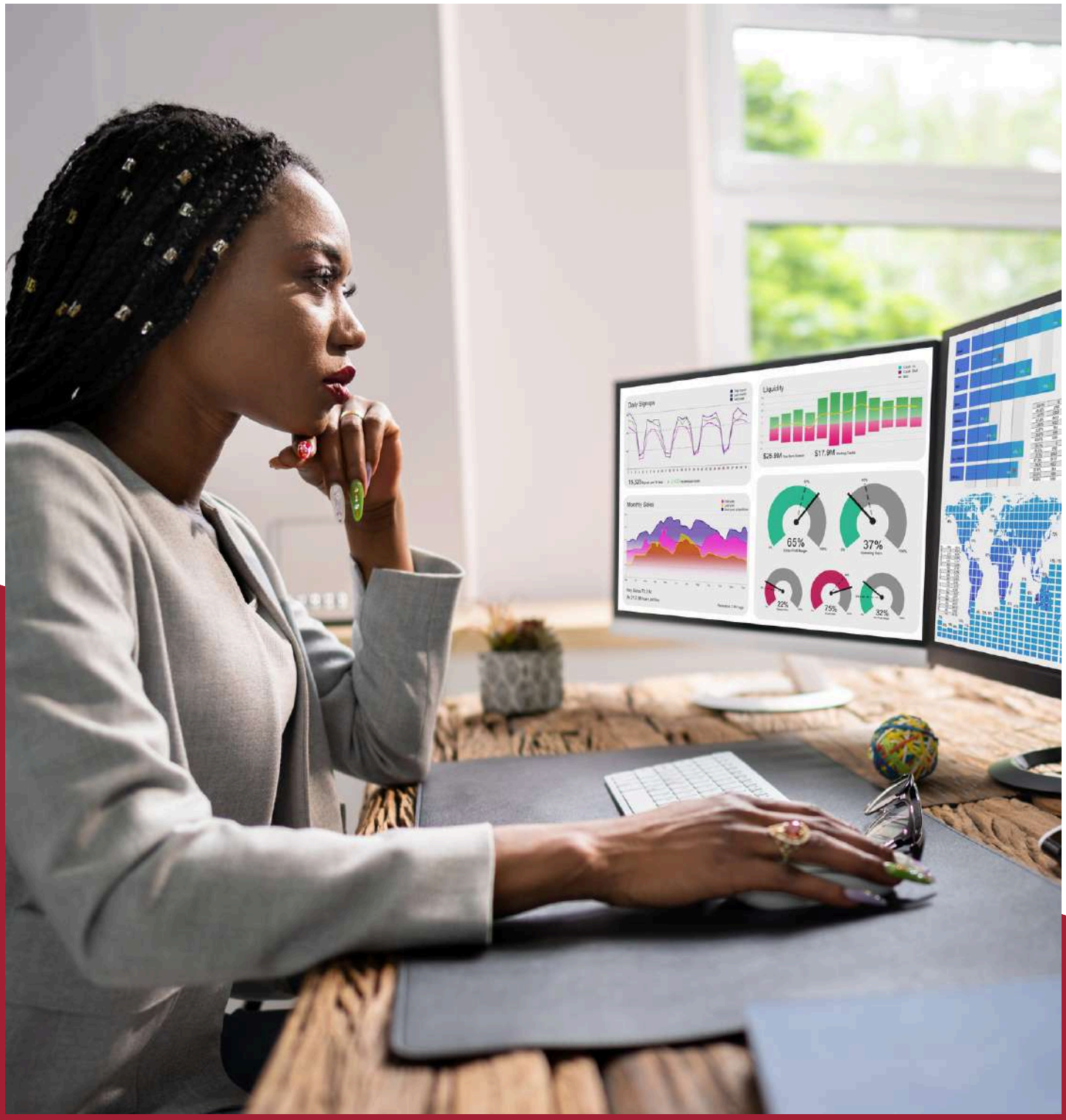


MIT xPRO

PROFESSIONAL CERTIFICATE IN DATA SCIENCE AND ANALYTICS

Advance your analytics expertise with AI, ML, and data science

Delivered in collaboration with EMERITUS

Overview

Data is not only pervasive in today's technologically savvy business environment—it's essential for improved efficiency, accelerated productivity, and maximum profitability. When leveraged, data gives organizations an edge and prepares them for long-term growth. To address this dynamic landscape, more organizations are adopting data-driven mindsets that encompass Artificial Intelligence (AI) and Machine Learning (ML) technologies.

