PROFESSIONAL EDUCATION

PROFESSIONAL CERTIFICATE PROGRAM IN

MACHINE LEARNING & ARTIFICIAL INTELLIGENCE

MESSAGE FROM THE DIRECTOR

Today's professionals are tasked with solving high-stakes challenges while navigating exponential data growth, ever-changing technology, and the demands of an increasingly global market. At MIT Professional Education, we know that the advancements required to answer these problems amid a shifting landscape cannot be made in isolation. That's why our Short Programs courses and certificates are dedicated to connecting industry practitioners with real-time, proven strategies from MIT across a variety of timely topics—from machine learning and biotech to innovation and manufacturing.

In our Professional Certificate Program in Machine Learning & Artificial Intelligence, you'll join a global community of lifelong learners committed to applying technical knowledge for the betterment of humankind. Designed and led by MIT experts, the certificate is a living, breathing credential that is constantly evolving to meet the latest industry trends and market demands. Whether you're looking to improve your existing AI strategies, capitalize on cutting-edge data tools, or power new product development, at MIT you'll find the insights you need to upskill your career and make a positive impact—on your organization, your industry, and the world.

We hope you'll join us as we push the boundaries of what's possible in machine learning and AI together. Your next chapter is waiting.

Sincerely,

Malgorzata Hedderick
Director, Short Programs

In today's world, things are changing so quickly in deep learning—new networks coming in every day, new chips, new silicons. I really wanted to know how to ask the right questions of the engineering team in order to make sure we're not making a mistake in choosing the right hardware."

Lavanya Manohar, Cognex Corporation

WHY IT MATTERS

The amount of data produced around the world is growing rapidly, enabling exciting opportunities for enhanced innovation and impact through machine learning and artificial intelligence (AI). However, without the right strategies and frameworks for collecting, storing, and analyzing available data, many organizations are leaving value on the table—and failing to keep pace with the competition.

14%
increase in global GDP is predicted by 2030, driven by advancementsin AI

91.5%
of leading businesses report ongoing investments in AI

However,
76%
of organizations are barely breaking even on their AI investments

REGISTER AT
professional.mit.edu/mlai

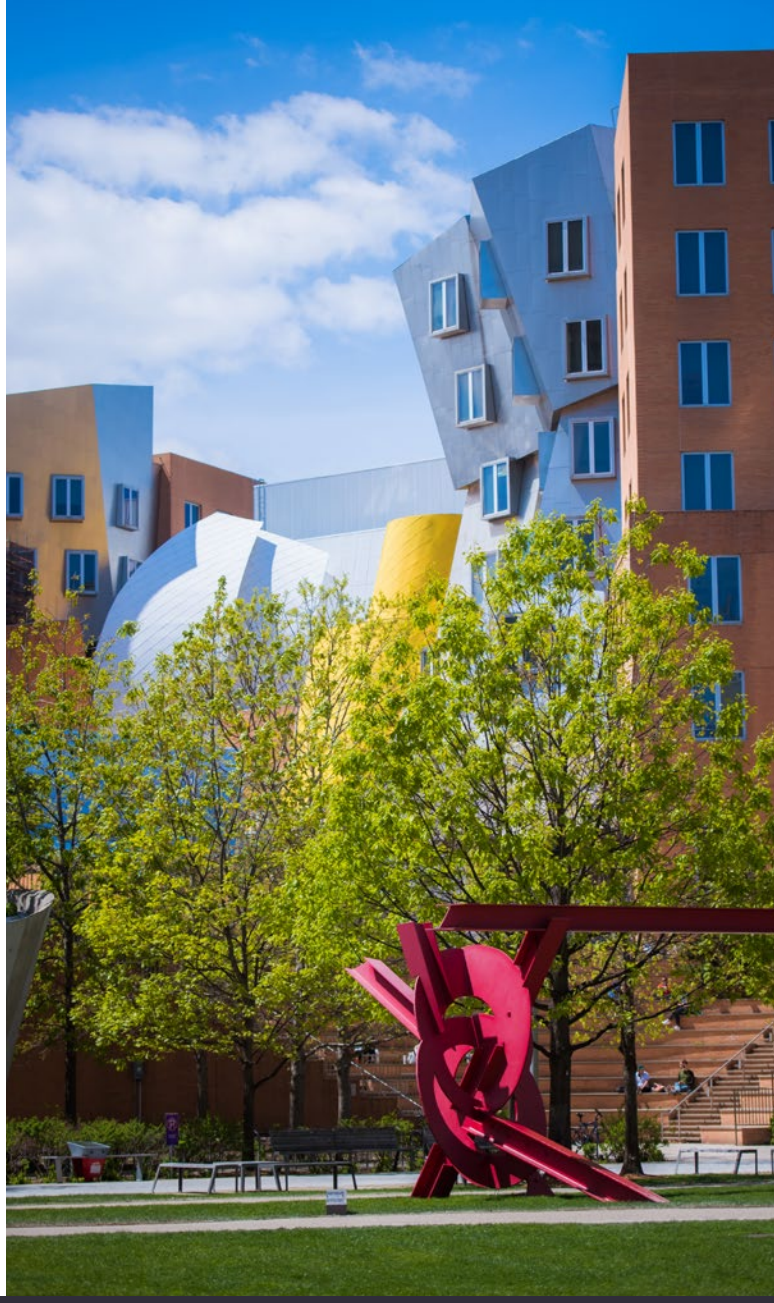
SOURCES:
www.wsj.com/articles/the-current-state-of-ai-adoption-01549644400
www.businesswire.com/news/home/20200106005280/en/NewVantage-Partners-Releases-2020-Big-Data-and-AI-Executive-Survey

