



CONTENTS

- 02 / DIGITAL PROGRAMS
BIG SUCCESS FOR BIG DATA
- 04 / SHORT PROGRAMS
WHO TRAINS THE TRAINERS?
- 06 / CUSTOM PROGRAMS
**NATIONAL OILWELL VARCO
DIGS DEEP AT MIT**
- 07 / INTERNATIONAL PROGRAMS
**NEW PROGRAMS EXPAND
GLOBAL FOOTPRINT**

Advanced Study Program

Last semester, Fellows from as far away as China, India, and Italy and as close as Washington, D.C. and Boston took courses in all five of MIT's schools.

Through the Advanced Study Program (ASP), students and working professionals can build their knowledge by enrolling in on-campus MIT classes as a non-degree student for a semester, a year, or even longer. ASP Fellows can select from the full MIT course catalog and earn MIT credit.

LEARN MORE ABOUT THE ADVANCED STUDY PROGRAM AT ASP.MIT.EDU

DEAR FRIENDS,

In our fall 2015 newsletter, I spoke about the launch and initial success of our new line of global courses for professionals—delivered online. In this newsletter, you will learn about the continuing success of our very first Digital Program, *Tackling the Challenges of Big Data*, what people like about it as well as how it has laid the foundations for additional digital courses in *Cybersecurity*, *Internet of Things*, *Data Science*, and *Systems Engineering*.

With increasing evidence to support the thesis that blended learning models, i.e. combining online with in-classroom learning, provide the most effective learning outcomes, we piloted an on-campus “train the trainer” program for K-16 and industry educators of the MIT App Inventor, which involved master trainers taking an online preparatory course before coming to MIT to take a three-day, rigorous, hands-on workshop. This methodology was also in keeping with MIT's motto of *mens et manus* (mind and hand). Early feedback tells us that the experiment was a huge success, as well as an incredible experience for the participants.

Speaking of *mens et manus*, you will also learn in this newsletter of a custom program that we developed specifically for engineering managers at a major energy services company. The participants first took intensive short courses on topics such as innovation and data modeling on the MIT campus; they then applied their learnings to real, hands-on projects at their work locations under the guidance and mentorship of some of the MIT faculty who taught the courses.

And finally, you will learn about how MIT Professional Education, which has always operated under the mission of providing lifelong learning opportunities for professionals at every level, is now further raising the bar by giving professionals worldwide greater access to MIT through several new International Programs launched in Taiwan, India, and the United Arab Emirates.

Best Regards,

Bhaskar Pant
EXECUTIVE DIRECTOR
MIT Professional Education
bpant@mit.edu



Bhaskar Pant
Photo by Stuart Darsch

Big Success for Big Data

Success of MIT Professional Education's first Digital Programs course forges a new path for online education.

With eight runs over two years, gaining almost 11,000 attendees from 120 countries to date, it's safe to say MIT Professional Education's Digital Programs course, *Tackling the Challenges of Big Data*, has been a massive success. But when MIT Professional Education launched this first online course in March 2014, notions of leveraging the digital platform for truly innovative learning for professionals had yet to fully manifest at MIT.

However, Sanjay Sarma, now the vice president for Open Learning; Anant Agarwal, formerly the head of MIT Computer Science and Artificial Intelligence Laboratory (CSAIL) and the president of edX; and Bhaskar Pant, executive director of MIT Professional Education, had a vision for expanding accessibility to MIT's vast pool of talent, resources, and knowledge to eager, but time- and location-constrained, professionals worldwide.

"We knew collectively that Big Data was a hot topic in industry across all sectors, so we approached Daniela Rus, the [current] director of CSAIL. She enthusiastically supported the idea of

deploying a pilot program on the subject that would be taught by faculty from MIT's largest lab," says Bhaskar Pant. "But at the time, we had no idea that the pilot would lead to so many more deliveries or that enrollments would come in the thousands from so many countries. It exceeded our most ambitious expectations."

Tackling the Challenges of Big Data offered a global audience an in-depth look into the growing challenges that arise from the advent of Big Data, addressing everything from data collection, security, storage, and processing to analytics, visualization, and practical application. The six-week digital course featured five modules covering 18 topics and included over 20 hours of video, case studies, interactive discussion forums for participants, and teachings from 12 MIT faculty members from CSAIL.

"The breadth of exposure to all of the topics was the best part of the class," says Michael DiPirro, senior vice president of the enterprise program and product management at Press Ganey. "It was worth it to see the latest approaches and technology to solving problems. I can take ideas from across this course back to existing projects to question and validate our approach and scope."