Professionals who are adept in data science—as well as AI and ML—are leaders who can harness expertise to achieve optimum results for their organization. They are a unique breed—and a valued organizational asset. Recognizing the power of being data informed, executives are turning to these professionals to play a pivotal role in ensuring operational excellence for their organizations. According to the US Bureau of Labor Statistics, there will be approximately 11.5 million new data science jobs by 2026, but the number of available data science workers is not growing fast enough to meet the market needs.

Developed by expert faculty from MIT, the Professional Certificate in Data Science and Analytics program is designed to meet the growing demand for data professionals who possess the AI, ML, and technical proficiency to help their organizations identify optimal solutions to modern-day business challenges. If leveling up your skills is part of your career goal, this rigorous program can provide the knowledge you need to navigate the complexities of an in-demand field.

The program imparts a strong foundation in data science and analytics as well as the business acumen to apply models, analyze data, and communicate results. During the program, you will explore fundamentals of data science—along with foundational and advanced AI/ML concepts relevant for data professionals. You will expand your skill set and learn to apply cutting-edge tools such as Python and Google Colab to gain an understanding of how data science, ML, and AI can enhance decision making and translate technical results into actionable insights. See other stats below.

PRICE: USD 7,550

DURATION

6 months, online
15–20 hours per week

USD 120,000

Average salary for data scientists in the United States in 2022

(Source: Glassdoor)

Program Highlights

- Explore how to apply AI and ML applications to help organize and analyze data science to maximize organizational performance
- Close the knowledge gap when interacting with data scientists and data science teams
- Gain insights from MIT faculty experts who bring industry experience to the classroom
- Learn from real-world case studies that use applications of data science and applied analytics
- Demonstrate your learning in a final capstone project by developing a portfolio of application-based assignments relevant to industry-specific challenges
- Gain in-demand data analytical skills from dedicated career coaches and connect with hiring managers for potential career opportunities in a burgeoning field
- Receive one-on-one career support from Emeritus career coaches
- Earn an MIT xPRO certificate and 36 continuing education units [CEUs]

Program Experience

20+ hours
of prerecorded
MIT faculty videos

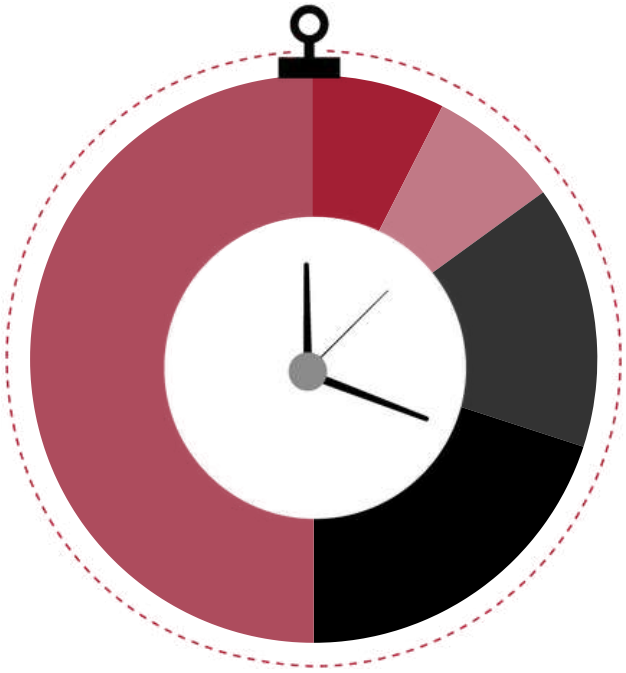
5+ hours
of live mentorship
and career
support*

8 hours
of optional career
development
activities*

19 career
development
video
lectures covering
30 career topics*

Sample Weekly Program Planner

Learners should expect to dedicate a minimum of **15–20 hours** per week to the program.