CORE INSTRUCTORS

REGINA BARZILAY
School of Engineering Distinguished Professor for AI and Health in CSAIL; MacArthur Fellow

TOMMI S. JAAKKOLA
Thomas Siebel Professor of Electrical Engineering and Computer Science and the Institute for Data, Systems, and Society

STEFANIE JEGELKA
X-Consortium Career Development Associate Professor of Electrical Engineering and Computer Science



Instructor research areas:

- Algorithmic machine learning
- Computational design
- Computer science
- Chemistry
- Electrical engineering
- Energy-efficient systems
- Graph algorithms
- Materials design
- Natural language processing
- Optimization
- Oncology
- Reinforcement learning
- Sampling
- Smart manufacturing
- Systems engineering

LEAD INSTRUCTORS ELECTIVES

PULKIT AGRAWAL
Assistant Professor of Electrical Engineering and Computer Science; Director, MIT Improbable AI Lab

BRIAN ANTHONY
Co-Director, MIT Medical Electronic Device Realization Center; Associate Director, MIT.nano.

MUNTHER DAHLEH
Director Institute for Data Systems and Society (IDSS); William A. Coolidge Professor, Electrical Engineering and Computer Science

PHILLIP ISOLA
Assistant Professor of Electrical Engineering and Computer Science

TIM KRASKA
MIT Associate Professor of Electrical Engineering and Computer Science

DAVID MARTINEZ
Associate Head, Cyber Security and Information Sciences Division, MIT Lincoln Laboratory

WOJCIECH MATUSIK
Associate Professor of Electrical Engineering and Computer Science; Member, Computer Graphics Group

DEVAVRAT SHAH
Professor of Electrical Engineering and Computer Science, MIT; Director, Statistics and Data Science Center

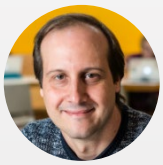
JULIAN SHUN
Associate Professor of Electrical Engineering and Computer Science; Lead investigator in MIT Computer Science and Artificial Intelligence Laboratory (CSAIL)

JUSTIN SOLOMON
X-Consortium Career Development Assistant Professor; Principal Investigator, Geometric Data Processing Group

DAVID SONTAG
Hermann L. F. von Helmholtz Career Development Professor of Medical Engineering; Associate Professor of Electrical Engineering and Computer Science; Principal Investigator, Computer Science & Artificial Intelligence Laboratory

SUVRIT SRA
Esther and Harold E. Edgerton (1927) Career Development Associate Professor of Electrical Engineering & Computer Science

