

AI (Artificial Intelligence) and Machine Learning (ML) with Python

Duration: 5 Days / 40 hours

Prerequisites: Knowledge of Python/Any Programming language and mathematics

Day 1 – Introduction to AI, ML & Python Foundations

Objective: Build foundational understanding of AI/ML concepts and Python essentials.

Module 1: Introduction to Artificial Intelligence & Machine Learning

- What is Artificial Intelligence?
- Types of AI (Narrow, General, Super AI)
- What is Machine Learning?
- ML vs AI vs Deep Learning
- Real-world use cases (Healthcare, Finance, Retail)

Module 2: Python Refresher for ML

- Python environment setup (Anaconda / VS Code)
- Data types, variables, operators
- Lists, Tuples, Dictionaries
- Control statements (if-else, loops)
- Functions and modules

Module 3: Python Libraries for AI/ML

- Introduction to:
 - NumPy (arrays, operations)
 - Pandas (data handling)
 - Matplotlib / Seaborn (visualization)

Hands-on Labs

- Install Python & setup environment
- Write basic Python programs
- Perform operations using NumPy
- Load and analyze dataset using Pandas
- Create basic plots using Matplotlib

Day 2 – Data Preprocessing & Exploratory Data Analysis (EDA)

Objective: Understand data handling, cleaning, and visualization.

Module 1: Data Collection & Loading

- Structured vs Unstructured data
- Import datasets (CSV, Excel, APIs)

Module 2: Data Cleaning

- Handling missing values
- Removing duplicates
- Data formatting & normalization

Module 3: Exploratory Data Analysis (EDA)

- Statistical summaries
- Correlation analysis
- Data visualization techniques

Module 4: Feature Engineering

- Encoding categorical variables
- Feature scaling (Normalization, Standardization)

Hands-on Labs

- Load real-world dataset
 - Clean and preprocess data
 - Perform EDA with graphs
 - Apply feature scaling techniques
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Day 3 – Supervised Machine Learning

Objective: Learn core ML algorithms for prediction tasks.

Module 1: Introduction to Supervised Learning

- Regression vs Classification
- Training vs Testing data

Module 2: Regression Algorithms

- Linear Regression
- Multiple Linear Regression

Module 3: Classification Algorithms

- Logistic Regression
- K-Nearest Neighbors (KNN)
- Decision Trees

Module 4: Model Evaluation

- Accuracy, Precision, Recall
- Confusion Matrix
- Overfitting vs Underfitting

Hands-on Labs

- Build Linear Regression model
- Implement classification model (KNN/Logistic)

- Evaluate model performance
 - Visualize results
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Day 4 – Unsupervised Learning & Model Optimization

Objective: Learn clustering and improve model performance.

Module 1: Unsupervised Learning

- Clustering concepts
- K-Means Clustering
- Hierarchical Clustering

Module 2: Model Optimization

- Train-test split
- Cross-validation basics
- Hyperparameter tuning basics

Module 3: Introduction to Ensemble Learning

- Random Forest (concept overview)

Module 4: Introduction to NLP (Optional Overview)

- Text data basics
- Tokenization, stop words

Hands-on Labs

- Implement K-Means clustering
 - Visualize clusters
 - Perform model tuning
 - Basic text processing task
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Day 5 – ML Project, Deployment Basics & Career Guidance

Objective: Apply learning in a mini project and understand real-world usage.

Module 1: End-to-End ML Project

- Problem statement understanding
- Data preprocessing
- Model building
- Evaluation

Module 2: Model Deployment Basics

- Saving models (Pickle / Joblib)
- Simple deployment using Flask / Streamlit

Module 3: Introduction to AI Tools & Frameworks

- Overview of:
 - TensorFlow
 - PyTorch
 - Scikit-learn

Module 4: Career Path & Industry Use

- Roles in AI/ML (Data Analyst, ML Engineer)
- Resume tips for freshers
- Interview preparation guidance

Hands-on Labs

- Build complete ML project (e.g., House Price Prediction / Customer Segmentation)
- Save and load model
- Create basic UI using Streamlit