SHORT PROGRAMS
2016

Introducing 13 new courses and a
new Professional Certificate.

CONNECTING INDUSTRY WITH THE PULSE OF MIT
“Part of MIT’s mission is to provide exceptional educational programs that prepare people to make a difference in the world, whether they’re undergraduates, graduate students, or practicing professionals. We’re proud that MIT Professional Education is carrying out this work in so many venues and in such innovative ways.”

–Ian Waitz, Dean, School of Engineering

**SHORT PROGRAMS AT-A-GLANCE**

<table>
<thead>
<tr>
<th>Count</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>50+</strong></td>
<td>courses</td>
</tr>
<tr>
<td><strong>65+</strong></td>
<td>MIT faculty representing all five of MIT’s schools</td>
</tr>
<tr>
<td><strong>1,500+</strong></td>
<td>participants</td>
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<tr>
<td>Representing <strong>62</strong> countries</td>
<td></td>
</tr>
<tr>
<td>and hailing from <strong>50+</strong> industries</td>
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**HOW TO REGISTER**

Registrations must be submitted online and are accepted on a rolling basis until the course limit has been reached, with a final deadline of 10 days before the course begins. We recommend registering at least 6-8 weeks before the course start date to ensure space is available. MIT Professional Education reserves the right to select applicants whose qualifications and experience suggest that they will receive the most benefit from a given course.

Applications, detailed course descriptions, and information on policies, accommodations, travel, discounts, and payment options are available by visiting: [http://shortprograms.mit.edu](http://shortprograms.mit.edu).

Introducing 13 new courses and a Professional Certificate for 2016!

[http://shortprograms.mit.edu](http://shortprograms.mit.edu)
ADVANCE YOUR CAPABILITIES
DEEPEN YOUR EXPERTISE

Staying ahead in today's increasingly competitive business environment requires updated skills, knowledge, and capabilities. To that end, every summer accomplished executives, directors, managers, and practitioners from around the world attend MIT Professional Education's Short Programs to sharpen their competencies, gain crucial knowledge, and take home timely, relevant skills.

From engineering leadership and robotics to sustainability and innovation, more than 50 courses from MIT Professional Education explore wide-ranging topics and are led by prominent MIT faculty—all recognized leaders in their respective fields.

Following MIT's motto, “Mens et Manus,” or mind and hand, our courses combine theoretical and research-based knowledge with practical hands-on experience and unmatched networking opportunities.

By taking a course, you’ll update your skill set, deepen your understanding of important issues and trends, and earn these valuable benefits:

- Learn from and interact with renowned MIT faculty and leading industry practitioners
- Network with an accomplished group of peers from around the globe
- Earn continuing education units (CEUs)
- Receive a 15 percent discount on future MIT Professional Education Short Programs courses
- Gain membership to the exclusive MIT Professional Education LinkedIn group

SHORT PROGRAMS TOPIC AREAS

Biotechnology / Pharmaceutical  4
Data Modeling and Analysis   5
Design, Analysis, and Manufacturing  6
Innovation  7
Leadership / Communication  9
Real Estate  10
Sustainability  11
Professional Certificate Programs:  
  Innovation and Technology  12
  Real Estate Finance and Development  13

Please see the website for courses in these additional topic areas:
- Computer Science
- Crisis Management
- Energy / Transportation
- Imaging
- Radar
- Systems Engineering
MIT PROFESSIONAL EDUCATION SHORT PROGRAMS – NEW COURSES

LEARN FROM DISTINGUISHED PROGRAM FACULTY

MIT Professional Education’s Short Programs are led by MIT faculty and distinguished lecturers who have made significant contributions to their fields. To deepen the connection between MIT research and real-world application, many courses feature guest speakers—industry experts who share their firsthand insights and specialized knowledge.

IMMERSE YOURSELF IN INNOVATION

Located in one of the world’s foremost centers of innovation—Cambridge, Massachusetts’ Kendall Square—MIT is the world’s leading university in science, technology, engineering, and innovation. The power of MIT’s influence in the world is undeniable. In fact, 25 percent of MIT alumni have founded companies with innovative ideas that started at the Institute; 31 percent hold one or more patents; and in total, MIT alumni have founded companies that have created 4.6 million jobs around the globe that generate nearly $2 trillion in annual revenues.

