MACHINE LEARNING WITH PYTHON FROM LINEAR MODELS TO DEEP LEARNING

FROM MIT IDSS

About MIT IDSS

The MIT Institute for Data, Systems, and Society (IDSS) is a multidisciplinary center advancing data science, machine learning, and societal systems. IDSS tackles complex challenges by integrating mathematics, statistics, computer science, engineering, and social sciences to create solutions with major human and economic impact. IDSS shapes the next generation of data and AI leaders, developing computational and analytical skills to solve high impact societal problems and drive global industry transformation.

About MIT

Founded in 1861, MIT (Massachusetts Institute of Technology) is one of the world's most influential institutions in science, engineering, and technological innovation. With a legacy of more than 160 years, MIT has continuously shaped global scientific progress and produced pioneers responsible for breakthroughs that define the modern world.

- **Global Recognition:** MIT is ranked #1 globally in the QS World University Rankings 2026 for the 12th consecutive year, reinforcing its unmatched leadership in research and academic excellence.
- **Future-Ready Learning:** IDSS programs emphasize real-world application through hands-on projects, cutting-edge tools, and collaboration with top researchers and industry experts.
- **Research & Innovation Ecosystem:** IDSS drives advancements in AI, network science, data-driven policy, sustainability, healthcare analytics, and intelligent systems, fast-tracking research into real-world solutions.

Why Choose This Course?

- **Prestigious Certification:** Receive a Certificate of Completion from edX , validating your expertise and boosting your professional credibility.
- **Future-Proof Career Gateway:** Launch a high-growth, future-ready career in Machine Learning with in-demand skills sought by top tech companies.
- **Advanced Curriculum:** Access cutting-edge Machine Learning content, interactive simulations, and practical evaluations, with a strong focus on real-world project implementation.
- **Case-Based Learning:** Engage in real-world, case-driven sessions that bridge the gap between theory and practical Machine Learning challenges.
- **World-Class Faculty:** Learn directly from MIT IDSS and gain insights from their research and industry experience.
- **Hands-On Projects:** Build end-to-end ML systems like digit recognition, NLP models, and recommendation engines to demonstrate your applied expertise.

What Will You Learn?

Master the core foundations of machine learning and build industry ready expertise through hands on projects, simulations, and real world case studies. Learn to work with data, build and optimize models, apply neural networks, and deploy ML solutions that solve high impact problems. Gain the skills to excel in ML driven roles by building a strong portfolio of practical projects, applying advanced techniques, and understanding the full lifecycle of modern AI systems. Become the kind of ML professional companies trust to build accurate, scalable,and innovative AI solutions.

Toolkit

Course Details

Course Duration	Time Commitment	Certification
7 Months	8-10 hours per week	From MITx

Course Curriculum

Module 1: Programming Foundations for AI & Data Science

- Introduction to Python
- Python syntax, variables, loops, functions
- Working with data structures (lists, dictionaries, tuples, sets)
- File handling
- Basics of computational thinking
- Mini-Project: Data Exploration with Python

Module 2: Mathematics & Statistics Essentials for Machine Learning

- Linear Algebra Foundations: vectors, matrices, operations
- Calculus for ML: functions, gradients, derivatives
- Probability Theory: random variables, distribution.
- Statistics Essentials: mean, variance, estimation, confidence intervals
- Intro to Optimization
- Mini-Project: Build a Gradient Descent Simulator

Module 3: Data Handling, Visualization & Practical Tools

- Numpy, Pandas, Matplotlib & Seaborn
- Data cleaning, preprocessing & transformation
- Working with real datasets
- Feature engineering fundamentals
- Exploratory Data Analysis (EDA)
- Mini-Project: Real-world Data Analysis Report

Module 4: Foundations of Classical Machine Learning

- Understanding supervised vs. unsupervised learning
- Introduction to ML workflow
- Core ML algorithms: Linear Regression | Logistic Regression | Decision Trees | KNN
  K-Means / Clustering
- Model evaluation metrics
- Mini-Project: Build Your First ML Model

