
Section 6

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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. By March 31, 2015, MIT will have completed the delivery of nearly 100 courses to SUTD, 13 more than promised in the collaboration agreement. The second cohort has successfully finished its freshmen year. The third incoming class matriculated in May of 2014. Student exchanges have taken center stage as the second group of Singapore students arrived in June for their ten-week Global Leadership Program, and the third group of MISTI-Singapore students arrived at SUTD this June to assist in leadership training. A key feature of the research component is the 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 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 101 for information on Singapore-MIT Undergraduate Research Fellowships.

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

Russia

MIT Skoltech Initiative

In 2011, MIT and institutions in Russia launched a multi-year collaboration to help conceive and launch the Skolkovo Institute of Science and Technology (Skoltech), a new concept for a graduate university focused on a small number of pressing global issues and designed to stimulate the development of a research and innovation ecosystem in Russia. MIT serves as an advisor on programs, structure, and curriculum and has helped established the main elements of Skoltech's educational programs, designing Master of Science programs in IT, Energy, and Biomedicine. MIT has helped design a domestic and international recruitment strategy and admissions process, leading to enrollment of the inaugural class of master's degree students in academic year 2012—with MIT hosting 60% of this cohort for the 2012–2013 academic year in Cambridge. At the heart of Skoltech's effort to address specific real-world problems is the establishment of 15 globally distributed Centers for Research, Education and Innovation (CREIs). MIT designed and implemented a multi-stage submission and international peer-review process, and launched new CREIs in Biomedicine (Stem Cells and Innovative Biomedical Therapies), and Electrochemical Energy Storage. Promoting innovation and entrepreneurship is central to Skoltech's mission.

Toward that end, MIT and its partners have developed an entrepreneurship and innovation curriculum designed to provide foundational understanding in an action-based learning environment for its students, and have built the administrative and operational foundations for knowledge transfer and commercialization of emerging technologies. Skoltech is a private graduate research university in Skolkovo, Russia, a suburb of Moscow.

<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 thanks to the generosity of the Tata Trusts, and their Chairman, Mr. Ratan N. Tata. The goal of the Center is to create a graduate education program that teaches students how to apply deep technical knowledge to the challenges of the developing world, guided by direct experience in India. The program is open to graduate students from all MIT schools. The students, known as Tata Fellows, develop thesis projects that respond to large-scale opportunities to use technology to improve the lives of people in India. Rapid progress has been made to develop a sister center in India at IIT-Bombay, which was launched in May 2014, and enrolled its first cohort in July 2014. The Centers have a similar mission and curriculum, and many faculty and student exchange activities are planned to reinforce and deepen the connection between them. The first joint conference took place in Mumbai in August 2014.

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

China

China Leaders for Global Operations

The China Leaders for Global Operations (CLGO) program was started in 2005 as a collaboration of 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 (32 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 LGO and China LGO students collaborate each year through visits to Shanghai and Cambridge, including joint plant tours of partner company sites.

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. Additionally, in summer 2014, CETI has started collaborating with Google and MIT App Inventor organizing mobile phone applications workshops at Tianjin University, Shanghai World Foreign Languages Middle School, Shenzhen Institute of Information Technology, South China University of Technology, Lanzhou University, and Gansu Radio & Television University.

Middle East

Center for Clean Water and Clean Energy at MIT and KFUPM

Technologies related to the production of fresh water and low-carbon energy are the focus of a research and educational partnership between faculty in MIT's Department of Mechanical Engineering and King Fahd University of Petroleum and Minerals (KFUPM) in Dhahran, Saudi Arabia. The joint program operates through the Center for Clean Water and Clean Energy, and it includes projects on topics such as desalination, solar energy, nanoengineered membranes, leak detection, and advanced manufacturing. The eight-year collaboration includes more than a dozen large-scale collaborative research projects and a number of education and curriculum development projects. Approximately 25 MIT faculty are involved, with a similar number at KFUPM, and an overall head count (including graduate students and postdocs) of more than 150 people between the two schools. KFUPM faculty and graduate students have the opportunity to spend one or two semesters at MIT, and MIT faculty visit KFUPM for one to two weeks each year. The Center also includes a unique outreach program that brings Saudi women engineers and scientists to MIT for research with our faculty. The Center is directed by Professor John H. Lienhard V and co-directed by Professor Kamal Youcef-Toumi.