1 hour of recorded video lectures with faculty

Live interaction with program learning facilitators**

2 hours of self-study and practice exercises

2–3 hours of engaging group discussion with peers to exchange and generate ideas

5–8 hours of rigorous, graded assignments to apply and reinforce lecture material

*Services provided by Emeritus, a learning partner for this program.

**The schedule for live interactions are subject to change based on availability and will be confirmed once the program starts.

Learning Journey

LEARNING COMMUNITY

Your learning community will provide an interactive environment where you can learn with a group of like-minded individuals and build a global network of peers.

LEARNING FACILITATOR

Your learning facilitator will leverage their industry experience and expertise to guide you by holding live sessions, providing assignment feedback, and answering questions.

PROGRAM ADVISOR

Your program advisor will be your enrollment resource, answering any pre-program questions and easing your transition into the program.

CAREER COACH

Your career coach will help you successfully navigate your job search by assisting with goal setting, providing feedback on your cover letter, resume , and LinkedIn profile, and conducting mock interviews. They will be a source of up-to-the-minute information on hiring trends and help celebrate the next step in your career.

Who Is This Program For?

Whether you are a recent STEM graduate, an experienced data or business professional, or an entrepreneur, this program offers a singular opportunity to deepen your knowledge of data science and analytics as well as the foundational techniques of AI and ML, with faculty from the #1 technical school in the United States By developing the skills you need to put theory into practice, you will become proficient in the science of data-based decision making and prepare for opportunities in a rapidly growing field.

The **program will be especially valuable for data professionals** in engineering, finance, insurance, IT, or operations with coding experience who wish to develop a suite of advanced data analysis, AI, and ML skills they can apply in their day-to-day work to make sound business decisions that are informed by data.

- **Data professionals** in engineering, finance, insurance, IT, or operations with coding experience who wish to develop a suite of advanced data analysis skills they can apply in their day-to-day work to make sound business decisions
- **Professionals** working in data science-adjacent fields looking to build on their existing skill set to effectively lead or manage teams
- **Business professionals** in sales, marketing, IT, or operations looking to sharpen their decision-making ability by learning to model, execute, and analyze business data and, in turn, use their data science expertise to advance their careers
- **Recent graduates** with a STEM background who wish to build knowledge and skills in data science to prepare for a role as an analyst and start down a career path in the field

Prerequisites

Familiarity with Excel datasets, data visualization, and basic knowledge of Python coding are recommended.

Prepare for These Future Job Titles:

- Applications architect
- Business intelligence developer
- Data architect
- Data engineer
- Data analyst
- Machine learning engineer
- Machine learning specialist

Participants must be 18 or above to apply for this program.

Program Curriculum

This program is designed to provide firsthand experience with the strategic applications of data to modern-day business decisions. Using tools such as Python and Google Colab, you will learn the essentials of clustering and probability, linear and logistic regression, deep learning, and digital transformation in order to optimize the decision-making process for your organization. This program's high-level key takeaways include:

- Leverage data in order to optimize or improve decision making within an organization
- Use Python and Google Colab to train, organize, run, and analyze datasets and models that yield meaningful results
- Analyze and translate technical results into actionable insights for executives
- Develop a portfolio of modeling tools from simple regression all the way to deep learning, neural networks, and natural language processing that showcases the application of the skills required to use data for prediction, classification, and optimization in practical business contexts

Orientation

The first module is an orientation module. You will receive access to the learning platform on the program start date. There is no instruction, but you can familiarize yourself with the site. While all instruction in this program is prerecorded, program leaders will provide one live office hour per module.

