



**Course Name:** AI & Machine Learning Program

### **Course Overview**

AI and Machine Learning professionals are in high demand, as they combine programming, mathematics, and intelligent systems to build automated solutions that drive business innovation. This program covers:

- Python & Math Foundations: Python programming essentials, linear algebra, calculus, probability, and statistics for ML.
- Data Analysis & Visualization: NumPy, Pandas, data cleaning, statistical analysis, and visualization with Matplotlib/Seaborn.
- Core Machine Learning: Supervised/unsupervised learning, regression, classification, ensemble methods, model evaluation, and hyperparameter tuning.
- Deep Learning & Neural Networks: Building neural networks with TensorFlow/PyTorch, CNNs for computer vision, and image classification.
- Natural Language Processing: Text preprocessing, sentiment analysis, text classification, and transformer models using Hugging Face.
- Model Deployment & Cloud: API development with Flask, UI creation with Streamlit, AWS (EC2, S3), and version control with Git/GitHub.
- End-to-End ML Pipeline: Data collection to model training, optimization, deployment, and production-ready solutions.
- Capstone Project: A comprehensive real-world project—recommendation systems, AI chatbots, fraud detection, or predictive analytics—applying all learned concepts end-to-end.

### **Course Type**

Mode: Online Live Instructor-led Training

### **Course Objectives**

1. Build Strong Foundations: Master Python programming, mathematical concepts (linear algebra, calculus, probability), and version control with Git/GitHub.
2. Apply Data Analysis & Statistics: Execute data cleaning, exploratory analysis, statistical methods, and create insightful visualizations using Pandas, NumPy, Matplotlib, and Seaborn.
3. Master Core Machine Learning: Implement supervised and unsupervised algorithms including regression, classification, decision trees, ensemble methods, and model optimization techniques.
4. Excel in Deep Learning: Construct neural networks using TensorFlow/PyTorch, develop CNNs for computer vision, and build image classification systems.



5. Leverage Natural Language Processing: Apply text preprocessing, sentiment analysis, text classification, and utilize transformer models for intelligent language solutions.
6. Engineer Production-Ready AI: Deploy ML models via Flask APIs, Streamlit interfaces, cloud platforms (AWS EC2, S3), and implement end-to-end ML pipelines.
7. Handle Real-World Challenges: Work with imbalanced datasets, perform feature engineering, hyperparameter tuning, and cross-validation for robust model performance.
8. Demonstrate Full Lifecycle Skills: Design, develop, and deploy a comprehensive capstone project—fraud detection, chatbot, recommendation system, or predictive analytics—spanning data collection to production deployment.

### **Duration**

200 Hours

### **Requirements**

- A computer (Windows, macOS, or Linux) with sufficient RAM (at least 8 GB recommended, 16 GB preferred for deep learning tasks)
- Reliable internet connection for online resources, cloud deployments, and collaborative tools
- Ability and willingness to install software (Python, Jupyter Notebook, TensorFlow/PyTorch, Git, IDEs, etc.)
- Basic mathematics understanding (high school level algebra)—advanced concepts will be taught from scratch
- No prior programming experience required—complete beginners are welcome

### **Pre-requisites**

- Basic knowledge of mathematics (high school algebra)—linear algebra, calculus, and probability will be covered in the program
- No prior programming experience required—Python fundamentals are taught from the ground up
- Willingness to learn and practice coding regularly
- Basic computer literacy and familiarity with file management
- Understanding of fundamental statistics is helpful but not mandatory—all concepts are explained step-by-step.