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' plans are focusing on several critical areas in the field of computing including cyber security, Arabic speech and language processing, advanced analytics and visualization in sports, data management for social computing, and data integration. 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 premier center of computing research regionally and internationally.

Kuwait-MIT Center for Natural Resources and the Environment

The Kuwait-MIT Center for Natural Resources and the Environment (CNRE) was established in 2005 bringing together faculty, students, and scientists to improve scientific and technical understanding of issues of natural resources, the environment, and related challenges. The mission of the Center is to foster collaborations in research and education in areas of Energy, Water and the Environment that are of mutual interest to research institutions in Kuwait and MIT. The Center sponsors a number of programs including grants to support collaborative research funding, and visitor exchange programs via post-doctoral fellowships and student internships. The Center is funded by the Kuwait Foundation for the Advancement of Sciences (KFAS). Its leadership team consists of Faculty Director: Prof. Mujid Kazimi of NSE and MechE; Associate Director: Prof. Jacopo Buongiorno of NSE; and Executive Director: Dr. Murad Abu-Khalaf.

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

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, Masdar Institute has grown to over 85 outstanding faculty and over 428 graduate students. MIT and Masdar Institute have collaborated on 62 research projects to date and the Cooperative Program continues to support 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/>

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 and research programs and synergies in: bioengineering systems, sustainable energy and transportation systems, and engineering design and advanced manufacturing. These academic-research initiatives are complemented by an array of ecosystem-building activities, including innovation and leadership training as well as a highly successful venture competition. The partnership has recently been extended (2013-2017), underscoring its importance and impact 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

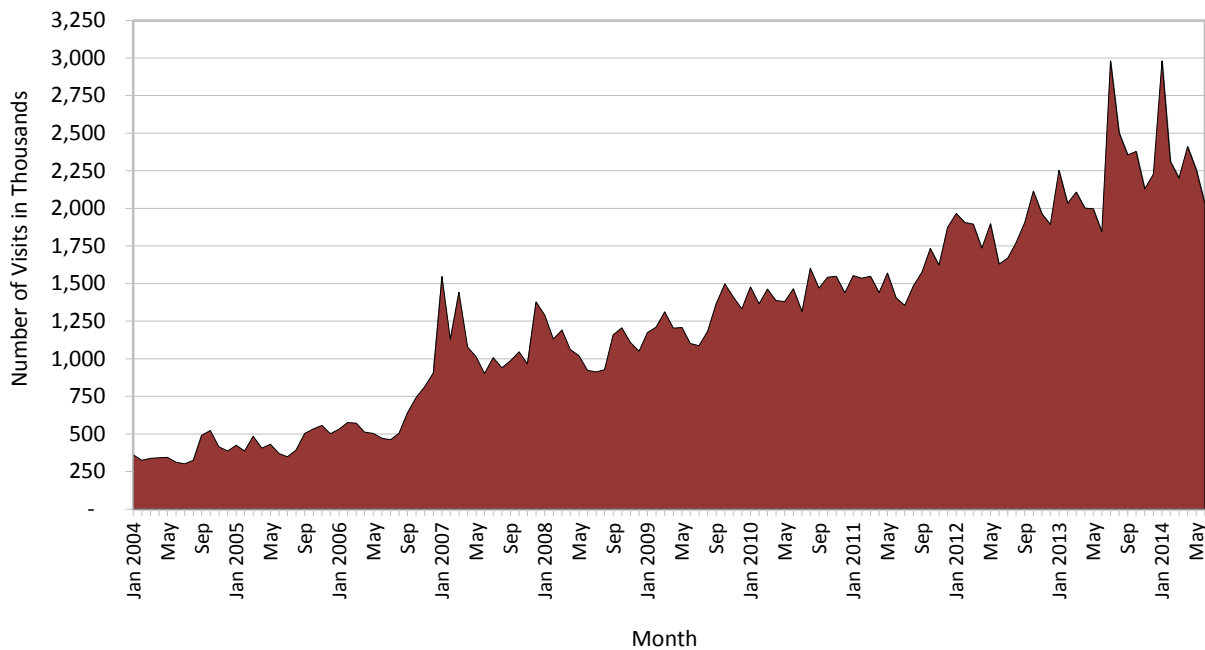
The overall goal of the MIT Center for Advanced Urbanism (CAU) is to establish a new theoretical and applied research platform to transform the quality of urban life. The Center is committed to achieving this goal via collaborative interdisciplinary research projects, intellectual discourse, leadership forums and conferences, publications, education of a new generation of leaders in the field, and a distinctive, highly influential presence at international gatherings focused on urbanism.