Part 1

Fundamentals of Data Science

Key Takeaways

- Survey the essentials of data science, including data, models, processes, and interactions with expert operators.
- Understand how data analytics and machine learning can improve decision making, systems, and products.
- Explore how data science can be used to help businesses learn more about their customers.
- Learn how to apply, interpret, and explain key analytical frameworks.

Module 1: Introduction to Data Science

Module 2: Thinking about Risk and Uncertainty through Probability and Distributions

Module 3: Correlation

Module 4: Clustering

Module 5: Linear Regression Part 1

Module 6: Linear Regression Part 2

Module 7: Logistic Regression

Part 2

Foundations of Optimization

Key Takeaways

- Learn about collaborative filtering models and their design.
- Discover the role optimization plays across different industries.
- Learn how to construct a linear optimization model and interpret the results.
- Understand the importance of model valuation and how it is assessed.
- Explore the steps involved in creating a model.
- Understand the value of optimization and how it can be used for the good of humanity.

Module 8: Collaborative Filtering

Module 9: Linear Optimization Models

Module 10: Linear Optimization Models, Case Study

Module 11: Integer, Nonlinear, and Discrete Optimization Models

Module 12: Sponsored Internet Search Advertising, Case Study

Module 13: Large-Scale Optimization, UN World Food Programme

Part 3

Foundations of Machine Learning

Key Takeaways

- Learn to make predictions with classification and regression trees.
- Practice performing a CART analysis and interpreting the results.
- Explore ensemble learning and how it can be used to improve predictive performance.

Module 14: Nonlinear Models for Regression and Classification: Classification and Regression Trees

Module 15: Nonlinear Models for Regression and Classification: Ensemble Learning

Module 16: Fairness and Bias Issues in Data-Driven Predictions

Part 4

Advanced Machine Learning

Key Takeaways

- Explore deep learning and examine developments in the field.
- Learn about neural network applications, training deep neural networks, and using Keras and TensorFlow to code predictive applications.
- Discover how to apply transfer learning to represent images that a computer can understand.
- Examine the mechanics and capabilities of natural language processing.
- Learn how to use a transformer to increase the accuracy of a dataset.

