ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

FROM VISHLESAN i-HUB, IIT PATNA

PROGRAM OVERVIEW

The Foundations in AI and Machine Learning Program is designed to accommodate learners fromdiverse academic and professional backgrounds. Through structured coursework and hands-onprojects, students will build a solid understanding of artificial intelligence (AI) and machine learning(ML) techniques—starting from foundational mathematics and basic programming, progressingthrough core machine learning models, and culminating in cutting-edge AI applications. By the endof the program, participants will be able to confidently implement AI/ML solutions, interpret results,and address real-world problems across various domains.

Skills you will gain:

- Python Programming
- Data Cleaning and Preprocessing
- Exploratory Data Analysis (EDA)
- Model Evaluation and Validation
- Regression and Classification Techniques
- Agentic AI Development
- Neural Networks and Deep Learning
- Natural Language Processing (NLP) and Transformers
- Computer Vision & Image Processing
- Unsupervised Learning (Clustering, Dimensionality Reduction)
- Gen AI Engineering

WHY CHOOSE THIS COURSE?

- No coding background requiredabeginner-friendly entry into AI/ML
- Taught by IIT faculty – learn from top academic experts
- Hands-on projects – apply concepts to real-world problems
- Industry-relevant curriculum – covers latest tools, trends, and techniques
- Career-focused outcomes – prepares you for high-demand AI/ML roles

COURSE SUMMARY

Courses
3

Course Duration
36 Weeks (12 + 12 + 12)

Evaluations (Per Course)
2 Quizzes | 1 Mid-Semester | 1 End-Semester

Break Duration
4 Weeks (2 + 2)

Weekly Commitment
10 Hours

COURSE DETAILS

Code	Course
AIM101	Introduction to AI and ML for Beginners
AIM201	Core Machine Learning Techniques and Practices
AIM301	Advanced AI: Deep Learning, NLP, and Emerging Trends

COURSE DESCRIPTIONS

AIM101

Introduction to AI and ML for Beginners

Geared toward students with minimal or no coding background, this course lays the groundwork for artificial intelligence and machine learning. The curriculum covers essential mathematical concepts, basic programming in Python, introductory data manipulation, and an overview of AI/ML applications. By the end, students will be comfortable writing simple Python scripts, performing basic data analysis, and understanding how AI/ML fits into various real-world scenarios.

AIM201

Core Machine Learning Techniques and Practices

After establishing the basics, this course dives deeper into machine learning algorithms. Students will work with both traditional and modern approaches—such as regression, classification, and clustering—while honing their skills in model evaluation, data preprocessing, and ethical considerations. By the end of AIM201, learners will be able to build, tune, and interpret effective ML models for diverse datasets, preparing them for more advanced AI techniques.

AIM301

Advanced AI: Deep Learning, NLP, and Emerging Trends

Building on the foundations from AIM101 and AIM201, this course explores cutting-edge AI topics like deep learning, natural language processing, and computer vision. Students will learn how to leverage advanced models (e.g., convolutional neural networks, transformers) and deploy them at scale. Throughout AIM301, participants will also stay current with emerging AI trends, addressing real-world complexities such as big data, reinforcement learning, and AI ethics in depth.