"It has been a very exciting six-week journey throughout the course. It expands horizons and introduces us to the upcoming technology advances," says Soumya Lal Sharma, database consultant for Infosys. "The brilliant case studies succeed in elaborating the need for change in 'evolved' database systems. It is definitely a must-attend for professionals who are keen on exploring the data technologies of the future."

The success of Big Data has also built a strong foundation to launch other digital courses for professionals in relevant topics such as *Cybersecurity* (with a third run launched in January 2016) and the *Internet of Things* (launched in April 2016) featuring CSAIL and other MIT faculty; *Entrepreneurial Negotiations: The MIT Way* (launched in April 2016 with Professor Lawrence Susskind, co-founder of the inter-university Program on Negotiation at Harvard Law School); and even greater international exposure with a Traditional Chinese language version of the Big Data course aimed at participants in Taiwan from May 10–June 21, 2016. ↗

Digital Programs expands its offerings with new courses launching in Fall 2016:

- **Data Science: Data to Insights**, in collaboration with the MIT Institute for Data, Systems, and Society, which aims to teach participants how to translate gigabytes of raw data into actionable insights. This course will be a part of the new Professional Certificate in Data Science launching in Fall 2016.
- **Architecture and Systems Engineering: Models and Methods to Manage Complex Systems**, in collaboration with the MIT Office of Digital Learning, Boeing, and NASA, is a four-course program that aims to give participants a working knowledge base and teach them the skills for analysis of complex systems and model management that will impact the way they approach and solve problems. While participants can take individual courses within the program, they will also have the opportunity to earn a professional certificate after successful completion of all four courses.

Tackling the Challenges of Big Data by the Numbers

Total Participants
10,750

6,444
US Participants

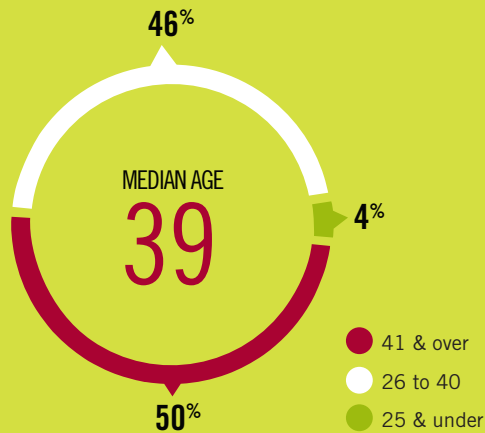
4,306
International Participants

823

NUMBER OF MIT ALUMNI ENROLLED

TOTAL NUMBER OF COUNTRIES REPRESENTED
124

Enrollment by Age



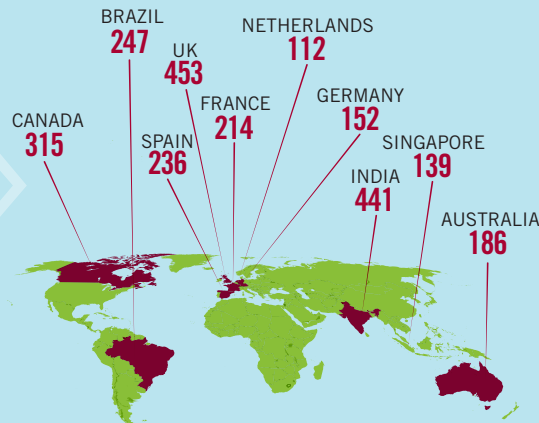
Enrollment by Gender

M 76%
W 18%

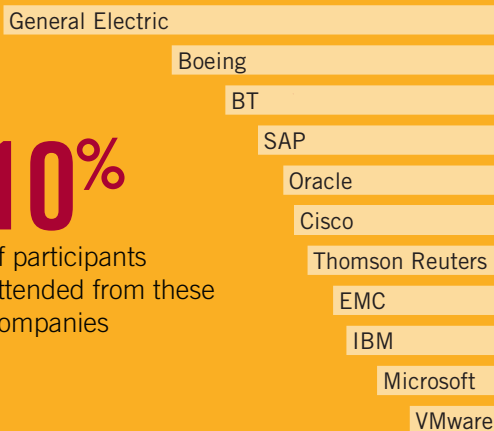
Education Level



Top 10 Countries Enrolled (Excluding US enrollments)



Top Companies



10%

of participants attended from these companies

Individual Registration vs. Group Orders

10,113
INDIVIDUAL REGISTRATION

637
GROUP ORDERS

Certificate



OVER 85%

Earned Certificates of Completion

Reimbursements
OVER 50% of participants indicated they would be reimbursed for the course.