Module 17: Neural Networks Part 1

Module 18: Neural Networks Part 2

Module 19: Neural Networks Part 3

Module 20: Natural Language Processing (NLP) Part 1

Module 21: Natural Language Processing (NLP) Part 2

Module 22: Interpretability and Causality in Models

Part 5

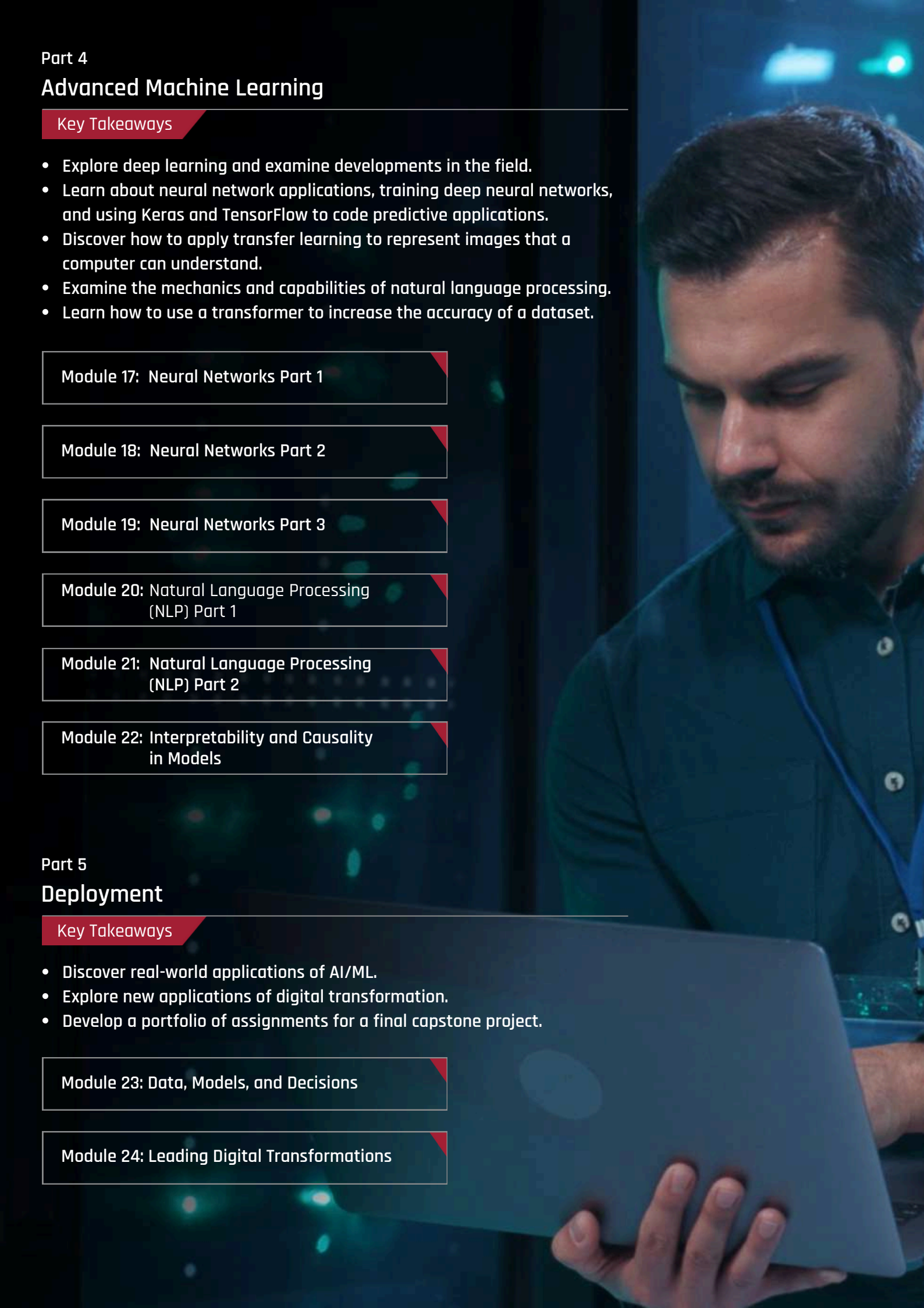
Deployment

Key Takeaways

- Discover real-world applications of AI/ML.
- Explore new applications of digital transformation.
- Develop a portfolio of assignments for a final capstone project.

Module 23: Data, Models, and Decisions

Module 24: Leading Digital Transformations



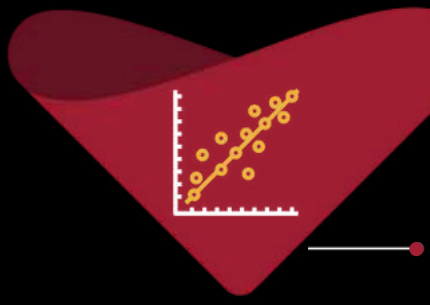
Case Studies and Examples

Throughout the program, each faculty member will present case studies they have personally helped solve using the principles and tools of data science, including:

Retail Management
Analyze how a Boston, MA retailer handled its response to the COVID-19 pandemic using the systems approach.

Filatoi Riuniti
Solve an optimization problem by developing a model and making recommendations on how this Italian yarn manufacturer should outsource production in order to maximize profits.

Facial Analysis Algorithms
Examine the ramifications of poorly designed models and discover how to detect, diagnose, and mitigate biases that can arise in model-based, data-driven decision making.



BlueBike
See how BlueBike used regression to predict demand. Then, build your own models with regression and use R2 to pick the optimal model.

Assignments and Activities

Assignments

Reinforce core concepts through weekly assignments. Build, solve, and assess models. Practice advanced data science techniques and communicate results that are clear and meaningful to stakeholders.

Discussions and Interactive Activities

Participate in hands-on activities, including practicing calculations, solving problems with regression and classification, and applying techniques such as data augmentation, transfer learning, and data filtering. Get firsthand experience with Google Colab and exchange ideas with learning peers from around the world.