COURSE SYLLABUS

AIM101: Introduction to AI and ML for Beginners

1. **Fundamentals of Computing and Python Basics**
   Introduction to programming concepts, setting up a development environment (e.g., Jupyter Notebooks).
2. **Essential Mathematics for AI/ML**
   Basic linear algebra (vectors, matrices), basic calculus (derivatives), overview of probability and statistics.
3. **Data Representation and Visualization**
   Pandas for data manipulation, Matplotlib for basic plotting, effective data storytelling.
4. **Core AI Concepts and History**
   Defining AI, early developments, key breakthroughs (symbolic AI to machine learning).
5. **Introduction to Machine Learning**
   Difference between AI and ML, supervised vs. unsupervised learning, simple examples in Python.
6. **Data Collection and Cleaning**
   Accessing open datasets/APIs, dealing with missing values, data wrangling best practices.
7. **Exploratory Data Analysis (EDA)**
   Summarizing data, identifying patterns, basic statistical tests.
8. **Basic Regression and Classification**
   Linear regression concepts, nearest neighbor classification, hands-on exercises.
9. **Evaluation Metrics and Model Validation**
   Train/test split, accuracy, RMSE, cross-validation concepts.
10. **Intro to Ethical AI**
    Bias in data, responsible AI usage, basic guidelines for respectful data handling.
11. **Case Studies**
    Understanding real-world uses of AI (e.g., healthcare, finance, education).

AIM201: Core Machine Learning Techniques and Practices

1. **Recap of Machine Learning Workflow**
   Data preprocessing, feature engineering, model training, evaluation, and deployment.
2. **Regression Techniques**
   Multiple linear regression, polynomial regression, regularization (Ridge, Lasso).
3. **Classification Algorithms**
   Logistic regression, decision trees, ensemble methods (random forests, gradient boosting).
4. **Advanced Unsupervised Learning**
   Clustering with K-Means/DBSCAN, dimensionality reduction (PCA), anomaly detection.
5. **Neural Network Fundamentals**
   Perceptrons, activation functions, feed-forward networks, backpropagation.
6. **Model Evaluation and Metrics**
   Precision, recall, F1-score, confusion matrix, AUC-ROC.
7. **Techniques for Overcoming Overfitting**
   Regularization, dropout, data augmentation, and early stopping.
8. **Hyperparameter Tuning**
   Grid search, random search, introduction to Bayesian optimization.
9. **Practical ML Pipeline Development**
   Building end-to-end ML pipelines, MLOps basics, version control and reproducibility.
10. **Ethical and Societal Dimensions of ML**
    Fairness, transparency, accountability, and building trust in ML systems.
11. **Hands-on Project**
    A mid-level project applying machine learning on a real-world dataset.

AIM301: Advanced AI: Deep Learning, NLP, and Emerging Trend

1. **Deep Learning Architectures**
   Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), sequence models.
2. **Advanced Neural Network Topics**
   Batch normalization, residual networks, transfer learning techniques.
3. **Natural Language Processing (NLP)**
   Text preprocessing, word embeddings (Word2Vec, GloVe), sequence-to-sequence models.
4. **Transformers and Language Models**
   BERT, GPT, attention mechanisms, fine-tuning for tasks like text classification and summarization.
5. **Computer Vision Beyond Basics**
   Object detection (SSD, YOLO), image segmentation, pretrained models for image tasks.
6. **Reinforcement Learning Foundations**
   Markov Decision Processes (MDPs), Q-learning, policy gradients.
7. **Generative Models**
   GANs (Generative Adversarial Networks), autoencoders and their applications.
8. **Large-Scale Data Processing and Deployment**
   Introduction to distributed computing (Spark), cloud-based AI platforms, containerization (Docker).
9. **AutoML and Advanced Hyperparameter Tuning**
   Automated feature engineering, advanced search strategies for optimal configurations.
10. **Frontiers of AI and Research Directions**
    Ethical AI at scale, fairness in large models, AI governance, current trends in AI research.
11. **Capstone Project / Research Work**
    Students integrate multiple advanced techniques to develop a robust AI solution.

MEET OUR MENTORS

Dr. Sriparna Saha (Guest Lecturer)
Dept. of Computer Science and Engineering
Associate Professor @ IIT Patna

Gaurav Kandel
Data Scientist at FinBox

Sriram Desai
Software Engineer at ByteDance

ADMISSON PROCESS

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

Complete Onboarding
Only shortlisted candidates go through the onboarding 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)	₹51,085	₹6,527 x 9 months
Total Program Fee	₹55,085	₹62,743

*GST at 18% extra, as applicable

For More Queries

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