He completed his Bachelor of Architecture degree at MIT in 1940. Pei has designed more than 60 buildings, including the John Fitzgerald Kennedy Library in Boston, Massachusetts, the Grand Louvre in Paris, France, the Miho Museum in Shiga, Japan, the Bank of China Tower in Hong Kong, and the Gateway Towers in Singapore.

Tony Tan, SM Physics 1964

Following his degrees from MIT and his Ph.D. from the University of Adelaide in applied mathematics, Tan taught mathematics at the University of Singapore. Tan was elected to the Parliament of Singapore in 1979, and has served in numerous leadership positions in the Singapore government. In December 1991, Tan stepped down from the Cabinet to return to the private sector as the Overseas-Chinese Banking Corporation's Chairman and Chief Executive Officer. He rejoined the Cabinet in 1995 as Deputy Prime Minister and Minister for Defense. In August 2003, Tan became Deputy Prime Minister and Co-ordinating Minister for Security and Defense. Tan won the Singapore presidential election in 2011 and is currently serving as the 7th President of Singapore.

International Scholars

MIT hosts many international researchers and faculty who come to the U.S. for teaching, research, collaboration, and other purposes. These include visiting scientists, professors, artists, and scholars, as well as postdoctoral fellows and associates, lecturers, instructors, research associates and scientists, and tenure-track faculty. During the year July 1, 2011 through June 30, 2012, MIT's International Scholars Office (ISchO) served 2,175 international scholars affiliated with MIT and their accompanying family members ("international" is defined as non-U.S. citizen, non-U.S. permanent resident).

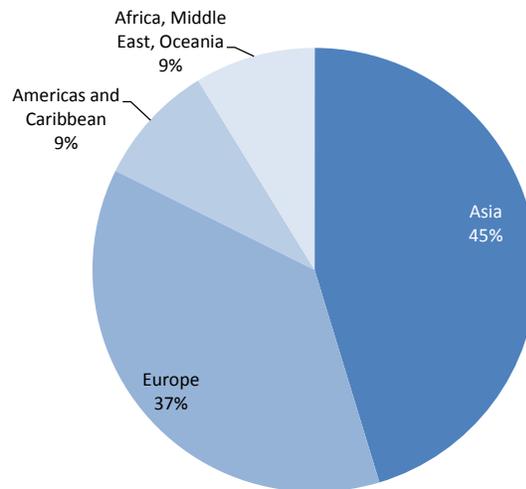
This reflects an increase of approximately 5.3 percent over last year (2,060). According to the Institute of International Education Open Doors 2011–2012 report, MIT ranked 10th nationally with regard to the numbers of international scholars at U.S. institutions. Postdoctoral associates and postdoctoral fellows accounted for 55 percent of MIT's international scholars.

Foreign national scholars came to MIT from 90 countries, with the highest numbers coming from China, Korea, India, Germany, Canada, Japan, Italy, Spain, France, and Israel. The top ten countries of origin of the entire international scholar population in the U.S. are roughly the same. Scholars from these top 10 countries constituted 68 percent of MIT's international scholar population. The greatest number of international scholars came to the School of Engineering, followed by the School of Science, interdisciplinary laboratories and centers, and the Sloan School of Management. Seventy-seven percent of international scholars were men and 23 percent were women.

**International Scholars
Top Countries of Origin, 2011–2012**

Country	Count
China	420
Korea	174
India	144
Germany	137
Canada	121
Japan	114
Italy	105
Spain	93
France	90
Israel	75

**International Scholars
by Geographic Region, 2011–2012**



Selected Projects

Research advances therapy to protect against dengue virus

Nearly half of the world's population is at risk of infection by the dengue virus, yet there is no specific treatment for the disease. A therapy to protect people from the virus could finally be a step closer, thanks to a team at MIT. For most people the virus causes flu-like symptoms. But for some, particularly children, the virus can develop into dengue hemorrhagic fever, causing severe blood loss and even death. Developing a vaccine against dengue has so far proved challenging, according to Ram Sasisekharan, because dengue is not one virus but four different viruses, or serotypes, each of which must be neutralized by the vaccine.

Researchers led by Sasisekharan chose as their model an antibody known as 4E11, which has been shown in tests to neutralize dengue 1, 2 and 3, but not dengue 4. Taking a statistical approach, they then ranked physical and chemical features of the antibody in terms of their importance. This significantly narrowed the number of possible changes, or mutations, the researchers needed to make to antibody 4E11 in order to improve its ability to neutralize all four viruses, in particular dengue 4. As a result, the researchers came up with just 10 possible mutations after further investigation.

When they tested their mutated antibody on samples of the four dengue serotypes in the laboratory, they found it had a 450-fold increase in binding to dengue 4, a 20-fold increase in binding for dengue 2, and lesser improvements in binding for dengue 1 and 3, Sasisekharan says. They are now preparing for potential preclinical trials, and hope to be ready to test the antibody on humans within the next two to three years. In the meantime, they are also investigating other targets for their immunotherapy approach, including the influenza virus.

This work was funded by the National Institutes of Health and the National Research Foundation Singapore through the Singapore-MIT Alliance for Research and Technology's Infectious Diseases Research Program.