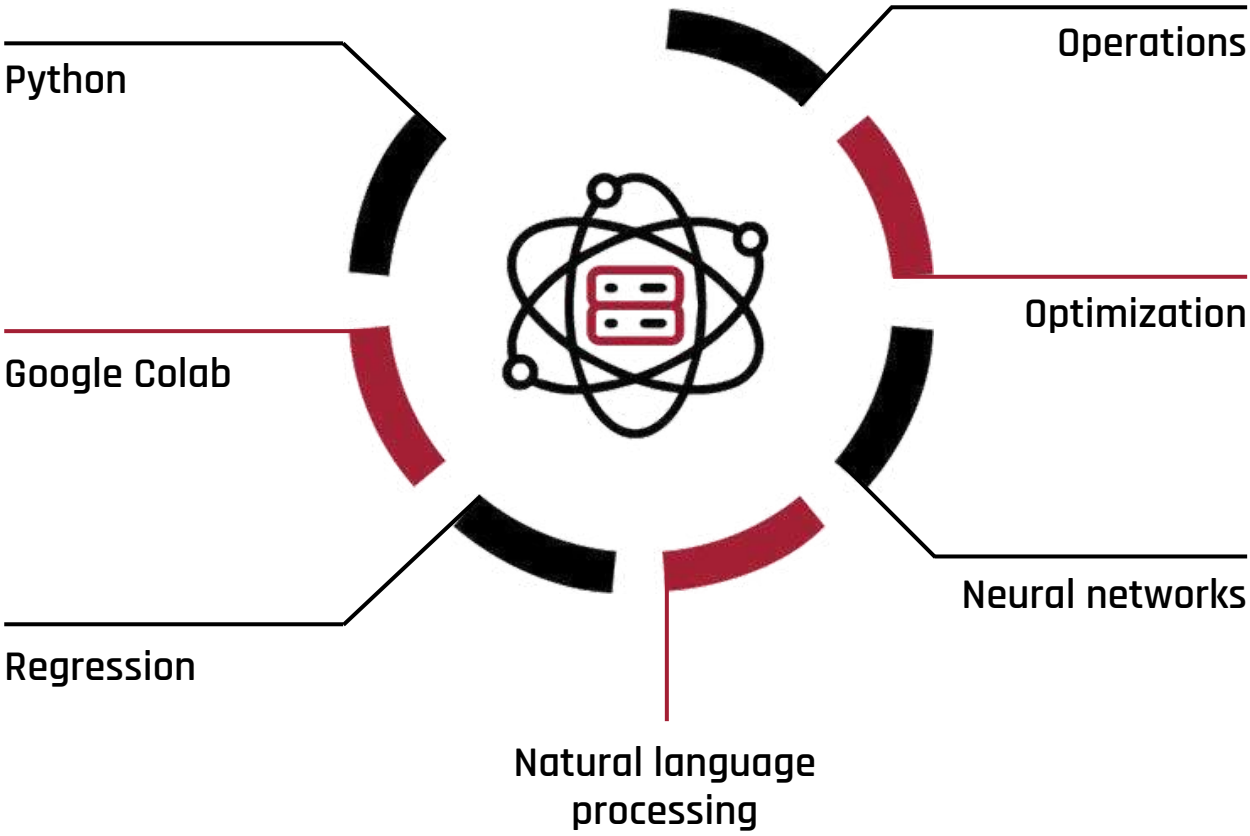
Experiential Projects

Final Capstone Project

Highlight your learnings in a final capstone project by building a portfolio of application-based assignments you have completed throughout the program. Your portfolio will demonstrate your proficiency in a range of data science skills required for model optimization and strategic decision thinking in organizational contexts.

Program Tools and Applications

Get hands-on experience with the latest data science tools and applications, including:



Faculty

Vivek Farias

Patrick J. McGovern (1959) Professor
Professor of Operations Management
MIT Sloan School of Management

Vivek is affiliated with the Operations Management group and the Operations Research Center (ORC) at MIT Sloan School of Management. His research focuses on the development of new methodologies for large-scale dynamic optimization under uncertainty and the application of these methodologies to the design of practical revenue management strategies across various industries, such as airlines, retail, and online advertising. He serves on the editorial boards of Management Science as a co-editor of Data Science, Operations Research, and the INFORMS Journal on Optimization.

