

# **MACHINE LEARNING SYLLABUS**

## **Module 1: Introduction to Machine Learning**

- What is Machine Learning
- Types of ML (Supervised, Unsupervised, Reinforcement)
- Applications of ML
- ML workflow overview

## **Module 2: Python for Machine Learning**

- Basics of Python
- NumPy and Pandas
- Data manipulation
- Data visualization (Matplotlib, Seaborn)

## **Module 3: Data Preprocessing**

- Data cleaning
- Handling missing values
- Feature scaling
- Encoding categorical data
- Train-test split

## **Module 4: Statistics & Probability**

- Mean, Median, Mode
- Variance & Standard Deviation
- Probability basics
- Distributions (Normal, Binomial)

## Module 5: Supervised Learning

- Regression (Linear, Multiple)
- Classification (Logistic Regression, KNN, Decision Tree)
- Model evaluation (Accuracy, Precision, Recall)

## Module 6: Unsupervised Learning

- Clustering (K-Means, Hierarchical)
- Dimensionality Reduction (PCA)
- Association rules

## Module 7: Model Optimization

- Overfitting & Underfitting
- Cross-validation
- Hyperparameter tuning
- Regularization

## Module 8: Advanced Algorithms

- Support Vector Machines (SVM)
- Random Forest
- Gradient Boosting
- XGBoost basics

## Module 9: Deep Learning Basics

- Introduction to Neural Networks
- Perceptron
- Activation functions
- TensorFlow / Keras basics

## Module 10: Natural Language Processing (NLP)

- Text preprocessing
- Tokenization
- Sentiment analysis
- NLP libraries

## Module 11: Computer Vision Basics

- Image processing
- Image classification
- OpenCV basics

## Module 12: Model Deployment

- Saving models (pickle/joblib)
- Building ML APIs
- Deploying models using Flask/Django

## Module 13: Real-World Projects

- House price prediction
- Spam detection system
- Customer segmentation
- Recommendation system