Class attendees of the Short Programs course, *MIT Master Trainers Program in Education Mobile Computing* with Prof. Hal Abelson and other instructors.

Who Trains the Trainers?

Short Programs breaks new ground with two spring courses aimed at educating the educators.

THE NEW MIT APP INVENTOR MASTERS

It may be glib to say there's an app for everything these days, but what may seem small in scope can have an extraordinary global impact, whether it's an app developed by young people that gives their peers a way to quickly reach out for help in managing their stress and anxieties or an app that quickly provides accurate information for donating relief funds and the correct needed items in the aftermath of a disaster.

That was one of the original goals behind the creation of MIT App Inventor, an Android-based, open-source application that transforms the complex language of text-based coding into visual, drag-and-drop building blocks so that even an inexperienced or young programmer can quickly create a basic but fully functional app. This increased accessibility and democratization of software development empowers people, especially young people, to move from consumers of technology towards becoming its creators.

These goals are also the driving force behind the new MIT Professional Education – Short Programs course, *MIT Master Trainers Program in Education Mobile Computing*, taught by Hal Ableson, renowned professor of electrical engineering and computer science, a pioneer of the open source movement, and one of MIT App Inventor's original developers; Josh Sheldon, director of strategic programs for the MIT App Inventor

Project; and David Wolber, professor of computer science at the University of San Francisco.

Thirty people who attended the course in March 2016 came from 18 countries across five continents and a variety of backgrounds including K–12 educators, university professors, and business professionals.

“The fact that we had thirty people and eighteen countries represented spoke to how amazing and varied the backgrounds, resumes, and experiences of the people who took this course were,” says Josh Sheldon, “I was honored that such a talented and enthusiastic group of people with so much experience of their own were willing to come and take part in the course.”

This course was notable for being MIT Professional Education's first online and on-campus blended Short Programs course, and the path to achieving Master Trainer certification was rigorous. Attendees were first required to take a challenging six-week MOOC, *Mobile Computer with App Inventor—CS Principles*, offered through Trinity College via the edX platform in October 2015. The MOOC focused on the computing science principles behind MIT App Inventor, including how to design and create Android mobile apps, how computer science principles apply to algorithms, programming, the Internet, and society, and how to think creatively, analytically, and abstractly about computational problems.

Students who successfully completed the MOOC could then apply for a 10-week online MIT course that began in January 2016 with participants focused on developing their mobile app development pedagogy. All participants were responsible for producing either a tutorial for learning an MIT App Inventor project or an agenda/outline for adult training.

Finally, the participants came to MIT from March 24–26, 2016, for a capstone workshop to consolidate their prior 16 weeks of learnings. The three-day workshop included lectures, discussions, and collaborative group work that covered topics from technical set-ups, debugging strategies, and troubleshooting to design thinking process, pedagogy, and creative trainings.

“The workshop was inspiring both in content and in our ability to meet and work with the creators of the software,” says Sue Maddock, a teacher at Berwick Academy who participated in the course. “That connection allowed us to feel part of the process rather than consumers of the product. The interactions with the participants were informative and I suspect the professional connections I made will be lasting.”

Upon completion of the program, the participants joined a community of experts, known as MIT App Inventor Master Trainers, certified to instruct both teachers and students via App Inventor workshops, consult with educational institutions, and design and conduct training programs of their own.

MAKING MORE OF MAKERSPACES

In June 2014, over 150 American universities pledged to support the White House’s *Building A Nation of Makers* initiative at the first White House Maker Faire. For many institutions, that meant revitalizing many of their existing initiatives and policies, but for others, it meant building their Makerspaces from the ground up.

With over 150 years of a “learning by doing” reputation and more than 45 dedicated Makerspaces on campus, MIT was already positioned as a leader of the maker culture movement. From March 21–23, 2016, 30 educators and business professionals from across the United States, as well as Mexico and Brazil, attended the new MIT Professional Education - Short Programs course, *Creating and Maintaining Safe and Productive Makerspaces That Matter to Students*.

The course, led by Martin Culpepper, professor of mechanical engineering and MIT’s own “Maker Czar,” was launched with the goal of educating individuals who are charged with creating or maintaining Makerspaces at their institutions in the best practices necessary to obtain measurable impact from large investments, as well as how to allocate and invest money, space, and other resources to obtain their desired results.

“We are opening a Makerspace in the fall. This course gave us the confidence we needed to know how to move forward and what needs to be done. It also provided us with contacts for ongoing support and information gathering,” says Melissa



MIT students work on the solar electric vehicle at the SEVT workshop, located in one of MIT’s many Makerspaces, in Building N51. Photo by Christopher Harting, 2012.