### **Target Audience**

- Beginners or early-career professionals targeting AI/ML engineering and data science roles



- Software developers and programmers aiming to pivot into artificial intelligence and machine learning fields
- Recent graduates (B.Tech, MCA, M.Sc) seeking specialized AI/ML skills for better career opportunities
- Data analysts and business analysts wanting to advance into predictive modeling and intelligent automation
- IT professionals looking to upskill in emerging technologies like deep learning, NLP, and computer vision
- Career changers from any domain interested in building AI-powered solutions and automated systems
- Entrepreneurs and startup enthusiasts wanting to integrate AI/ML capabilities into their products

### **Career and Future Prospects**

- AI/ML Engineer
- Machine Learning Developer
- Data Scientist (with AI/ML specialization)
- Deep Learning Engineer
- NLP Engineer / Computer Vision Engineer
- AI Application Developer
- MLOps Engineer
- Research Scientist (AI/ML domain)
- Business Intelligence Analyst (with AI-powered analytics)

With experience, AI/ML professionals often become senior engineers, AI architects, team leads, or product managers, driving innovation in intelligent automation, predictive systems, and cutting-edge AI solutions across industries like healthcare, finance, e-commerce, and technology startups.

### **Designation/Title**

- Junior AI/ML Engineer / Associate ML Developer
- Machine Learning Engineer
- AI Engineer / AI Developer
- Senior Machine Learning Engineer
- Deep Learning Engineer



- NLP Engineer / Computer Vision Engineer
- AI Research Engineer
- MLOps Engineer
- Data Scientist (AI/ML specialization)
- Applied AI Scientist (focus on R&D and innovation)

### **Projects**

Here are the projects for the AI & Machine Learning Program:

Monthly Projects:

Month 1: Foundations Project

- Student Performance Analyzer
  - Predict student pass/fail using basic rule-based logic
  - Learn Python programming fundamentals
  - Introduce basic data manipulation concepts

Month 2: Data Analysis Project

- Sales Data Analysis Dashboard
  - Analyze sales data using Pandas
  - Create visualizations with Matplotlib/Seaborn
  - Perform descriptive statistical analysis
  - Generate insights from business data

Month 3: Machine Learning Project

- House Price Prediction System
  - Implement linear and multiple regression
  - Perform feature engineering
  - Apply model evaluation techniques (MAE, MSE, R<sup>2</sup> Score)
  - Predict house prices based on multiple features

Month 4: Advanced ML Project

- Credit Card Fraud Detection System



- Apply classification algorithms
- Handle imbalanced datasets
- Implement ensemble learning techniques
- Build a robust fraud detection model

#### Month 5: AI & Deep Learning Projects

##### 1. Image Classification System

- Develop CNN-based image recognition
- Use TensorFlow/PyTorch
- Classify images across multiple categories

##### 2. AI Chatbot or Sentiment Analyzer

- Implement NLP techniques
- Build text classification model
- Create interactive AI application

#### Month 6: Capstone Project Options

- Recommendation System
- Resume Screening AI
- Stock Price Predictor
- Healthcare Chatbot

#### Key Project Characteristics:

- Hands-on, practical approach
- Real-world problem-solving
- End-to-end implementation
- Industry-relevant technologies
- Portfolio-building experience

#### Salary

India

Entry Level: ₹4-8 LPA



Mid-Level: ₹8-15 LPA

Senior Level: ₹15-30 LPA

Expert/Lead Level: ₹30-50 LPA

USA

Entry Level: \$80,000 – \$120,000

Mid-Level: \$120,000 – \$180,000

Senior Level: \$180,000 – \$250,000

Expert/Lead Level: \$250,000 – \$350,000

Canada

Entry Level: CAD 70,000 – \$100,000

Mid-Level: CAD \$100,000 – \$150,000

Senior Level: CAD \$150,000 – \$220,000

Expert/Lead Level: CAD \$220,000 – \$300,000

UK

Entry Level: £35,000 – £55,000

Mid-Level: £55,000 – £85,000

Senior Level: £85,000 – £120,000

Expert/Lead Level: £120,000 – £180,000

Australia

Entry Level: AUD \$70,000 – \$100,000

Mid-Level: AUD \$100,000 – \$150,000

Senior Level: AUD \$150,000 – \$220,000

Expert/Lead Level: AUD \$220,000 – \$300,000

## Features

– Comprehensive Curriculum:

