



Professional  
Education

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*Professional Certificate Program in*  
**Machins Learning &  
Artificial Intelligence**

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# 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

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## 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.

**73%**

of employers agree that hiring AI-skilled talent is a priority

Source:  
[Amazon Web Services](#)

**73%**

of American companies have already adopted AI in at least some areas of their business

Source: [PwC](#)

**47%**

of organizations are opting to significantly customize or develop their own generative AI models

Source: [McKinsey](#)

# Core Instructors



**Regina Barzilay**  
Distinguished Professor for AI and Health,  
Department of Electrical Engineering and  
Computer Science, MIT; AI Faculty Lead,  
Jameel Clinic



**Stefanie Jegelka**  
Associate Professor, Department of Electrical  
Engineering and Computer Science, MIT



**Tommi S. Jaakkola**  
Thomas Siebel Professor of Electrical  
Engineering and Computer Science; Principal  
Investigator, MIT Computer Science & Artificial  
Intelligence Lab



**Suvrit Sra**  
Ester and Harold E. Edgerton (1927) Career  
Development Associate Professor, Department  
of Electrical Engineering and Computer Science,  
MIT; Faculty Principal Investigator, Laboratory for  
Information & Decision Systems

# Lead Instructors



**Pulkit Agrawal**  
Associate Professor, Department of  
Electrical Engineering and Computer  
Science, MIT; Head, MIT Improbable AI Lab



**Devavrat Shah**  
Andrew (1956) and Erna Viterbi Professor,  
Department of Electrical Engineering and  
Computer Science, MIT; Principal Investigator,  
MIT Institute for Foundations of Data Science



**Brian Anthony**  
Principal Research Scientist, Department of  
Mechanical Engineering, MIT; Director, Master  
of Engineering in Manufacturing Program, MIT



**Julian Shun**  
Associate Professor, Department of Electrical  
Engineering and Computer Science, MIT; Principal  
Investigator, MIT Computer Science & Artificial  
Intelligence Lab



**Richard Braatz**  
Edwin R. Gilliland Professor of Chemical  
Engineering, MIT; Associate Faculty Director,  
Center for Biomedical Innovation, MIT



**Vivienne Sze**  
Professor, Department of Electrical Engineering  
and Computer Science, MIT; Principal  
Investigator, MIT Computer Science & Artificial  
Intelligence Lab



**Markus Buehler**  
Jerry McAfee (1940) Professor in Engineering,  
MIT; Professor of Civil and Environmental  
Engineering, MIT



**Antonio Torralba**  
Delta Electronics Professor of Electrical  
Engineering and Computer Science, MIT;  
Investigator, MIT Computer Science & Artificial  
Intelligence Lab

## 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



**Munther Dahleh**

William A. Coolidge Professor, Department of Electrical Engineering and Computer Science, MIT; Director, MIT Institute for Data, Systems, and Society



**John Tsitsiklis**

Clarence J. Lebel Professor, Department of Electrical Engineering and Computer Science, MIT; Principal Investigator, Laboratory for Information & Decision Systems



**Chuchu Fan**

Associate Professor, Department of Aeronautics and Astronautics, MIT; Principal Investigator, Laboratory for Information & Decision Systems



**Caroline Uhler**

Andrew (1956) and Erna Viterbi Professor of Engineering, Department of Electrical Engineering and Computer Science, MIT; Core Faculty, MIT Institute for Data, Systems, and Society



**Andrew Lawrie**

Associate Professor, Department of Mathematics, MIT



**Ben Waber**

Visiting Scientist, MIT Media Lab; Co-Founder, Humanyze



**David R. Martinez**

Laboratory Fellow, Cyber Security and Information Sciences Division, MIT Lincoln Laboratory



**Cathy Wu**

Thomas D. and Virginia W. Cabot Career Development Associate Professor of Civil and Environmental Engineering, MIT; Core Faculty, Institute for Data, Systems, and Society



**Wojciech Matusik**

Professor, Department of Electrical Engineering and Computer Science, MIT; Lead, Computational Design and Fabrication Group, MIT

# 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.

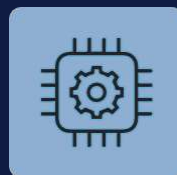
*Solve pressing challenges related to...*



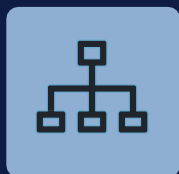
**Customization**



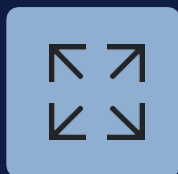
**Algorithmic Bias**



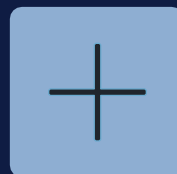
**Dirty Data**



**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 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 strategies you need to get ahead and stay ahead.