Digital Learning

OpenCourseWare (OCW) and MITx represent MIT's largest and most far-reaching international outreach programs. With more than 2,200 courses on OCW, many of them available in other languages through OCW translation affiliates in other countries, there

is something of interest for almost everyone. Since 2003, more than 150 million individuals have accessed MIT academic content through these programs, sometimes with astonishing results. Please see <http://ocw.mit.edu/about/ocw-stories/> for inspiring examples.

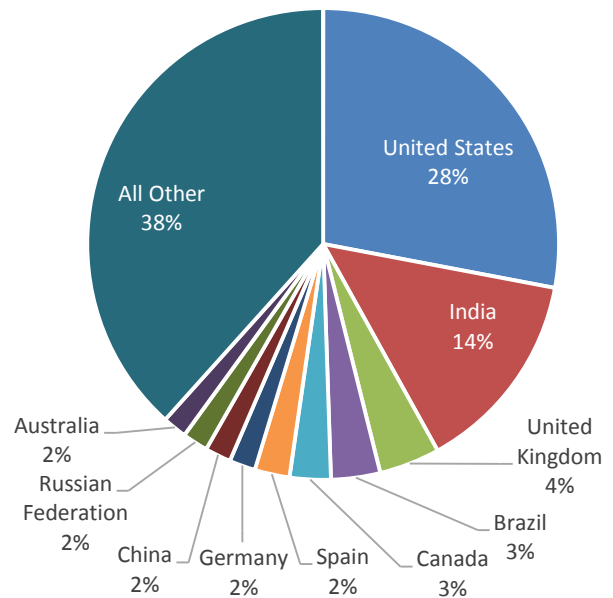
Monthly Visits to OCW Website (January 2004–June 2014)



OCW is accessed by a broadly international population of educators and learners, with 55%-60% of all visitors accessing OCW from outside the U.S. in a typical month.

MITx is MIT's online learning initiative ("MOOC"), offering global access to a portfolio of free MIT courses taught by MIT faculty through the edX interactive teaching and learning platform. Students must enroll in these courses, and they have the opportunity to earn certificates of achievement. Since the first MITx course was offered in August 2012, more than 900,000 individuals around the world have registered, some for multiple courses (more than 1.3 million enrollments). Individual registrants come from more than 200 countries:

Percent Registered by Country



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 2013, 38 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

Through the Cambridge-MIT Exchange Program (CME), undergraduate MIT students can spend their junior year studying at the University of Cambridge in England. The University of Cambridge consists of 31 colleges where students live and study in a supportive educational environment. Participating departments include 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 (including Course 6-3); History; 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 exchange programs with Oxford University and Imperial College London. The Department of Political Science has an exchange program with Sciences Po in Paris, France. The Department of Mechanical Engineering has an exchange program with ETH-Zurich in Switzerland.