DISCOVER CAMBRIDGE

With its cafés, bookstores, museums, and student community, Cambridge is a vibrant and fascinating place to visit.

Neighborhoods to visit:
• Central Square: International restaurants and music clubs
• Harvard Square: Bookstores and street performers; plenty of shops, bars, and restaurants
• Inman Square and Porter Square: Restaurants, bars, and coffee houses
• Kendall Square: Home to MIT; center to the high-tech and biotechnology industries in Massachusetts
• Davis Square: Vibrant arts community; many stores, bars, and restaurants
MIT PROFESSIONAL EDUCATION
SHORT PROGRAMS COURSES

Additive Manufacturing: From 3D Printing to the Factory Floor | July 25–29
Advances in Imaging: Emerging Devices and Visual Mining | August 1–4
NEW Agriculture, Innovation, and the Environment | June 13–17
Applied Cybersecurity | June 20–24
Beyond Smart Cities | July 25–27
Build a Small Radar System | June 6–10
Challenges of Leadership in Teams | July 18–22
NEW Climate Change: From Science to Solutions | August 1–5
Commercial Real Estate Development | June 13–15
Controlled Release Technology: Delivery Systems for Pharmaceuticals and Other Agents | June 20–24
NEW Corporate Real Estate | June 20–21
NEW Creative Design Making with a Robotic Arm | June 20–24
Crisis Management and Business Continuity | August 1–5
NEW Culture Matters: Communicating Effectively in the Global Workplace | June 13–15
Data and Models in Engineering, Science, and Business | June 20–24
NEW Decision-making, Design, and Strategy Under Uncertainty | July 11–15
Design and Analysis of Experiments | August 1–5
Discrete Choice Analysis: Predicting Demand and Market Shares | June 6–10
Downstream Processing | July 25–29
Energy, Sustainability, and Lifecycle Assessment | June 13–15
Engineering Leadership for Early Career Professionals | June 13–17
Engineering Leadership for Mid-Career Professionals | August 1–5
Evaluating Real Estate Markets | June 8
Fermentation Technology | July 18–22
Formulation and Stabilization of Biotherapeutics | June 13–15
Global Real Estate Markets | June 16–17
High-Speed Imaging for Motion Analysis: Systems and Techniques | June 13–16
NEW Innovation: Beyond the Buzzword | July 25–27
NEW Innovative Precision Product Design | June 6–10
Leadership Skills for Engineering and Science Faculty | June 6–7
Machine Learning for Big Data and Text Processing | July 18–22
Mastering Innovation and Design-Thinking | July 11–13
Modeling and Simulation of Transportation Networks | August 1–5
NEW Models for Infrastructure Delivery | June 23–24
Multiscale Materials Design | June 20–24
Nuclear Plant Safety | June 13–17
NEW Precision Medicine | July 25–29
Professional Communication Bootcamp | June 6–10
Quantitative Cardiovascular Physiology and Clinical Applications for Engineers | August 1–3
Radical Innovation | June 6–8
Rapid Prototyping Technology | July 18–22
NEW Real Disruption: The Intersection of Technology and Commercial Real Estate | June 22
Real Estate Finance: Advanced | June 9–10
Real Estate Finance: Fundamentals | June 6–7
NEW Survey Design, Implementation, and Evaluation | June 20–22
Sustainability: Principles and Practice | July 25–29
Technology, Organizations, and Innovation: Putting Ideas to Work | June 20–24
NEW The Invention Process | July 18–22
Tribology: Friction, Wear, and Lubrication | June 20–24
Understanding and Predicting Technological Innovation: New Data and Theory | July 11–15

“In this 67th year of Short Programs, we are particularly excited about introducing 13 new courses in varied areas such as climate change, innovation, invention, medicine, and real estate – with our motto “Mens et Manus” (mind and hand) firmly guiding us! We look forward to welcoming you to one or more of our offerings at MIT.”