## 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

# 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  
Labs



Group  
Projects



Supplemental  
Resources

## Sample Learning Path

### Product Development Engineer

Foundations of Mathematics for Artificial Intelligence | 2 days  
Machine Learning for Big Data and Text Processing: Foundations | 2 days  
Machine Learning for Big Data and Text Processing: Advanced | 3 days  
Advanced Data Analytics for IIoT and Smart Manufacturing | 4 days  
Applied Data Science Program | 5 days

## Sample Learning Path

### Data Scientist

AI Strategies and Roadmap | 5 days  
Machine Learning for Big Data and Text Processing: Advanced | 3 days  
Designing Efficient Deep Learning Systems | 2 days  
Deep Learning for AI and Computer Vision | 5 days  
Advanced Reinforcement Learning | 2 days

# Core Courses and Recommended References

## Machine Learning for Big Data and Text Processing: Foundations

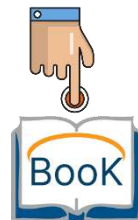
2 Days | Regina Barzilay, Tommi Jaakkola, Stefanie Jegelka, Suvrit Sra

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, Suvrit Sra

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



# Core Courses and Recommended References

## 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 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 organization's ability to produce large volumes of highly integrated, complex, and customized products.



## AI in Robotics: Learning Algorithms, Design and Safety

3 Days | Pulkit Agrawal, Chuchu Fan

Explore breakthrough advances in robot learning, safety certification, and testing—and acquire the advanced knowledge you need to create state-of-the-art generative AI applications.



## AI Strategies & Roadmap: Systems Engineering Approach to AI Development & 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 System Architecture and Large Language Model Applications

4 Days | David Martinez

Deepen your understanding of the end-to-end AI system architecture needed to design and deploy large language models (LLMs)—and implement an LLM application of your own.



## 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.



## AI for Scientific Discovery -

5 Days | Wojciech Matusik, Hanspeter Pfister

Master cutting-edge AI techniques to accelerate your scientific research, enhance data analysis, optimize experiment design, and uncover new insights across disciplines from biology to engineering.



# Core Courses and Recommended References



## 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.



## Foundations of Mathematics for Artificial Intelligence

2 Days | Suvrit Sra, Andrew Lawrie

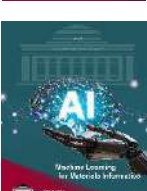
Take a deep dive into the mathematical foundations of AI and machine learning. You'll explore the math behind not only fundamental models and algorithms, but also recent innovations such as Transformers and Graph Neural Nets—and discover how these concepts relate to Python code and associated applications.



## 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 Materials Informatics

4 Days | Markus J. Buehler

Explore the cutting-edge of modern material informatics tools, including machine learning, data analysis and visualization, and molecular/multiscale modeling.



## Reinforcement Learning

3 Days | Pulkit Agrawal, Cathy Wu

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



## Workplace Analytics, AI, and Ethics

3 Days | Ben Waber

Explore the innovative management strategies, AI technologies, and workplace analytics tools that are transforming the way companies do business. Over three intensive days, you'll build an understanding of these breakthrough technologies and their ethical implications and learn how to use them to boost employee productivity, streamline workloads, and help your enterprise meet its most ambitious goals.



## Ethics of AI: Building Responsible AI, Machine Learning, and GPTs

3 Days | Michael Davies, Neil Thompson

In this dynamic three-day program, featuring a powerful blend of working sessions, case study exploration, and hands-on exercises, you'll gain the advanced knowledge you need to develop AI systems that are humane, ethical, and sustainable.



# Alumni Benefits

*As an MIT Professional Education Professional Certificate Program alum 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

Upon successful completion of this program, you will receive an official certificate presented during the final day.



# How to Apply

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1

Explore the Innovation & Technology Professional Certificate program at [professional.mit.edu/emlai](https://professional.mit.edu/emlai).