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 own 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 research 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 study abroad provider. Examples of such opportunities include l'École Polytechnique in France, the London School of Economics, Oxford University and other UK institutions, and a number of programs in China.

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 internship, teaching 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, the Netherlands, 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.

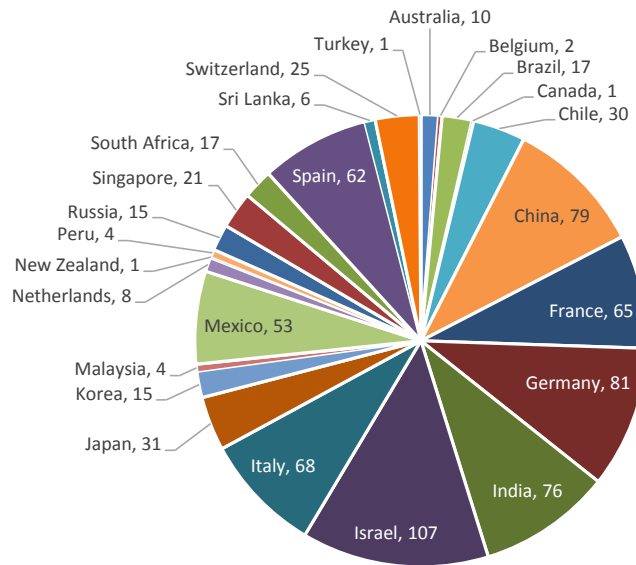
Physics major Jason Bryslawskyj designed superconducting magnetic bearings for electric motors at Siemens in German. He wrote two patents at Siemens.