VIVIENNE SZE
Associate Professor of Electrical Engineering and Computer Science; Principal Investigator, Research Laboratory of Electronics



ANTONIO TORRALBA
Professor of Electrical Engineering and Computer Science; Director, MIT-IBM Watson AI Lab; Inaugural Director, MIT Quest for Intelligence

BERNHARDT L. TROUT
Raymond F. Baddour, ScD, (1949) Professor of Chemical Engineering; Director, Novartis-MIT Center for Continuous Manufacturing

JOHN TSITSIKLIS
Clarence J. Lebel Professor of Electrical Engineering

CAROLINE UHLER
Henry L. & Grace Doherty Associate Professor, Electrical Engineering and Computer Science

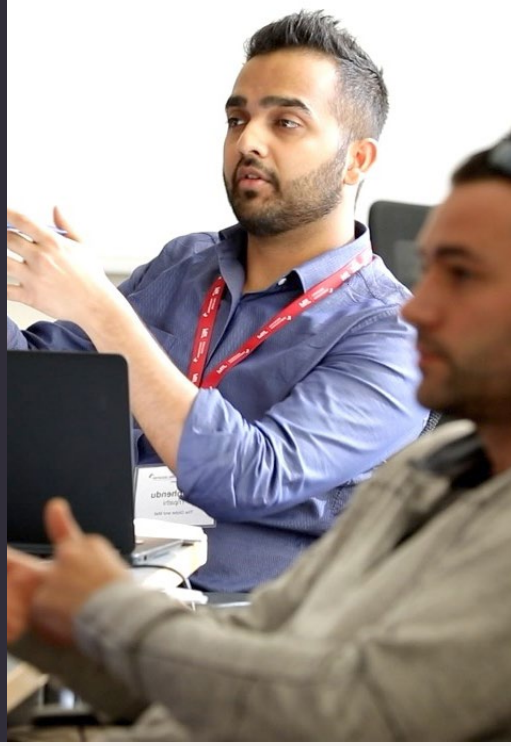
CATHY WU
Gilbert W. Winslow Career Development Assistant Professor of Civil and Environmental Engineering

DISCOVER THE LATEST ADVANCES IN AI

Get—and stay—ahead in the ever-evolving technology arena by mastering the latest approaches to artificial intelligence, including predictive analytics, deep learning, and algorithmic methods. In our prestigious certificate program, you'll work alongside leading MIT faculty as you explore cutting-edge developments and create strategies for building effective AI systems.

Solve pressing challenges related to:

- Customization
- Algorithmic Bias
- Dirty Data
- Infrastructure
- Scaling
- And More



LEARNING OUTCOMES

- Acquire proven strategies for maximizing the value of your data
- Learn how to formulate problems as machine learning tasks and identify the right tools for each challenge
- Anticipate and mitigate scaling issues, including data volume, dimensionality, storage, and computation
- Deepen your understanding of the many opportunities, costs, and likely performance hurdles in predictive modeling
- Explore cutting-edge areas of machine learning and AI, such as deep learning, computer vision, and reinforcement learning
- Access industry-specific insights across a variety of areas, including healthcare, manufacturing, bioprocessing, and cybersecurity

HOW IT WORKS

In this prestigious certificate program, you'll complete 16 days of qualifying Short Programs courses within 36 months—choosing from a combination of core and elective courses. These courses will help you target the skills most relevant to your personal goals, equipping you with the cutting-edge strategies you need to get ahead and stay ahead.