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

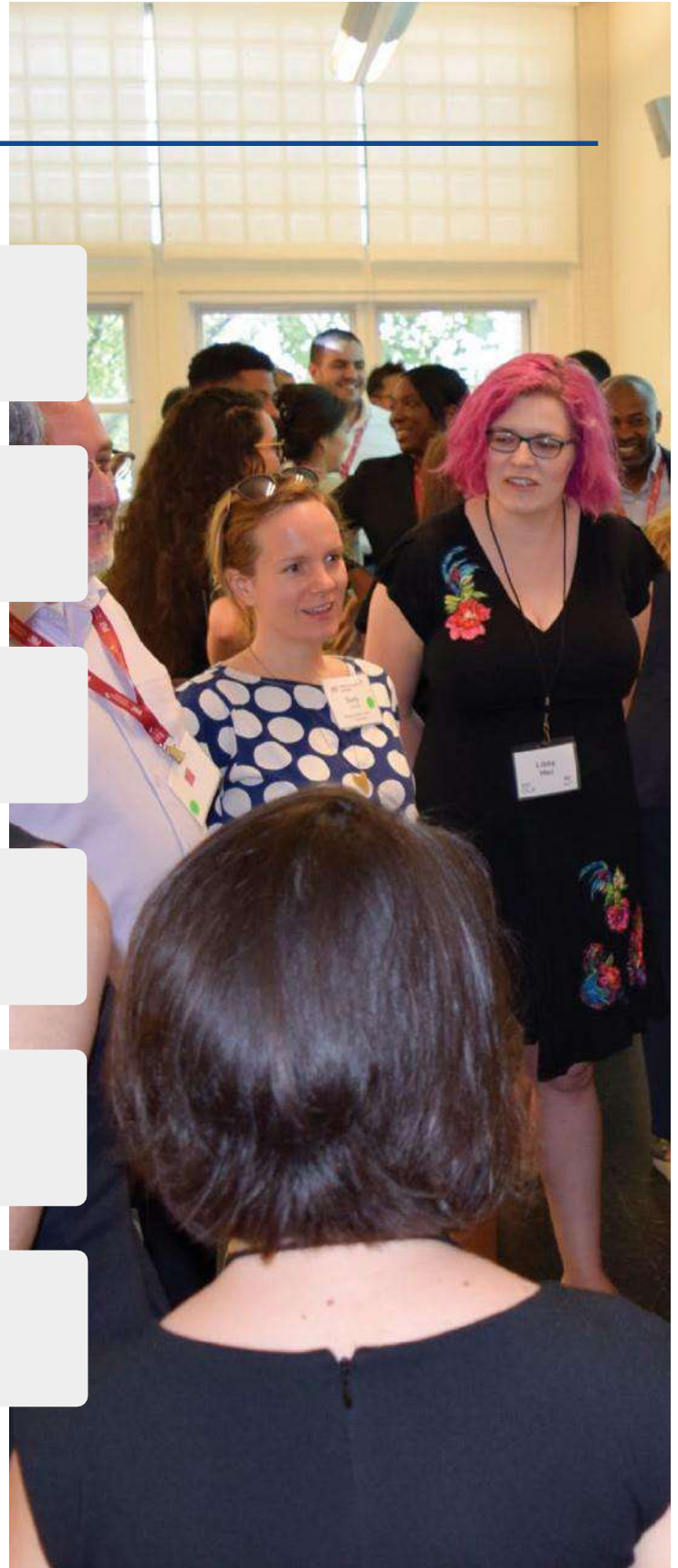
Watch your email—you will receive an admissions decision within two to three weeks from [professional.mit.edu/emlai](https://professional.mit.edu/emlai)

6

Once accepted into the program, you will be invited to **apply** for individual courses.

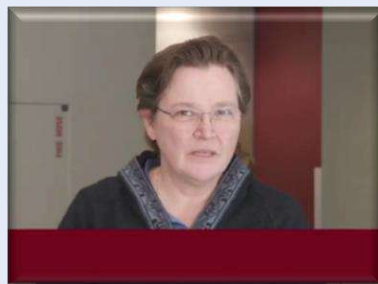
*Apply Today At*

[professional.mit.edu/emlai](https://professional.mit.edu/emlai)



# Testimonials from Participants and Instructors

Click on These videos to Read the Testimonials



# About MIT Professional Education

For more than 75 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 Corporate Programs designed specifically for their companies. For more information, please visit [professional.mit.edu](https://professional.mit.edu).



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