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

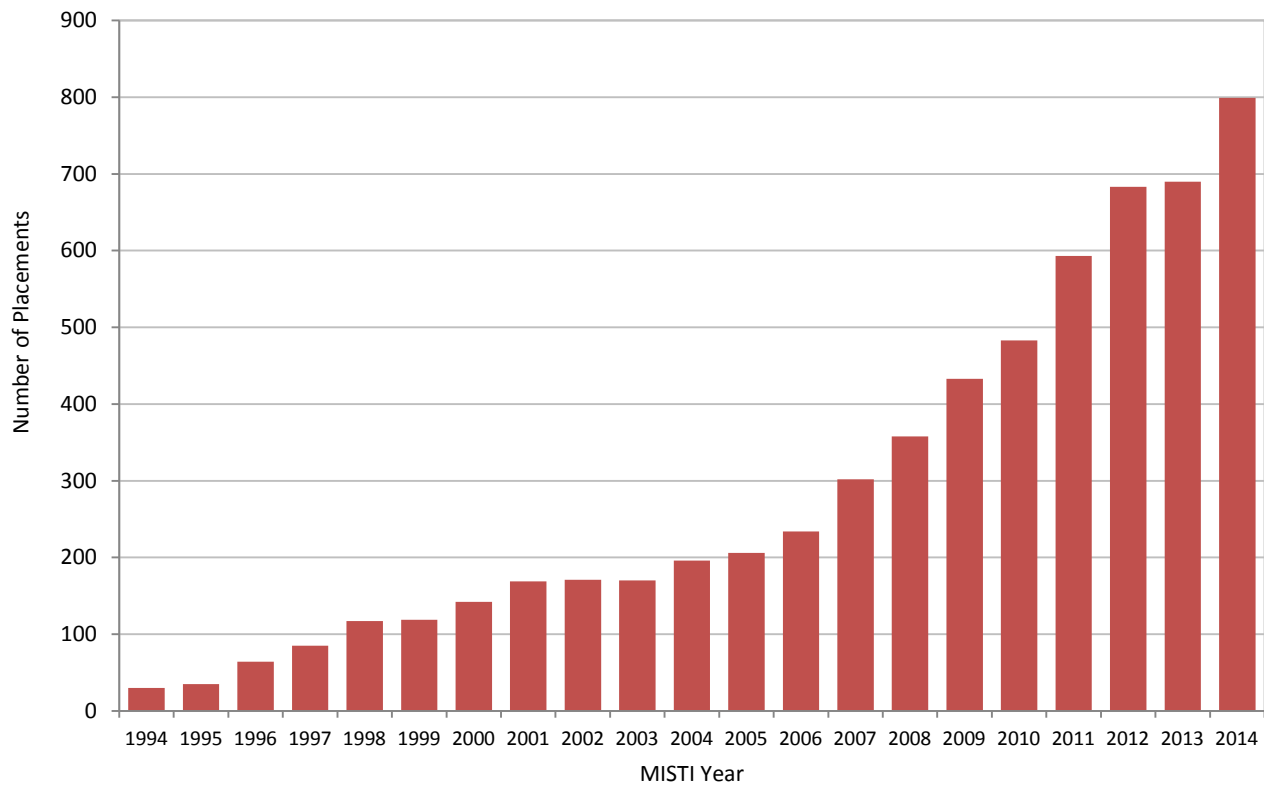
MISTI Programs and Start Year

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

MISTI Placements by Country, 2013–2014



**MISTI Annual Internship Placements
1994–2014†**



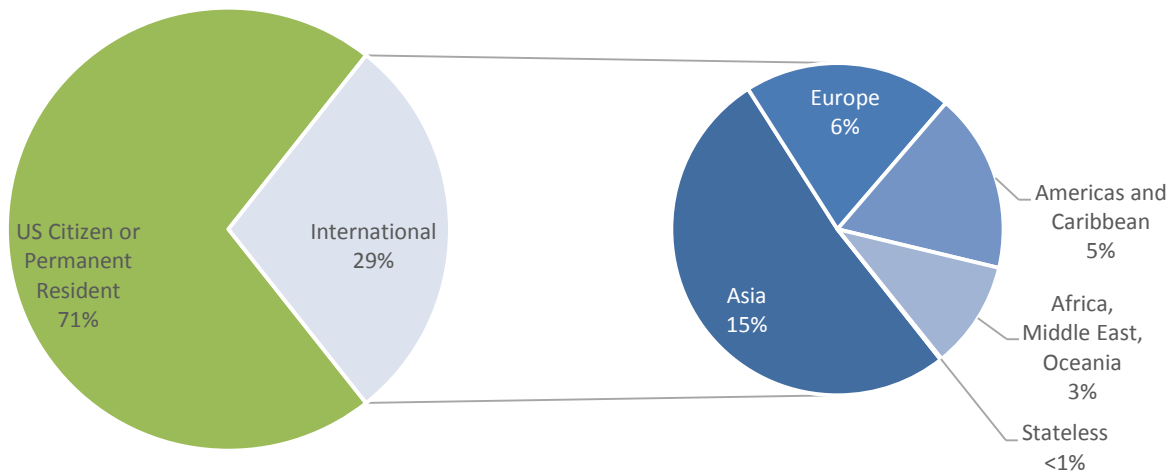
†MISTI year runs from September 1–August 31. 2014 represents the 2013–2014 year.

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 2013 report, the number of international students enrolled in U.S. colleges during the 2012–2013 academic year reached a record high of 820,000 students. MIT is ranked 34th in the report’s “International Students by Institutional Type: Top 40 Doctorate Institutions, 2012/13” list. NAFSA: Association of International Educators produced an economic analysis based in part on Open Doors data that states that during the 2012–2013 academic year, international students and their dependents contributed \$24 billion to the U.S. economy through tuition and fees, and living expenses.