Robert Freund

Theresa Seley Professor in Management Science
Professor of Operations Research
MIT Sloan School of Management

Robert's primary research interests are in convex optimization, computational complexity and related computational science, convex geometry, and large-scale nonlinear optimization and related mathematical systems. Robert has served as the co-editor of Mathematical Programming and as an associate editor of several optimization and operations research journals. He received the Longuet-Higgins Prize in computer vision (2007) and numerous MIT teaching and education awards in conjunction with an MBA core course and the textbook Data, Models, and Decisions: The Fundamentals of Management Science, co-authored with Dimitris Bertsimas. Robert received his BA in Mathematics from Princeton University and his MS and PhD in Operations Research from Stanford University.

Retsef Levi

J. Spencer Standish (1945) Professor of Operations Management
Faculty Leader, MIT Leaders for Global Operations (LGO)
MIT Sloan School of Management

Retsef's research focuses on the design of analytical data-driven decision support models and tools addressing complex business and system design decisions under uncertainty in areas such as health and health care management, supply chain, procurement and inventory management, revenue management, pricing optimization, and logistics. Retsef is the recipient of the NSF Faculty Early Career Development award, the 2008 INFORMS Optimization Prize for Young Researchers, the 2013 Daniel H. Wagner Prize, and the 2016 Harold W. Kuhn Award. Retsef received a BA in Mathematics from Tel Aviv University (Israel) in 2001 and a PhD in Operations Research from Cornell University in 2005.

Rama Ramakrishnan

Professor of the Practice
MIT Sloan School of Management

Rama's research and teaching interests focus on the application of data science and machine learning techniques to problems in industry and the creation of intelligent products and services created by the algorithmic use of data. Rama has over two decades of experience as a data science entrepreneur and tech executive. He has founded or served as a senior executive in four software organizations that have been acquired by technology giants, such as Oracle, Salesforce, and Demandware. He remains an active member of the start-up space as an advisor, angel investor, and board member.

Rama holds a B.Tech degree from the Indian Institute of Technology, Chennai and MS and PhD degrees from MIT.

Career Preparation and Guidance

This program offers a wide array of career support and guidance to help you develop your career path. These services are provided by Emeritus, our learning collaborator for this program, via the Emeritus Career Center (ECC). The primary goal is to help you build the skills needed to prepare for your career; however, we do not guarantee job placement. Learn more about all of the services and support available to you, including:

A SUPPORT TEAM YOU CAN RELY ON

Your support team includes program leaders and career coaches who will help you reach your learning goals and guide you through your job search.

CAREER PREPARATION SERVICES THAT GET YOU NOTICED

- Write noteworthy resumes and cover letters
- Create effective LinkedIn profiles
- Navigate your job search
- Prepare for interviews
- Craft your elevator pitch
- Negotiate your salary

Emeritus Career Center

Comprehensive career services. One convenient location.

The Emeritus Career Center is your one-stop shop for streamlined access to career-related services. As a participant in the program, you will gain access to the ECC and its related benefits for 12 months from the program start date. Benefits include:

COACHING
Schedule appointments with a career coach, and share details about new jobs and job search outcomes with them.

CAREER PROFILE
Create a profile for networking and to provide valuable information to our employer relations team and potential employers.

These services are provided by Emeritus, our learning collaborator for this program.

UNLOCK ADDITIONAL BENEFITS: SHARE YOUR RESUME

Upload your resume to the ECC for approval and take advantage of:

- A resume review and feedback from your career coach

Financing Options

We want to make sure that the Professional Certificate in Data Science and Analytics program is an affordable option for all. This is why we offer you many different ways to pay for the program.