—Bhaskar Pant
Executive Director
MIT Professional Education
BIOTECHNOLOGY / PHARMACEUTICAL

**Precision Medicine**  
Ernest Fraenkel and Peter Szolovits  
July 25–29, 2016 | $4,500

By integrating data from health, wearable-device generated, genomic, and post-genomic fields to identify the patients who will best respond to specific therapies, precision medicine promises to transform the pharmaceutical industry. In this course, you will examine scientific methods that underly genomics, systems biology, and data integration as well as their related technical, regulatory, and ethical challenges.

**All Biotechnology/Pharmaceutical Offerings**

Controlled Release Technology: Delivery Systems for Pharmaceuticals and Other Agents | June 20–24  
Downstream Processing | July 25–29  
Fermentation Technology | July 18–22  
Formulation and Stabilization of Biotherapeutics | June 13–15  
**NEW** Precision Medicine | July 25–29  
Quantitative Cardiovascular Physiology and Clinical Applications for Engineers | August 1–3

“In just five days, I have learned and have been exposed to knowledge and information that otherwise would have taken me three years to acquire!”

—Ammar Khan  
Business Continuity Manager  
Abu Dhabi Islamic Bank
This course is designed to provide you with the tools and conceptual frameworks with which to mitigate uncertainty. By taking part in hands-on exercises, you’ll become familiar with software tools that can aid in designing effective strategies, including Decision Analysis, Real Options, and Monte Carlo simulations. You’ll learn to improve the flexibility and robustness of your designs, strategies, and decisions—helping drive improved decision-making and better outcomes.

Survey Design, Implementation, and Evaluation
Adam Berinsky
June 20–22, 2016 | $2,500

Surveys have become an increasingly common way for companies and professionals to communicate with their clients and staff in the United States and around the world. But not all surveys are created equal. Some surveys include questions that lead to biased results and other surveys may only interview a narrow slice of people. These flaws are not always obvious to an untrained eye. This course provides participants with the skills needed to design, implement, and evaluate surveys in professional settings.

All Data Modeling and Analysis Offerings
Data and Models in Engineering, Science, and Business | June 20–24
NEW Decision-making, Design, and Strategy Under Uncertainty | July 11–15
Design and Analysis of Experiments | August 1–5
Discrete Choice Analysis: Predicting Demand and Market Shares | June 6–10
Machine Learning for Big Data and Text Processing | July 18–22
Multiscale Materials Design | June 20–24
NEW Survey Design, Implementation, and Evaluation | June 20–22
Understanding and Predicting Technological Innovation: New Data and Theory | July 11–15
MIT PROFESSIONAL EDUCATION SHORT PROGRAMS – NEW COURSES

DESIGN, ANALYSIS, AND MANUFACTURING

Creative Design Making with a Robotic Arm
Daniel Smithwick and Larry Sass
June 20–24, 2016  |  $4,200

Robotic technologies open up exciting creative design possibilities through advanced material manipulation and interactive assembly processes. Designed for educators and practitioners, this course will help you integrate robotics into your design-making practice or classroom. You’ll gain the skills necessary for robotic programming, including solid, parametric, and contour modeling, visual programming, and principles of rapid prototyping. All participants will complete design-making exercises using a 6-axis industrial robotic arm, multi-axis milling, and pick and place assembly.

Innovative Precision Product Design
Alexander Slocum and Nevan Hanumara
June 6–10, 2016  |  $4,900

This course is suited for anyone—across any industry—who is interested in developing new, innovative mechanical products. This course provides an introduction to the FUNdaMENTALS of Precision Product Design, starting with deterministic design process and physics-based design principles and followed by focused machine element topics including, linkages, screws and gears, actuators, structures, joints, and bearings. In addition to conceptualizing and fabricating a small benchtop precision system, you’ll be invited to share your own non-proprietary design challenge.