- End-to-end learning from Python foundations to advanced AI/ML techniques
- Covers deep learning, neural networks, NLP, computer vision



- Strong emphasis on mathematical foundations and practical implementations
- Hands-On Practical Approach:
  - Real-world projects across domains like fraud detection, image classification
  - Live coding sessions and practical assignments
  - Industry-relevant case studies and problem-solving scenarios
  - Build comprehensive portfolio during the program
- Cutting-Edge Technology Stack:
  - Mastery of Python ecosystem
  - Advanced frameworks: TensorFlow, PyTorch
  - Cloud platforms: AWS
  - Deployment tools: Flask, Streamlit
  - Version control: Git/GitHub
  - MLOps and production-level deployment techniques
- Industry-Aligned Learning:
  - Mentor-led training by AI/ML professionals
  - Latest industry trends and technological advancements
  - Practical skills directly applicable in real-world scenarios
  - Exposure to current AI/ML challenges and solutions
- Career & Placement Support:
  - Resume building workshops
  - Mock interview preparation
  - GitHub portfolio development
  - Placement assistance
  - Network with industry professionals
  - Capstone project guidance

### **Benefits**

- Comprehensive Skill Transformation:



- Master end-to-end AI/ML ecosystem from foundational to advanced levels
- Develop expertise spanning Python, machine learning, deep learning, and deployment
- Transform from beginner to industry-ready AI professional
- Industry-Grade Practical Expertise:
  - Real-world projects mimicking actual industry challenges
  - Hands-on experience with cutting-edge tools and frameworks
  - Learn techniques used by leading tech companies and innovative startups
  - Build solutions that solve practical business problems
- Career Acceleration Pathway:
  - Multiple career entry points in AI/ML domain
  - Opportunities in tech, finance, healthcare, e-commerce sectors
  - Potential roles: AI Engineer, ML Developer, Data Scientist
  - Strong foundation for future specializations in NLP, computer vision
- Professional Portfolio Development:
  - Multiple project-based certifications
  - GitHub-ready portfolio
  - Capstone project demonstrating comprehensive AI/ML skills
  - Professional documentation and presentation techniques
- Future-Ready Technological Competence:
  - Learn emerging AI/ML technologies
  - Understand latest industry trends
  - Adaptable skills applicable across multiple domains
  - Continuous learning approach integrated into curriculum
- Ethical and Responsible AI Learning:
  - Understanding of AI ethics and responsible development
  - Awareness of data privacy standards



- Compliance with global technological guidelines
- Develop conscientious approach to AI solution design

### **The Results**

The program transforms learners into skilled AI/ML professionals, equipping them with cutting-edge technological expertise across machine learning, deep learning, and deployment techniques.

Graduates gain the ability to develop intelligent solutions that drive business innovation, solve complex problems, and create significant value across industries like tech, finance, and healthcare.

By mastering industry-standard tools and frameworks, participants unlock high-paying career opportunities with potential salary increases of 50-100% and rapid career progression.

The comprehensive, project-based curriculum builds a robust professional portfolio, providing a competitive edge in the rapidly evolving world of artificial intelligence and machine learning.



## Syllabus

### Month 1: Python + Math Foundations for AI/ML

#### Module 1. Introduction to AI & ML

##### Concepts:

- What is Artificial Intelligence
- What is Machine Learning
- Difference between AI, ML, Deep Learning
- Types of ML:
- Supervised
- Unsupervised
- Reinforcement Learning

##### Real-world examples:

- Netflix recommendation (ML)
- Self-driving cars (AI)
- Chatbots (AI + NLP)

#### Module 2. Python for AI/ML

##### Topics:

- Variables, Data Types
- Lists, Dictionaries, Sets
- Loops and Conditions
- Functions
- File Handling

##### Practical:

- Build simple programs (calculator, grading system)