Foreman, assistant director, First Year Programs & Learning Communities, and learning community program manager at the University of Connecticut. “We look forward to being able to give back in this way in the future, once we get up and running and build our own experience.”

The course examined proven methods for getting students excited about using Makerspaces, including peer-mentoring communities. Participants deepened their understanding of the fundamental principles of Makerspaces, the differences between various spaces, the importance of culture and community, impact assessment, effective safety systems, and the relationship between safety and complementary policy, insurance, legal, and regulatory issues.

One of the primary goals MIT cultivates within its Makerspaces is the idea of student-run, student-centered spaces that enable a more relaxed and nurturing environment to foster creativity and innovation. Features of these spaces include 24/7 accessibility to the space, few if any rules, and a broadened definition of what a Makerspace is (MIT has expanded its definition to include, for example, cooking spaces).

“Everything we learned can immediately be applied to what we’re doing on our campus. It incited excitement about creating our Makerspace and creating a community with our users,” says Karen Skudlarek, educational technologist at the University of Connecticut. “We’ve already sent out emails to all involved in our new Makerspace and we’ll be sharing what we learned from it: specifically, the need to let the students ‘own’ the space and let them learn.” ↩

National Oilwell Varco Digs Deep at MIT

Custom program helps employees unearth innovations in technology.



Graduates of the MIT Professional Education Custom Programs course, *NOV Advanced Technology Program*, with NOV senior executives, MIT faculty and staff.

On March 22, 2016, 26 engineering managers from the National Oilwell Varco (NOV), a global energy services company, received their certificates from MIT Professional Education during a ceremony held in Houston, Texas for successfully completing the Custom Program, *NOV Advanced Technology Program*, conducted at the MIT campus in Cambridge, Massachusetts. Several staff and faculty members from MIT were in attendance including Bhaskar Pant, executive director of MIT Professional Education; Tish Miller, director of academic and custom programs; Sheri Brodeur, associate director of corporate relations for the MIT Industrial Liaison Program (ILP); and three MIT faculty members from the course: Dale Morgan, professor of geophysics for the Department of Earth, Atmospheric and Planetary Sciences; Daniel Frey, professor of mechanical engineering; and Richard M. Wiesman, professor of the practice for the Department of Mechanical Engineering.

The year-long program, which was cultivated through relationship building in conjunction with the ILP, featured five MIT faculty members and was structured into a sequence of three one-week terms that emphasized innovation, data, and modeling for engineering, science, and business.

The course also featured a practical aspect that had participants working on real-world team projects at their home locations—which spanned across the United States, Canada, Norway, and Scotland—between terms with mentorship by MIT faculty.

“The MIT program for NOV was in perfect alignment with trends and philosophies I observed at the company,” says Richard M. Wiesman, one of the MIT faculty team mentors for the program. “The program helped engineers at NOV, who are very good at performing their respective jobs, expand their understandings and capabilities for developing innovative

improvements to existing operations and innovative new products, procedures, and product improvements.”

Example projects that the NOV teams worked on between terms focused on robotics and automation for service shop operations, vibrations and the drilling process, and integration and validation of multiple physics and numerical models into cohesive drill string/drill bit systems.

“The technical challenges NOV confronts are at the very edge of what is possible today,” says Daniel Frey, who served as both a faculty member for the program as well as a team mentor. “Several elements [in the plant] are each optimized to the edge of current technology and then combined in the best possible way via carefully planned experiments. Why else would a manufacturing facility for drill bits—an item that is ordinarily just a commodity—need a modern R&D lab? Downhole conditions are so extreme and so remote that the very best engineering is required to function at all, much less compete.”

But most valuable of all is how the research and work produced from the program will be carried back to NOV. “NOV engineers found practices, technologies and components that they could integrate to provide truly innovative advancements to NOV’s product offerings and operations,” says Wiesman. “And the NOV engineers can carry these newly acquired talents forward into their work and careers.”

“We are particularly proud of the academic program we developed for NOV because it truly followed MIT’s motto, *mens et manus*: classroom instruction followed by on-the-job MIT faculty-mentored project execution,” says Bhaskar Pant. “The experience wasn’t just one sided. Our MIT faculty also came away enthused and enlightened from having participated in a two-way knowledge exchange experience.”

New Programs Expand Global Footprint

New offerings launched on sustainability and innovation in Taiwan, India, and the United Arab Emirates.