All Design, Analysis, and Manufacturing Offerings
Additive Manufacturing: From 3D Printing to the Factory Floor  |  July 25–29
NEW Creative Design Making with a Robotic Arm  |  June 20–24
Downstream Processing  |  July 25–29
Energy, Sustainability, and Lifecycle Assessment  |  June 13–15
Fermentation Technology  |  July 18–22
Formulation and Stabilization of Biotherapeutics  |  June 13–15
High-Speed Imaging for Motion Analysis: Systems and Techniques  |  June 13–16
NEW Innovative Precision Product Design  |  June 6–10
Multiscale Materials Design  |  June 20–24
Rapid Prototyping Technology  |  July 18–22
Tribology: Friction, Wear, and Lubrication  |  June 20–24
INNOVATION

Agriculture, Innovation, and the Environment
Markus Buehler and Edmund Schuster
June 13–17, 2016  |  $4,500

By 2050, the earth’s population will likely reach 9.5 billion people, requiring an 80% increase in agricultural production. This presents the need for innovative technologies to make agriculture more efficient and to optimize existing inputs. This course focuses on three fundamental areas that underpin agricultural innovation; a) macro/micro aspects of environmental impacts including climate, weather, and microbiological, b) the application of advanced technologies, such as new materials, in agricultural processes, and c) the use of data and modeling to improve yield by enhanced precision and predictive power.

Innovation: Beyond the Buzzword
Federico Casalegno
July 25–27, 2016  |  $2,500

We live in an age of change in which rapid innovation is disrupting and unseating incumbent products and industries, creating new technological frontiers, and challenging nearly everything we think we know about business. Centered on the concept of design thinking, this course will include faculty and guest lectures, case study discussions, and learning expeditions on and beyond the MIT campus. You will emerge a more critical thinker, knowledgeable about what innovation is (and is not), how it happens, how to discern meaningful trends in design and technology, and how to identify opportunities and propose innovative products, services, and experiences.

Innovative Precision Product Design
Alexander Slocum and Nevan Hanumara
June 6–10, 2016  |  $4,900

Well suited for anyone—across any industry—who is interested in developing new, innovative mechanical products, this course provides an introduction to the FUNdaMENTALS of Precision Product Design, starting with deterministic design process and physics-based design principles and followed by focused machine element topics, including linkages, screws and gears, actuators, structures, joints, and bearings. In addition to conceptualizing and fabricating a small benchtop precision system, you’ll be invited to share your own non-proprietary design challenge.

continued on next page

“Fruitful, excellent experience. I also used the time after the course to meet with relevant people from different labs at MIT and some companies based in Boston that are relevant to our company.”

–Yair Frastai
Vice President, Research & Development
QPX
INNOVATION continued

**The Invention Process**  
Emanuel Sachs  
July 18–22, 2016 | $4,500

This course explores the culture and methodology of the inventor, primarily through an engineering lens, with additional lessons drawn from the fields of science, visual arts, architecture, and more. You will examine the role of invention on innovation and improve your ability to think critically about intellectual property within a competitive strategy framework.

**All Innovation Offerings**

- NEW Agriculture, Innovation, and the Environment | June 13–17
- NEW Innovation: Beyond the Buzzword | July 25–27
- NEW Innovative Precision Product Design | June 6–10
- NEW The Invention Process | July 18–22
- Mastering Innovation and Design-Thinking | July 11–13
- Radical Innovation | June 6–8
- Technology, Organizations, and Innovation: Putting Ideas to Work | June 20–24
- Understanding and Predicting Technological Innovation: New Data and Theory | July 11–15

TAKE YOUR INNOVATION EFFORTS TO THE NEXT LEVEL

Consider pursuing a Professional Certificate in Innovation and Technology offered by MIT Professional Education – Short Programs. Learn more on page 12.
LEADERSHIP AND COMMUNICATION

Culture Matters: Communicating Effectively in the Global Workplace
Jane Dunphy and Bhaskar Pant
June 13–15, 2016  |  $2,400

In today's increasingly global environment, communicating with individuals from other cultures is all in a day's work. From collaborating on international projects and supervising multicultural staff to negotiating agreements across national borders and writing for multicultural audiences, this course examines the challenges inherent to communicating in a global workplace and provides strategies for overcoming them.

Survey Design, Implementation, and Evaluation
Adam Berinsky
June 20–22, 2016  |  $2,500

Surveys have become an increasingly common way for companies and professionals to communicate with their clients and staff in the United States and around the world. But not all surveys are created equal. Some surveys include questions that lead to biased results and other surveys may only interview a narrow slice of people. These flaws are not always obvious to an untrained eye. This course provides participants with the skills needed to design, implement, and evaluate surveys in professional settings.