TEACHING METHODOLOGY

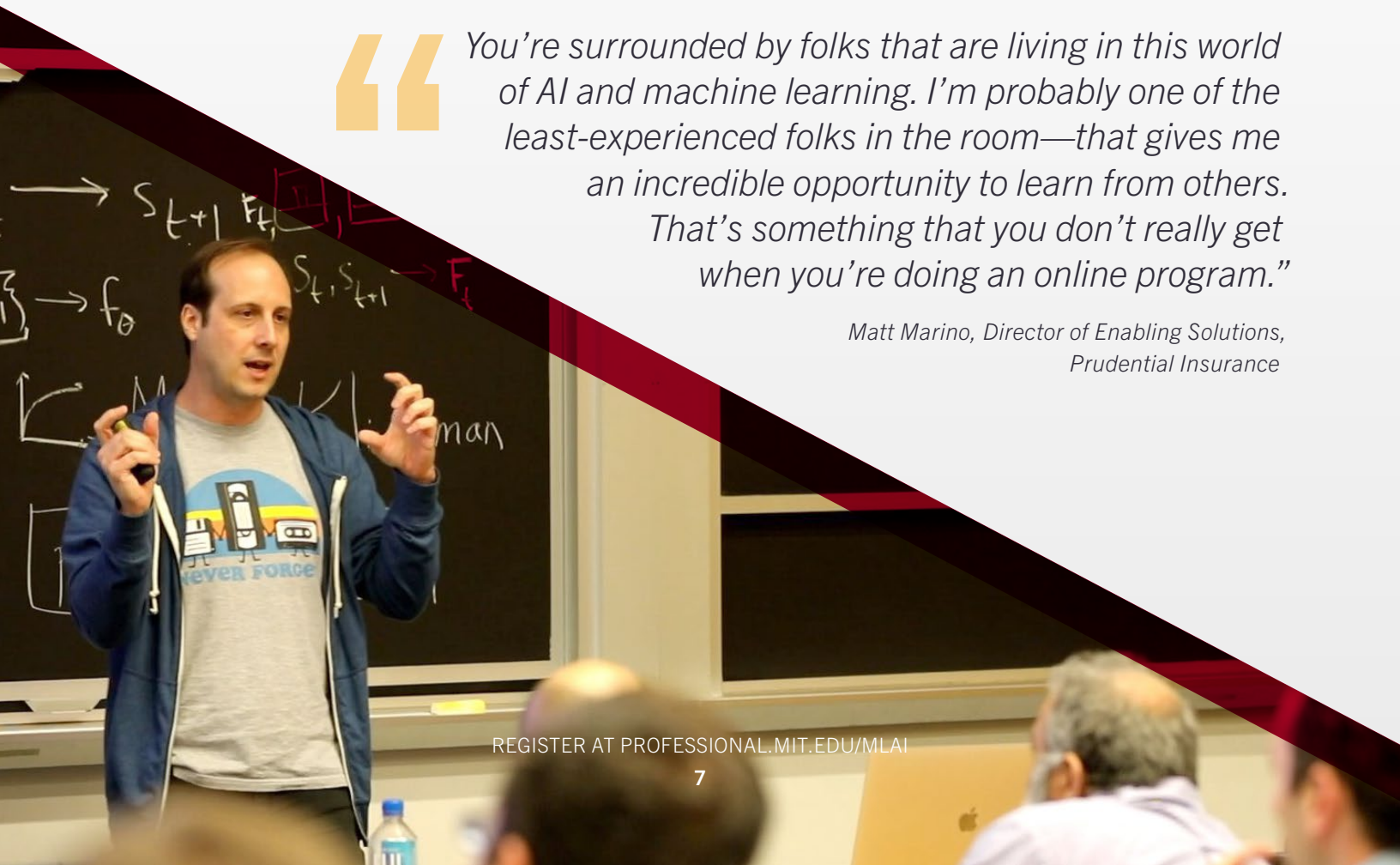
The certificate curriculum is grounded in the spirit of MIT's motto, "Mens et Manus," or "mind and hand," which combines theoretical instruction with hands-on methods of discovery.

Interactive Lectures

Hands-on Exercises

Group Projects

Supplemental Resources



"You're surrounded by folks that are living in this world of AI and machine learning. I'm probably one of the least-experienced folks in the room—that gives me an incredible opportunity to learn from others. That's something that you don't really get when you're doing an online program."

Matt Marino, Director of Enabling Solutions, Prudential Insurance

CORE COURSES

Machine Learning for Big Data and Text Processing: Foundations

2 DAYS | REGINA BARZILAY, TOMMI JAAKKOLA, STEFANIE JEGELKA

Gain a solid foundation of core mathematical concepts and theories relevant to machine learning, including probability, statistics, classification, regression, and optimization.