#### Module 3. Mathematics for ML

##### Topics:



- Linear Algebra:
- Vectors
- Matrices
- Basic Calculus:  
Derivatives (concept only)
- Probability Basics:
- Events
- Conditional probability

Real-world:

- Matrix = image data
- Probability = prediction chances

Mini Project:

- Student Performance Analyzer (predict pass/fail using rules)

## **Month 2: Data Analysis + Statistics**

Module 1. NumPy

Topics:

- Arrays
- Mathematical operations
- Broadcasting

Module 2. Pandas

Topics:

- DataFrames
- Reading CSV/Excel
- Filtering, Sorting
- GroupBy

Module 3. Data Cleaning

Topics:



- Missing values
- Outliers
- Data formatting

#### Module 4. Statistics

##### Topics:

- Mean, Median, Mode
- Variance, Standard Deviation
- Normal Distribution

#### Module 5. Data Visualization

##### Tools:

- Matplotlib
- Seaborn

##### Charts:

- Bar, Line, Histogram, Heatmap

##### Project:

- Sales Data Analysis Dashboard

### **Month 3: Core Machine Learning**

#### Module 1. ML Workflow

##### Topics:

- Data collection
- Data preprocessing
- Train-test split
- Model training
- Prediction

#### Module 2. Regression Algorithms

##### Topics:

- Linear Regression



- Multiple Regression

Working:

- Model finds relationship between input and output

Example:

- Predict house price using size and location

Module 3. Model Evaluation

Topics:

- MAE
- MSE
- RMSE
- $R^2$  Score

Module 4. Feature Engineering

Topics:

- Feature scaling
- Encoding categorical data

Project:

- House Price Prediction System

**Month 4: Advanced Machine Learning**

Module 1. Classification Algorithms

Topics:

- Logistic Regression
- K-Nearest Neighbors
- Support Vector Machine

Real-world:

- Spam detection (spam or not spam)

Module 2. Decision Trees

Topics:



- Tree structure
- Splitting criteria

### Module 3. Ensemble Learning

Topics:

- Random Forest
- Gradient Boosting

### Module 4. Model Optimization

Topics:

- Cross-validation
- Hyperparameter tuning

### Module 5. Handling Imbalanced Data

Topics:

- Oversampling
- SMOTE concept

Project:

- Credit Card Fraud Detection System

## **Month 5: Deep Learning + NLP**

### Module 1. Neural Networks

Topics:

- Neuron concept
- Layers (input, hidden, output)
- Activation functions (ReLU, Sigmoid)

### Module 2. Training Process

Topics:

- Forward propagation
- Backpropagation
- Loss functions



### Module 3. Deep Learning Frameworks

Tools:

- TensorFlow
- PyTorch

### Module 4. Computer Vision

Topics:

- Image representation
- Convolution Neural Networks (CNN)

Project:

- Image Classification System

### Module 5. Natural Language Processing

Topics:

- Tokenization
- Stopwords removal
- Text vectorization

### Module 6. NLP Models

Topics:

- Sentiment Analysis
- Text Classification

### Module 7. Transformers (Introduction)

Tools:

- Hugging Face

Project:

- AI Chatbot or Sentiment Analyzer

## **Month 6: Deployment + Industry Preparation**

### Module 1. Model Deployment

Topics:



- API creation using Flask
- UI using Streamlit

#### Module 2. Cloud Basics

##### Topics:

- Amazon Web Services
- EC2 (server)
- S3 (storage)

#### Module 3. Version Control

##### Tools:

- Git
- GitHub

#### Module 4. End-to-End Pipeline

##### Steps:

- Data → Model → API → Deployment

#### Module 5. Capstone Project (Mandatory)

Students must build a complete system:

##### Options:

- Recommendation System
- Resume Screening AI
- Stock Price Predictor
- Healthcare Chatbot

#### Module 6. Placement Preparation

##### Topics:

- Resume building
- GitHub portfolio
- Mock interviews
- Case study discussion