BEYOND SMART CITIES

TAIWAN

As the global population continues its rapid growth with a projected population of 9.5 billion people living on the planet by 2050, nearly 86% of that population will live in urban areas. These 21st century cities will account for nearly 90% of global population growth, 80% of wealth creation, and 60% of total energy consumption.

On January 11–12, 2016, MIT Professional Education hosted the Short Programs course, *Beyond Smart Cities*, led by Dr. Kent Larson, director of the MIT Media Lab's Changing Places group, and Dr. Ryan C.C. Chin. The course focused on improving the livability of cities while dramatically reducing resource consumption.

This first foray into the greater China area followed an urban mobility project announcement where Taiwan Premier Mao Chi-kuo PhD '82, along with Larson, inaugurated the autonomous tricycle—coined Persuasive Electric Vehicle (PEV)—testing project in Taipei, the country's capital.

“We were lucky to have had the opportunity to launch our very first professional education program in Taiwan in conjunction with such a high profile MIT research project,” says Bhaskar Pant, executive director of MIT Professional Education. “Our course, already very popular at MIT and featuring the same faculty involved with the PEV project, addressed not only innovations in transportation but other aspects of living more intelligently in the cities of the future. A very important element in the course also was to include local guest lecturers who brought to light local challenges confronting Taiwan specifically.”

Participants in the course not only had the chance to hear faculty speak about the latest trends on the topic, they also had the opportunity to actively work in cross-generational groups to tackle real problems facing urban cities. “This was an experience that's unheard of in Taiwan. The hands-on group exercises were excellent,” a class participant noted. “Groups discussed issues they cared about passionately. MIT should definitely continue its tradition of the ‘mind-and-hand’ learning model here in Taiwan.”

MIT Professional Education is preparing several new international program offerings during the coming months, including a *Beyond Smart Cities* course in Hong Kong on June 6, 2016.

RADICAL INNOVATION

DUBAI AND BANGALORE

In October 2015, the International Programs team brought the *Radical Innovation* course to Dubai and Bangalore. For the second year in a row, course director Professor Sanjay Sarma explored the impact of innovation across the world and shared tools, procedures, and incentives that can be used to drive progress. A total of over 60 participants attended “Radical Innovation” across the two locations.

“As the business hub of the Middle East and the Silicon Valley of India, Dubai and Bangalore are the ideal locations for courses on innovation,” says Professor Sarma. “In addition to imparting my own expertise, our guest lecturers shared their unique perspectives on the extraordinary pace of innovation in the region.”

To ensure relevant educational experiences, the International Programs team works with on-the-ground collaborators who know the market and regional trends. Lily Fu, associate director of international marketing for MIT Professional Education, says, “For example, the *Beyond Smart Cities* course in Taiwan featured MIT faculty members as well as three local guest lecturers—experts who discussed the implications of the region's expanded urbanization.”

Over the course of the next several years, MIT Professional Education plans to expand into new countries and regions, including South Africa, Singapore, and South America. ↗



The January 2016 *Beyond Smart Cities* class in Taipei, Taiwan.

New Course Offerings

Summer 2016

**Agriculture, Innovation,
and the Environment**

June 13–17, 2016

shortprograms.mit.edu/aie

**Climate Change: From Science
to Solutions**

August 1–5, 2016

shortprograms.mit.edu/cc

Corporate Real Estate

June 20–21, 2016

shortprograms.mit.edu/core

**Creative Design Making
with a Robotic Arm**

June 20–24, 2016

shortprograms.mit.edu/cdm

**Culture Matters: Communicating
Effectively in a Global Workplace**

June 13–15, 2016

shortprograms.mit.edu/clm

**Decision-Making, Design, and Strategy
Under Uncertainty**

July 11–15, 2016

shortprograms.mit.edu/dmd

Innovation: Beyond the Buzzword

July 25–27, 2016

shortprograms.mit.edu/ibb

**Innovative Precision
Product Design**

June 6–10, 2016

shortprograms.mit.edu/ippd

Precision Medicine

July 25–29, 2016

shortprograms.mit.edu/pmed

**Product Platform and Product Family
Design: Tenth Anniversary Symposium**

July 29–30, 2016

shortprograms.mit.edu/pppf

The Invention Process

July 18–22, 2016

shortprograms.mit.edu/tip

LEARN MORE AT
SHORTPROGRAMS.MIT.EDU



PROFESSIONAL EDUCATION



**For more information on these programs,
visit professional.mit.edu**

MIT Professional Education
Massachusetts Institute of Technology
238 Main Street, Building E48-401
Cambridge, MA 02142

Jim Jones

Massachusetts Institute of Technology
238 Main Street, Building XXX-XXX
Cambridge, MA 02142