All Leadership and Communication Offerings
Challenges of Leadership in Teams  |  June 18–22
NEW Culture Matters: Communicating Effectively in the Global Workplace  |  June 13–15
Engineering Leadership for Early-Career Professionals  |  June 13–17
Engineering Leadership for Mid-Career Professionals  |  August 1–5
Leadership Skills for Engineering and Science Faculty  |  June 6–7
Professional Communication Bootcamp  |  June 6–10
NEW Survey Design, Implementation, and Evaluation  |  June 20–22

“Most excellent! The caliber of instruction was superior and the value of networking with globally based peers was incalculable.”

Tom Roepke
Director, Business Continuity
Sony Pictures Entertainment
REAL ESTATE

Corporate Real Estate*
Sarah Abrams
June 20–21, 2016  |  $2,100
Focused on deepening your understanding of corporate real estate and its impact on the demand for and design of space, this course is well suited for individuals who are considering a career in corporate real estate. You’ll learn how large space users think about their real estate, what drives their decisions, and how they practice their craft.

Models for Infrastructure Delivery*
Chris Gordon and James McKeller
June 23–24, 2016  |  $2,100
Infrastructure is a complex international business involving various partnership arrangements in both the public and private sectors. This course examines infrastructure’s many “moving parts” by evaluating issues from both the developer and investor’s perspectives. In addition to assessing the basics of project finance, you will evaluate how the fundamentals of infrastructure are impacted by technological, sustainability, and demographic trends.

Real Disruption: The Intersection of Technology and Commercial Real Estate*
Steve Weikal
June 22, 2016  |  $1,050
Well-established traditions of developing, transacting, and managing commercial real estate are being disrupted by real estate technology startups. This course examines the challenges and opportunities resulting from the rise of mobile technology, crowdsourcing, cloud storage, big data, and complex analytics—including the creation of innovative new models for the global commercial real estate industry.

All Real Estate Offerings

Commercial Real Estate Development  |  June 13–15
NEW Corporate Real Estate  |  June 20–21
Evaluating Real Estate Markets  |  June 8
Global Real Estate Markets  |  June 16–17
NEW Models for Infrastructure Delivery  |  June 23–24
NEW Real Disruption: The Intersection of Technology and Commercial Real Estate  |  June 22
Real Estate Finance: Advanced  |  June 9–10
Real Estate Finance: Fundamentals  |  June 6–7

*NOTE: These three special topic Real Estate courses are not included in the Center for Real Estate Professional Certificate Program.

TAKE YOUR REAL ESTATE ACUMEN TO THE NEXT LEVEL

Consider pursuing a Professional Certificate in Real Estate Finance and Development offered by MIT Professional Education and the Center for Real Estate. Learn more on page 13.

To learn more and register online, visit: http://shortprograms.mit.edu
SUSTAINABILITY

Climate Change: From Science to Solutions
Noelle Selin and Daniel Cziczo | $3,500
August 1–5, 2016

Aimed at broadening your understanding of the scientific foundation behind anthropogenic climate change and its impact on the earth, this focused course examines the fundamental physical processes that shape climate and evaluates strategies for mitigating the impact of climate change. In addition to discussions of climate change policy and governance considerations, this course will address the contemporary science of climate measurements, models of climate change and impacts, and climate change policy and negotiations.

Agriculture, Innovation, and the Environment
Markus Buehler and Edmund Schuster
June 13–17, 2016 | $4,500

By 2050, the earth’s population will likely reach 9.5 billion people, requiring an 80% increase in agricultural production. This presents the need for innovative technologies to make agriculture more efficient and to optimize existing inputs. This course focuses on three fundamental areas that underpin agricultural innovation; a) macro /micro aspects of environmental impacts including climate, weather, and microbiological, b) the application of advanced technologies, such as new materials, in agricultural processes, and c) the use of data and modeling to improve yield by enhanced precision and predictive power.