Machine Learning for Big Data and Text Processing: Advanced

3 DAYS | REGINA BARZILAY, TOMMI JAAKKOLA, STEFANIE JEGELKA

Discover how the latest tools, techniques, and algorithms driving modern and predictive analysis can be applied in different fields.

ELECTIVE COURSES

Advanced Data Analytics for IIoT and Smart Manufacturing

4 DAYS | BRIAN ANTHONY

Explore the latest developments in smart manufacturing and learn to apply these strategies to solve practical challenges and acquire a competitive edge in the evolving industrial marketplace.

Advanced Reinforcement Learning

2 DAYS | PULKIT AGRAWAL, CATHY WU

Explore the cutting-edge of reinforcement learning research, and learn which approaches are best suited to solving your organizational challenges.

AI Strategies and Roadmap: Systems Engineering Approach to AI Development and Deployment

5 DAYS | DAVID MARTINEZ

Master the strategies you need to deploy an AI system engineering approach that maximizes the value of your digital products and services.

AI for Computational Design and Manufacturing

5 DAYS | WOJCIECH MATUSIK

Acquire the frameworks you need to build a smart design and manufacturing workflow—powered by AI—that will fuel your organizations' ability to produce large volumes of highly integrated, complex, customized products.

Applied Data Science Program

5 DAY EQUIVALENT | MUNTHER DAHLEH, STEFANIE JEGELKA, DEVAVRAT SHAH, CAROLINE UHLER, JOHN TSITSIKLIS

Upgrade your data analytics skills over 12 weeks by learning the theory and practical application of supervised and unsupervised learning, time-series analysis, neural networks, recommendation engines, regression, and computer vision.

Bioprocess Data Analytics and Machine Learning

3 DAYS | RICHARD D. BRAATZ, BRIAN ANTHONY, SEONGKYU YOON

Discover transformative ways to apply data analytics and avoid the most common pitfalls that arise when analyzing bioprocess data.

ELECTIVE COURSES CONTINUED

Deep Learning for AI and Computer Vision

5 DAYS | ANTONIO TORRALBA, PHILLIP ISOLA

Develop practical skills necessary to build highly-accurate, advanced computer vision applications. Learners should have experience in programming with Python, as well as experience with linear algebra, calculus, statistics, and probability.

Designing Efficient Deep Learning Systems

2 DAYS | VIVIENNE SZE

Discover how to overcome power, memory, and processing challenges to deploy complex deep learning neural networks on IoT enabled devices such as cell phones, wearables, and drones.

Ethics of AI: Safeguarding Humanity

3 DAYS | BERNHARDT TROUT, STEFANIE JEGELKA

Examine today's most pressing ethical issues related to AI and explore ways that organizations can leverage technology to benefit mankind.

Foundations of Data and Models: Regression Analysis

5 DAYS | F. DALE MORGAN

Learn the fundamentals of fitting data to models using linear algebra, various computational methods, and other mathematical concepts.

Graph Algorithms and Machine Learning

2 DAYS | JULIAN SHUN

Learn how to extract useful insights from large and structured data sets and solve large-scale graph problems.

Machine Learning for Healthcare

3 DAYS | DAVID SONTAG

Explore machine learning methods for clinical and healthcare applications and how emerging trends will shape healthcare policy and personalized medicine. Learners of this course should be comfortable programming in Python, performing basic data analysis, and using the machine learning toolkit Scikit-learn.

Modeling and Optimization for Machine Learning

5 DAYS | JUSTIN SOLOMON, SUVRIT SRA

Reduce machine learning problems to their standard mathematical form and understand how to identify the best algorithms and software tools to solve them. Learners are required to have a background in linear algebra and multivariable calculus, as well as at least basic programming in Python.

No Code Analytics and AI

4 HALF-DAYS | TIM KRASKA

In this course, you will acquire the no-code analytics and AI tools you need to become a "citizen data scientist"—a professional who is equipped to perform analytical tasks while working in an area of expertise outside statistics and analytics.