<http://web.mit.edu/press/2013/research-advances-therapy-to-protect-against-dengue.html>

Chips with self-assembling rectangles

Researchers at MIT have developed a new approach to creating the complex array of wires and connections on microchips, using a system of self-assembling polymers. The team's solution creates an array of tiny posts on the surface that guides the patterning of the self-assembling polymer molecules. This turns out to have other advantages as well: In addition to producing perfect square and rectangular patterns of tiny polymer wires, the system also enables the creation of a variety of shapes of the material itself, including cylinders, spheres, ellipsoids, and double cylinders. The work could eventually lead to a way of making more densely packed components on memory chips and other devices. The new method was developed by MIT visiting doctoral student Amir Tavakkoli of the National University of Singapore, along with graduate students Adam Hannon and Kevin Gotrik and professors Caroline Ross, Alfredo Alexander-Katz, and Karl Berggren.

<http://web.mit.edu/newsoffice/2012/self-assembling-rectangular-chips-research-update-0719.html>

The research, which included work at MIT's Nanostructures Laboratory and Scanning-Electron-Beam Lithography facility, was funded by the Semiconductor Research Corporation, the Center on Functional Engineered Nano Architectonics, the National Resources Institute, the Singapore-MIT Alliance, the National Science Foundation, the Taiwan Semiconductor Manufacturing Company and Tokyo Electron.

A cooler way to protect silicon surfaces

Silicon, the material of high-tech devices, requires a surface coating to prevent oxidation that would ruin its electrical properties. Italian energy company Eni S.p.A., under the Eni-MIT Alliance Solar Frontiers Program, supported research where silicon is protected in a process that never heats the silicon above room temperature. See page 82 for more information.

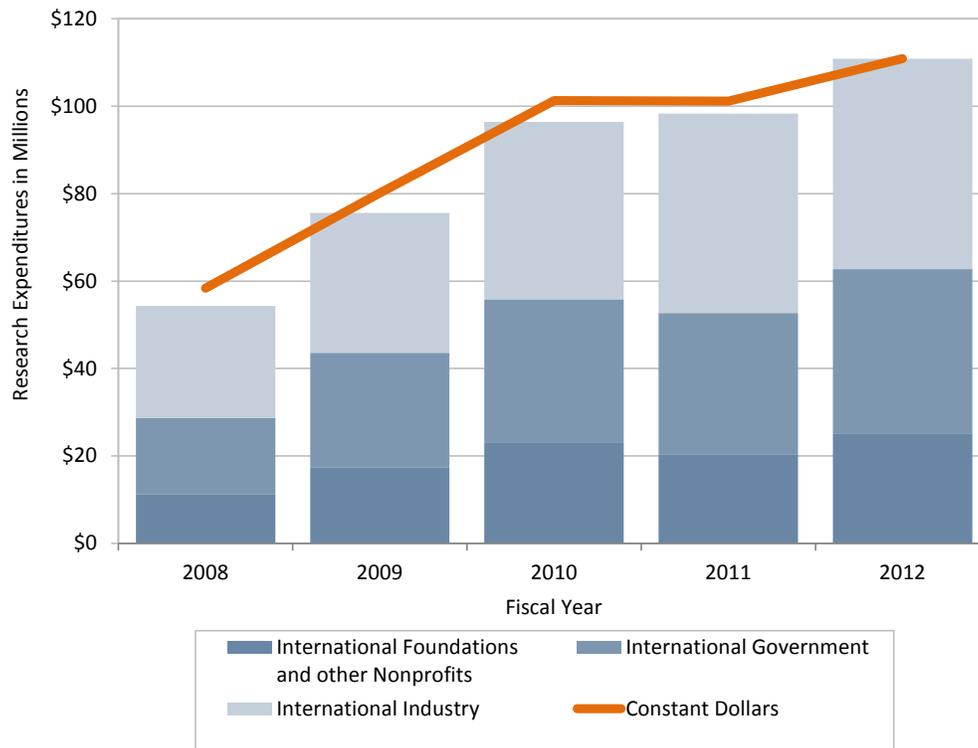
Continuous drug manufacturing

Traditional drug manufacturing is a time-consuming process. An MIT and pharmaceutical company Novartis research effort, known as the Novartis-MIT Center for Continuous Manufacturing was created to transform those procedures. MIT researchers have developed and demonstrated a prototype continuous-manufacturing system. See page 82 for more information.

Campus Research Sponsored by International Organizations

**International Organizations Campus Research Expenditures (in U.S. Dollars)
Fiscal Years 2008-2012**

International Sponsor Type	2008	2009	2010	2011	2012
Foundations and other nonprofits	11,299,312	17,314,194	23,170,052	20,233,545	25,025,346
Government	17,444,906	26,299,968	32,633,438	32,471,318	37,712,878
Industry	25,582,009	31,988,543	40,642,427	45,603,282	48,133,890
Total	54,326,226	75,602,705	96,445,918	98,308,146	110,872,115
Constant dollars*	58,396,824	80,148,565	101,265,060	101,188,454	110,872,115



*Constant dollars are calculated using the Consumer Price Index for All Urban Consumers weighted with the fiscal year 2012 equaling 100.