All Sustainability Offerings
NEW Agriculture, Innovation, and the Environment | June 13–17
Beyond Smart Cities | July 25–27
NEW Climate Change: From Science to Solutions | August 1–5
Energy, Sustainability, and Life Cycle Assessment | June 13–15
Sustainability: Principles and Practice | July 25–29

“The depth of the instruction was of the highest caliber. It not only gave state-of-the-art information on innovation, it was a course that significantly enhanced one’s critical thinking on the subject.”

–Tanya Lewis
Business Operations Strategy Consultant
Lewis Garret
TAKE YOUR EDUCATION AND SKILLS TO THE NEXT LEVEL WITH PROFESSIONAL CERTIFICATES

Professional Certificate Programs offered by MIT Professional Education – Short Programs formally recognize your development and commitment to advancing your knowledge and skills in a particular field of interest. Designed for busy professionals, the Short Programs courses that make up these professional certificates feature a convenient, accelerated format and are held each summer on MIT’s campus. Groups from the same company and location with five or more registrations in the same year receive a 15 percent discount for all courses in the Certificate Programs. Please contact shortprograms@mit.edu for details.

NEW Professional Certificate Program in Innovation and Technology

The Professional Certificate in Innovation and Technology focuses on building competitive advantage through innovation and technology. In keeping with MIT’s Institute-wide Innovation Initiative, you’ll acquire timely strategies for developing, managing, and implementing innovation techniques and technologies that create value for your organization.

Awarded upon successful completion of four qualifying Short Programs courses, this certificate equips you with the best practices and actionable knowledge needed to make a powerful impact on your organization’s innovation efforts.

Certificate Requirements

The Professional Certificate Program consists of a core of innovation-focused courses and several elective courses that have a strong innovation component. Earning the Professional Certificate requires the completion of four qualifying courses within two years: at least three in the Core Course category with up to one elective course.

Please Note: It is highly likely that these courses will be offered year to year. We do reserve the right to cancel courses in the future, however, as we are committed to a diverse and updated portfolio of offerings.

Core Courses

Radical Innovation | June 6–8, 2016
NEW Innovative Precision Product Design | June 6–10, 2016
Technology, Organizations, and Innovation: Putting Ideas to Work | June 20–24, 2016
Mastering Innovation and Design Thinking | July 11–13, 2016
NEW The Invention Process | July 18–22, 2016

Elective Courses

Multiscale Materials Design | June 20–24, 2016
Rapid Prototyping Technology | July 18–22, 2016
Beyond Smart Cities | July 25–27, 2016
Advances in Imaging | August 1–4, 2016

To learn more and register online, visit: http://shortprograms.mit.edu
Professional Certificate Program in Real Estate Finance and Development

The Professional Certificate in Real Estate Finance and Development examines the key factors and investment strategies that are redefining the real estate landscape both in the United States and abroad. Recent global developments, coupled with economic conditions, have demonstrated that it is difficult to understand financial markets and the economy without understanding real estate markets and underwriting real estate risk. The real estate courses that make up the Professional Certificate Program in Real Estate Finance and Development provide training opportunities for large organizations seeking to educate and inspire their most talented employees.

Certificate Requirements

To qualify for the Professional Certificate in Real Estate Finance and Development, participants must complete the following five required courses within a two-year period:

- **Evaluating Real Estate Markets** | June 8, 2016
- **Commercial Real Estate Development** | June 13–15, 2016
- **Global Real Estate Markets** | June 16–17, 2016

New Special Topics Courses

This summer, an additional third week of courses is being offered by MIT Professional Education — Short Programs, along with the Center for Real Estate. While these courses are not included in the Certificate Program, they will offer advanced knowledge in Real Estate. See page 10 for a description of each course. These special topic courses include:

- **NEW Corporate Real Estate** | June 20–21, 2016
- **NEW Real Disruption: The Intersection of Technology and Commercial Real Estate** | June 22, 2016
- **NEW Models for Infrastructure Delivery** | June 23–24, 2016

Please visit [http://shortprograms.mit.edu](http://shortprograms.mit.edu) for more information and to register.

Have questions?

Contact us at:
Telephone: +1 617-253-2101
Fax: +1 617-258-8831
Email: shortprograms@mit.edu