Reinforcement Learning

3 DAYS | PULKIT AGRAWAL, CATHY WU

Join professionals from around the world to upgrade your machine learning (ML) toolkit in this three-day RL bootcamp.

WHO SHOULD ATTEND

The Professional Certificate Program in Machine Learning & Artificial Intelligence is designed for learners with at least three years of professional experience who hold a bachelor's degree (at minimum) in a technical area such as computer science, statistics, physics, or electrical engineering. Professionals who will find the curriculum helpful include:

- **Data scientists and other analytics professionals** who want to become more effective at drawing meaningful insights from large quantities of data
- **Developers, software engineers, and programmers** looking to improve their ability to implement AI and machine learning strategies in practice
- **Executives and managing directors** who want a deeper understanding of the latest developments in AI in order to make smart decisions about technology use and investments
- **Statisticians, applied mathematicians, and similar professionals** who want to launch specialized careers in machine learning
- **Technical managers and team leaders** who need a thorough understanding of the opportunities, costs, and likely performance hurdles in predictive modeling
- **Any technical professional** whose work interfaces with data analysis and who wants to learn key concepts, formulations, and algorithms related to emerging possibilities in AI

SAMPLE LEARNING PATH: **PRODUCT DEVELOPMENT ENGINEER**

- **Machine Learning for Healthcare** 3 DAYS
- **Machine Learning for Big Data and Text Processing: Advanced** 3 DAYS
- **AI Strategies and Roadmap** 5 DAYS
- **Bioprocess Data Analytics and Machine Learning** 3 DAYS
- **Graph Algorithms and Machine Learning** 3 DAYS

SAMPLE LEARNING PATH: **DATA SCIENTIST**

- **Machine Learning for Big Data and Text Processing: Foundations** 2 DAYS
- **Machine Learning for Big Data and Text Processing: Advanced** 3 DAYS
- **Modeling and Optimization for Machine Learning** 5 DAYS
- **Deep Learning for AI and Computer Vision** 5 DAYS
- **Advanced Reinforcement Learning** 3 DAYS

ALUMNI BENEFITS

As an MIT Professional Education Professional Certificate Program alumnus you will receive:

- A 15 percent discount on future MIT Professional Education courses
- Invitations to special events, networking opportunities, and future courses
- Updates on faculty research, new programs, and MIT initiatives via our newsletter
- Membership in the exclusive MIT Professional Education Alumni Group on LinkedIn
- Continuing Education Units (CEUs) for each eligible course


PROFESSIONAL EDUCATION
Short Programs

This is to certify that

Your Name Here

has successfully completed

Professional Certificate Program in Machine Learning & Artifical Intelligence

Within two weeks of the successful completion of your course, you will receive your digital certificate via email.

Between MIT's global reputation and the great content offered by the certificate program, I knew I had to add the Professional Certificate in Machine Learning & AI to my resume.

Rick Durham, Data Science and AI Architect, Americas Global Black Belt Team, Microsoft

HOW TO APPLY

1. Explore the Machine Learning & Artifical Intelligence Professional Certificate program at **professional.mit.edu/mlai**.
2. Determine which course options align most closely with your professional goals.
3. Submit an application for the program on our website.
4. Pay the non-refundable $325 application fee.
5. Watch your email—you will receive an admissions decision within two to three weeks from shortprograms@mit.edu.
6. Once accepted into the program, you will be invited to apply for individual courses.

PROFESSIONAL EDUCATION

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ABOUT MIT PROFESSIONAL EDUCATION

For 70 years, MIT Professional Education has been providing technical professionals worldwide a gateway to renowned MIT research, knowledge, and expertise, through advanced education programs designed specifically for them. In addition to industry-focused, two-to-five-day live virtual and on-campus courses through Short Programs, MIT Professional Education offers professionals the opportunity to take online and blended learning courses through Digital Plus Programs, attend courses abroad through International Programs, enroll in regular MIT academic courses through the Advanced Study Program, or attend Custom Programs designed specifically for their companies. For more information, please visit **professional.mit.edu**.