Machine Learning with AI: 4-Week Course Outline

This course provides a practical introduction to Machine Learning and Artificial Intelligence using Python. Over four weeks, learners will understand data preparation, machine learning algorithms, model evaluation, and basic AI applications.

Week 1: Foundations of AI, Machine Learning, and Python

- Introduction to Artificial Intelligence (AI) and Machine Learning (ML)
- Real-world applications of AI and Machine Learning
- Types of Machine Learning: Supervised, Unsupervised, Reinforcement Learning
- Setting up the Python Environment (Jupyter Notebook / VS Code)
- Python Basics Review: Variables, Data Types, Lists, Dictionaries, Tuples
- Control Flow: Conditional Statements (if/else) and Loops (for/while)
- Introduction to NumPy for numerical operations

Week 2: Data Preparation and Exploratory Data Analysis

- Introduction to Pandas for data manipulation
- Working with datasets (CSV, Excel files)
- Data Cleaning Techniques: Handling Missing Values, Removing Duplicates, Handling Outliers
- Feature Engineering Basics
- Data Transformation and Scaling
- Exploratory Data Analysis (EDA)
- Data Visualization using Matplotlib and Seaborn
- Understanding relationships between variables

Week 3: Supervised Machine Learning Algorithms

- Introduction to Supervised Learning
- Regression Models: Linear Regression, Multiple Linear Regression
- Classification Models: Logistic Regression, K-Nearest Neighbors (KNN), Decision Trees
- Training Machine Learning Models
- Splitting Data (Training vs Testing)

Week 4: Model Evaluation, Unsupervised Learning, and AI Applications

- Model Evaluation Techniques: Accuracy, Precision, Recall, F1 Score
- Overfitting vs Underfitting
- Bias-Variance Tradeoff
- Introduction to Unsupervised Learning: K-Means Clustering
- Dimensionality Reduction (PCA)
- Introduction to AI Projects and Model Deployment
- End-to-End Machine Learning Workflow

Final Practical Project

- House Price Prediction
- Customer Churn Prediction
- Sales Prediction
- Project Steps: Data collection, Data cleaning, Exploratory Data Analysis, Model building, Model evaluation, Presenting insights