**Total Enrollment by Citizenship
and Geographic Region of Country of Citizenship
2013–2014**



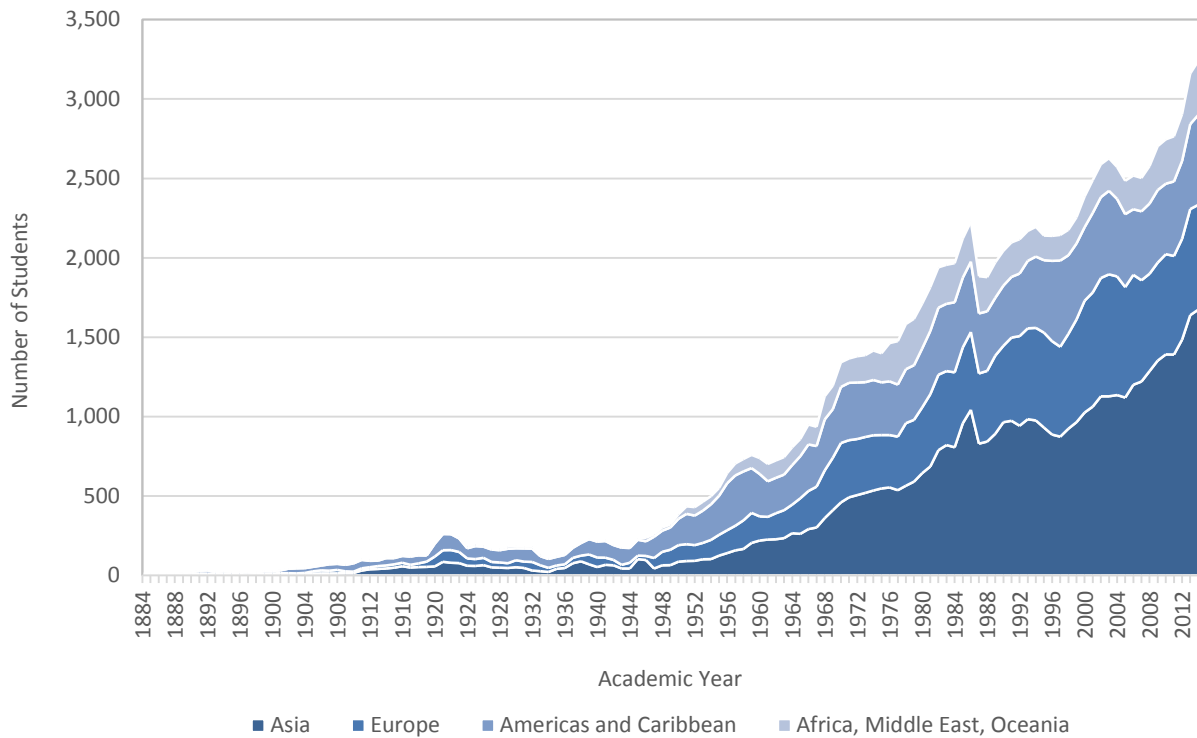
**International Undergraduate Students
Top Countries of Citizenship, 2013–2014**

Country	Count
China	56
South Korea	27
India	21
Thailand	21
Canada	19
Brazil	14
Mexico	12
Vietnam	10
Singapore	9
Taiwan	9

**International Graduate Students
Top Countries of Citizenship, 2013–2014**

Country	Count
China	587
India	291
Canada	238
South Korea	225
Singapore	89
France	87
Taiwan	70
Japan	67
Israel	65
Brazil	62

