

# Specialised Programme on Machine Learning – 2 Weeks

## Pre-requisites for the course

- Proficient in Python programming.

## Aim

- Equip participants with a solid foundation in machine learning, empowering them to apply supervised and unsupervised learning techniques effectively

## Objectives

- Understand the fundamentals and types of machine learning
- Gain proficiency in key machine learning libraries: NumPy, Pandas, and Scikit-Learn
- Master supervised learning algorithms: Linear Regression, Logistic Regression, K-Nearest Neighbors, SVM
- Explore unsupervised learning techniques: K-Means Clustering and DBSCAN
- Harness the power of decision trees, random forests, and ensemble learning
- Introduce neural networks using TensorFlow and Keras
- Apply theoretical concepts through hands-on exercises for practical proficiency
- Enable participants to confidently approach real-world machine learning challenges

## Course Contents

### Introduction to Machine Learning

- Overview of Machine Learning
- Types of Machine Learning (Supervised, Unsupervised, Reinforcement Learning)
- Key Machine Learning Terminology
- Python Libraries for Machine Learning Overview (NumPy, Pandas, Scikit-Learn)

### Supervised Learning

- Introduction to Supervised Learning
- Linear Regression
- Regularization
- Logistic Regression
- Model Evaluation Metrics
- Hands-on Exercise
- K-Nearest Neighbors Algorithm
- Introduction to SVM
- Linear SVM
- Non-Linear SVM
- Kernel Functions
- Cross-Validation
- Hyperparameter Tuning
- Overfitting and Underfitting
- Hands-on Exercise

### Unsupervised Learning

- Introduction to Unsupervised Learning
- K-Means Clustering Algorithm
- DBSCAN
- Hands-on Exercise

## **Supervised Learning with Trees**

- Decision Trees
- Random Forest
- Ensemble Learning (Bagging and Boosting)
- Hands-on Exercise

## **Introduction to Neural Network**

- Tensor flow and keras libraries
- ANN and DNN architectures
- Activation Functions
- Hands-on Exercise