Loan Partners (For US Residents)

Climb Credit	**Immediate repayment, interest-only repayment, and deferred payment options are available.**

- Visit the Climb Credit application portal
- Fill in your basic details and proceed to the loan section of the application
- Select your program from the Program dropdown
- Choose your preferred repayment option and enter financial information
- Agree to the disclosure and submit your application
- Once approved, sign the Master Promissory Note
- Our program advisors will contact you for a confirmation on your loan application
- After confirmation, we will certify your loan. You will receive a welcome email with login instructions from notifications@instructure.com within three business days

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Sallie Mae	**Fixed repayment, interest-only repayment, and deferred payment options are available.**

- Visit the Sallie Mae application portal
- Fill in your basic details and proceed to the loan application page
- At the time of loan application, please select "Undergraduate Students Training School" when prompted
- Choose from fixed repayment, interest-only repayment, and deferred payment options and submit your application
- Our program advisors will contact you for a confirmation on your loan application*
- After confirmation, we will certify your loan. You will receive a welcome email with login instructions from notifications@instructure.com within three business days

Flexible Payment Options (For All Countries)

- Choose to make your payment in two, three, or six installments for higher flexibility.
- Complete your application for "Professional Certificate in Data Science and Analytics" and enroll for the program.

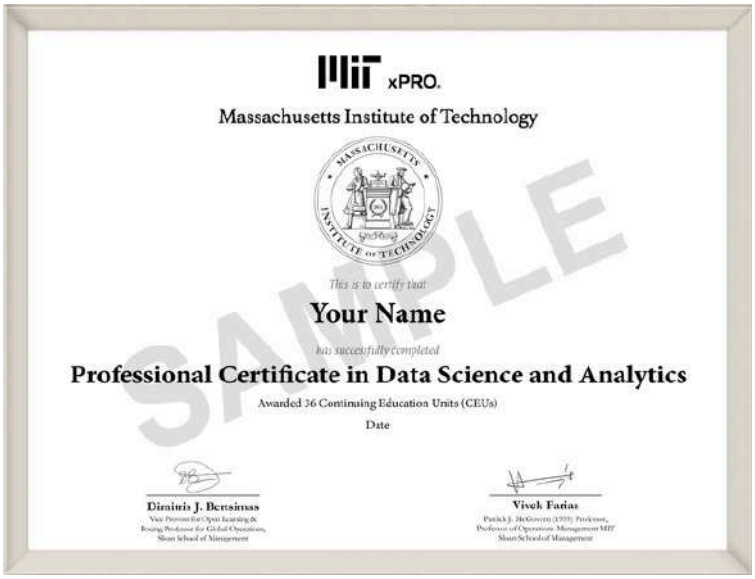
You can opt for any one of the financing options to cover up to the full cost of the program tuition. If you are considering financing your program through one of our partners, the enrollment process can only be completed with the assistance of your program advisor or by calling +1 315 640 4846.

*Due to processing time, the loan application should be submitted no later than four business days prior to the enrollment deadline.

Certificate

Get recognized. Upon successful completion of this program, MIT xPRO grants a certificate of completion to participants and 36 Continuing Education Units (CEUs). This program is graded as a pass or fail; participants must receive 75% to pass and obtain the certificate of completion.

After successful completion of the program, your verified digital certificate will be emailed to you, at no additional cost, with the name you used when registering for the program. All certificate images are for illustrative purposes only and may be subject to change at the discretion of MIT.



About MIT xPRO

MIT xPRO's online learning programs leverage vetted content from world-renowned experts to make learning accessible anytime, anywhere. Designed using cutting-edge research in the neuroscience of learning, MIT xPRO programs are application focused, helping professionals to build their skills on the job. To explore the full catalog of MIT xPRO programs, visit xpro.mit.edu.

About Emeritus

MIT xPRO is collaborating with online education provider Emeritus to deliver this online program through a dynamic, interactive, digital learning platform. This program leverages MIT xPRO's thought leadership in engineering and management practice developed over years of research, teaching, and practice.

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We attempt to respond to queries in 24 hours or less.
However, over weekends and holidays, our responses may take up to 72 hours.

MIT xPRO

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