

## **Machine Learning Syllabus**

### **1. Introduction to Machine Learning**

- What is Machine Learning
- Types of ML:
  - Supervised Learning
  - Unsupervised Learning
  - Reinforcement Learning
- Real-world applications
- ML vs AI vs Deep Learning

### **2. Python for Machine Learning**

- Python basics revision
- Libraries:
  - NumPy
  - Pandas
  - Matplotlib / Seaborn
- Data handling & preprocessing

### **3. Data Preprocessing**

- Handling missing values
- Encoding categorical data
- Feature scaling (Normalization & Standardization)
- Train-test split
- Handling imbalanced datasets

### **4. Exploratory Data Analysis (EDA)**

- Data visualization
- Correlation matrix
- Feature selection techniques

## **5. Supervised Learning Algorithms**

### **Regression**

- Linear Regression
- Multiple Linear Regression
- Polynomial Regression

### **Classification**

- Logistic Regression
- K-Nearest Neighbors (KNN)
- Support Vector Machine (SVM)
- Decision Tree
- Random Forest
- Naive Bayes

## **6. Unsupervised Learning Algorithms**

- K-Means Clustering
- Hierarchical Clustering

## **7. Model Evaluation & Metrics**

- Confusion Matrix
- Accuracy, Precision, Recall, F1-score
- ROC-AUC Curve
- Cross-validation
- Bias vs Variance

## **8. Hyperparameter Tuning**

- Grid Search
- Random Search
- Overfitting & Underfitting handling

## **9. Feature Engineering**

- Feature creation
- Feature selection
- Dimensionality reduction