An Introductory Course on Machine Learning Using Python

Module 1: Introduction to AI, ML & Data Science *(3 Hours)*

- Artificial Intelligence vs Machine Learning vs Data Science
- Types of Machine Learning
- Real-world applications of ML
- Industry trends and career paths
- Python's role in Machine Learning

Outcome:
Students understand the relevance and scope of Machine Learning.

Module 2: Python Programming Fundamentals *(6 Hours)*

- Python installation and IDE setup
- Data types and variables
- Input/Output statements
- Conditional statements
- Looping constructs
- Functions and basic scripting
- Hands-on Python exercises

Outcome:
Students gain the programming foundation required for ML.

Module 3: Python for Data Analysis *(7 Hours)*

- NumPy:
    - Arrays, indexing, slicing
    - Mathematical operations
    - NumPy exercises
- Pandas:

    - Series and Data Frames
    - Data loading and cleaning
    - Data manipulation and preprocessing

Outcome:
Students learn to prepare datasets for machine learning models.

Module 4: Machine Learning with Scikit-learn *(4 Hours)*

- Introduction to Scikit-learn
- ML workflow: dataset → model → evaluation
- Train-test split and validation concepts
- Model evaluation metrics (accuracy, precision, recall – conceptual)

Outcome:
Students understand how ML models are trained and evaluated.

Module 5: Supervised Learning Algorithms *(7 Hours)*

(Each topic includes explanation and a mini-project)

- Linear Regression
- Logistic Regression
- Naïve Bayes
- Support Vector Machines (SVM)

Outcome:
Students implement and test supervised learning models.

Module 6: Unsupervised Learning & Advanced Concepts *(3 Hours)*

- K-Means Clustering (with mini-project)
- Introduction to Neural Networks
- Principal Component Analysis (PCA)

Outcome:
Students gain exposure to unsupervised learning and advanced ML concepts.