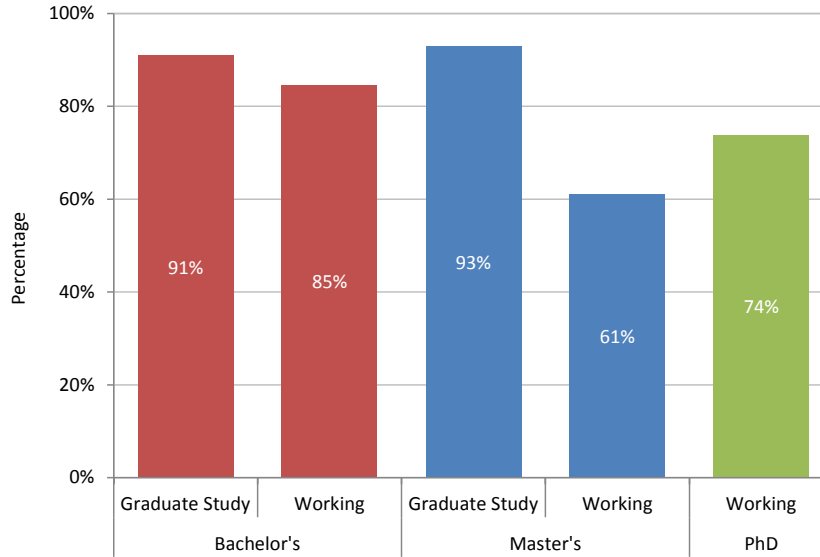
**International Students by Geographic Region of Country of Citizenship
1884–2014**



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

2013, as reported in a survey administered by MIT. Seventy-four percent of international students plan to remain in the U.S. after graduation.

Percentage of 2013 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:

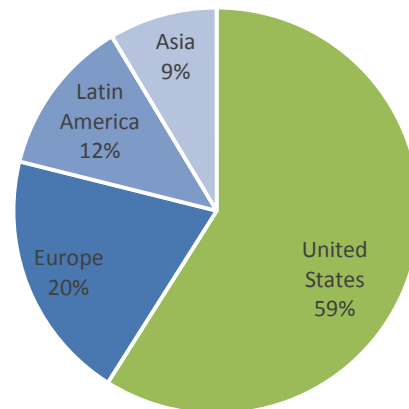
Alumni who were not U.S. citizens when admitted to MIT founded companies at different (usually higher per capita) rates relative to their American counterparts, with at least as many remaining in the United States as are returning to their home countries....

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

Currently serving his second term as Prime Minister of Israel, Benjamin Netanyahu was born 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

Former Managing Director of the World Bank, Ngozi Okonjo-Iweala is a globally renowned Nigerian economist. She 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 international scholars from around the world who come to the U.S. for teaching, research, collaboration, and other purposes. This diverse group of professionals includes 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, 2013 through June 30, 2014, The International Scholars Office (ISchO) served 2,305 international scholars affiliated with MIT and their accompanying family members (“international” is defined as non-U.S. citizen, non-U.S. permanent resident).

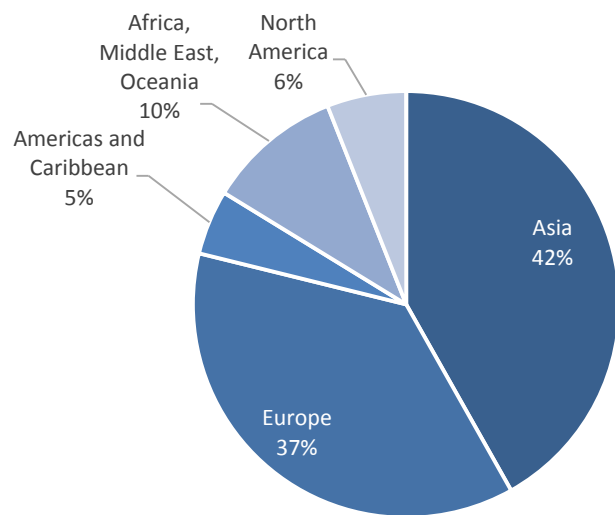
This reflects an increase of nearly 2.6 percent over last year (2,248). According to the most recently published Institute of International Education Open Doors report (2012-13), MIT ranked 9th nationally with regard to the numbers of international scholars at U.S. institutions. Postdoctoral associates and postdoctoral fellows accounted for 58 percent of MIT’s international scholars.

