AI & Machine Learning using Python [120 Hrs]

Target Audience

- Class 12 pass students
- BCA / BTech / MCA / BSc students
- IT & Non-IT graduates
- Teachers / Trainers (for upskilling)
- Beginners with **basic computer knowledge**

Course Duration

4 Months (120 Hours)

Type	Duration
Theory	40 Hours
Practical / Lab	60 Hours
Projects & Assessment	20 Hours

Tools & Technologies

- Python 3.x
- Jupyter Notebook
- NumPy, Pandas
- Matplotlib, Seaborn
- Scikit-Learn
- TensorFlow / Keras (Intro)
- Kaggle Datasets

DETAILED COURSE SYLLABUS

Module 1: Python Programming for AI (20 Hours)

Theory

- Introduction to Python
- Python syntax & keywords
- Data types & variables
- Operators
- Control statements (if, loops)

Practical

- Lists, Tuples, Sets, Dictionaries
- Functions & Modules
- File handling

- Exception handling
- Intro to OOP (Class, Object)

Outcome: Student becomes comfortable writing Python programs.

Module 2: Python Libraries for Data Science (20 Hours)

- NumPy (arrays, operations)
- Pandas (Series, DataFrame)
- Data loading (CSV, Excel)
- Data cleaning & preprocessing
- Handling missing values
- Data visualization using Matplotlib & Seaborn

Outcome: Student can analyze and visualize data.

Module 3: Fundamentals of Machine Learning (20 Hours)

- What is AI vs ML vs DL
- Types of Machine Learning
    - Supervised
    - Unsupervised
    - Reinforcement (concept)
- ML workflow
- Training & testing data
- Overfitting & underfitting

Outcome: Strong conceptual foundation.

Module 4: Supervised Learning Algorithms (25 Hours)

Regression

- Linear Regression
- Multiple Linear Regression
- Evaluation metrics (MAE, MSE, R²)

Classification

- Logistic Regression
- K-Nearest Neighbors (KNN)
- Decision Tree
- Random Forest

Practical

- House price prediction
- Student performance prediction

Outcome: Student can build predictive models.

Module 5: Unsupervised Learning (15 Hours)

- Clustering concepts
- K-Means clustering
- Hierarchical clustering
- Principal Component Analysis (PCA)

Use case

- Customer segmentation
- Data grouping problems

Outcome: Student understands pattern discovery.

Module 6: Model Evaluation & Optimization (10 Hours)

- Train-Test split
- Cross-validation
- Confusion Matrix
- Accuracy, Precision, Recall, F1-score
- Hyperparameter tuning

Outcome: Student learns to improve model accuracy.

Module 7: Introduction to Deep Learning (10 Hours)

- What is Neural Network
- Perceptron
- Activation functions
- Intro to TensorFlow & Keras
- Simple Neural Network model

Outcome: Entry-level deep learning understanding.

Module 8: Mini Projects & Capstone (20 Hours)

Mini Projects (Any 2)

- Spam Email Detection
- Handwritten Digit Recognition
- Movie Recommendation System
- Loan Approval Prediction

Final Capstone Project

- End-to-end ML project
- Dataset → Model → Prediction
- Presentation + Viva

Outcome: Job-ready practical exposure.

Assessment & Certification

- Weekly assignments
- Module tests
- Project evaluation
- Final practical exam