MIT MICROMASTERS PROGRAM (4 MODULES)

Module 1: Foundations of Machine Learning

- Environment Setup + Numpy Exercises
- Tutorial on Common Scientific Packages
- Introduction to Machine Learning
- Linear Classifier & Perceptron
- Hinge Loss, Margins & Regularization
- Linear Classification & Generalization
- Linear Regression
- Nonlinear Classification
- Recommender Systems
- Project 1: Automatic Review Analyzer

Module 2: Deep Learning & Neural Networks

- Project 2 (Part 1): Digit Recognition
- Introduction to Feedforward Neural Network
- Backpropagation & Stochastic Gradient Descent
- Recurrent Neural Networks (RNNs): Part 1 & 2
- Convolutional Neural Networks (CNNs)
- Project 3 (Part 2): Digit Recognition with Neural Networks

Module 3: Unsupervised Learning & Probabilistic Modeling

- Clustering (K-Means, Hierarchical)
- Advanced Clustering Techniques
- Generative Models
- Mixture Models
- Expectation-Maximization (EM Algorithm)
- Project 4: Collaborative Filtering using Gaussian Mixtures

Module 4: Reinforcement Learning & NLP Applications

- Reinforcement Learning (RL) Fundamentals
- RL Algorithms & Exploration Strategies
- Applications in Natural Language Processing
- Sequence models & text-based tasks
- Project 5: Text-Based Game (Reinforcement Learning Project)

Instructor & Industry Experts

Prof.Regina Barzilay
Professor of Electrical Engineering and Computer Science, MIT

Regina Barzilay is a Delta Electronics Professor in the Department of Electrical Engineering and Computer Science and a member of the Computer Science and Artificial Intelligence Laboratory at the Massachusetts Institute of Technology. Her research interests are in natural language processing, applications of deep learning to chemistry and oncology. She is a recipient of various awards including the NSF Career Award, the MIT Technology Review TR-35 Award, Microsoft Faculty Fellowship and several Best Paper Awards at NAACL and ACL. In 2017, she received a MacArthur fellowship, an ACL fellowship and an AAAI fellowship. She received her Ph.D. in Computer.

Dr. Harkeerat Kaur
Assistant Professor, Computer Science and Engineering, IIT Jammu

Dr. Harkeerat Kaur teaches and conducts research in areas such as design and analysis of algorithms, computer vision, image processing, and computer architecture. She completed her Ph.D. from PDPM Indian Institute of Information Technology, Design and Manufacturing, Jabalpur, and has authored multiple research publications with notable citations in her fields of expertise. Dr. Kaur's work spans both theoretical and applied aspects of computer science, contributing to the academic and research environment at IIT Jammu.

Sriram Desai
Senior Software Engineer, Paypal (Singapore)

Sriram Desai is a seasoned software engineer with experience at leading global technology companies, including roles at PayPal and other major tech firms, bringing strong expertise in backend and systems engineering. He holds an advanced degree in computing from the Georgia Institute of Technology and has built a broad professional network with international work experience. Known for his technical leadership and contributions to high-impact software projects, Sriram blends deep engineering skills with practical industry insight.

Admission Process

Clear Qualifier Test
You must pass the exam to confirm your seat for the program.

Complete Counselling
Only shortlisted candidates go through the counselling process.

Start Learning
Learn from India's top educators and stand out from the crowd.

Fees Structure

Qualifier Test Fee (Non-Refundable)	**₹99**

	Option 1	Option 2
	Upfront	**EMI** (Through our NBFC partners)
Secure Seat Fee (Non-Refundable)	₹4,000	₹4,000
Remaining Course Fee (Non-Refundable)	₹56,000	₹7,156 x 9 months
Total Program Fee	₹60,000*	₹68,404*

*GST at 18% extra, as applicable

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