Foreign national scholars came to MIT from 90 different countries, with the highest numbers coming from China, South Korea, Germany, Canada, India, Japan, France, Italy, Israel, and Spain. 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 65 percent of MIT’s international scholar population. Seventy-six percent of international scholars at MIT were men and 24 percent were women. The greatest number of international scholars came to join departments in the School of Engineering, followed by the School of Science, interdisciplinary laboratories and centers, and the Sloan School of Management.

**International Scholars
Top Countries of Origin, 2013–2014**

Country	Count
China	400
Korea	175
Germany	141
Canada	139
India	136
Japan	126
France	111
Italy	110
Israel	91
Spain	81

**International Scholars
by Geographic Region, 2013–2014**



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://newsoffice.mit.edu/2013/research-advances-therapy-to-protect-against-dengue-0408>

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.

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.

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

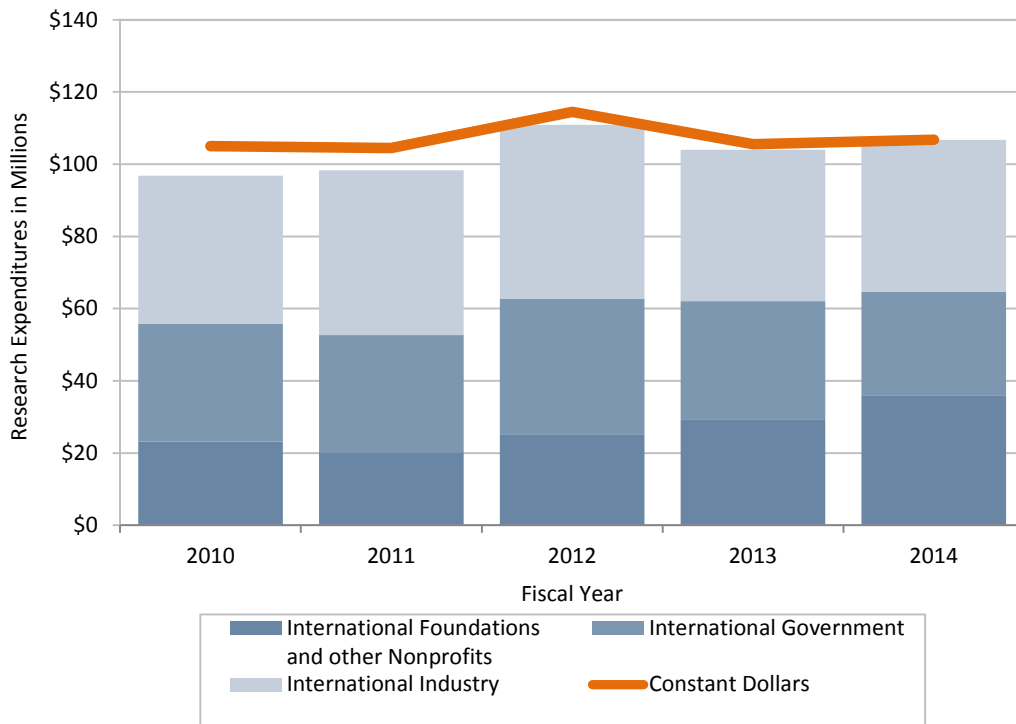
Continuous drug manufacturing

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 88 for more information.

Campus Research Sponsored by International Organizations

International Organizations Campus Research Expenditures (in U.S. Dollars)
Fiscal Years 2010-2014

International Sponsor Type	2010	2011	2012	2013	2014
Foundations and other nonprofits	23,170,052	20,233,545	25,025,346	29,381,412	35,830,415
Government	32,633,438	32,471,318	37,712,878	32,651,167	28,803,960
Industry	41,030,728	45,603,282	48,133,890	41,922,158	42,127,804
Total	96,834,218	98,308,146	110,872,115	103,954,737	106,762,179
Constant dollars*	104,979,501	104,479,441	114,478,047	105,578,447	106,762,179



*Constant dollars are calculated using the Consumer Price Index for All Urban Consumers weighted with the fiscal year 2014 equaling 100.