

## Machine Learning Basic

**Duration – 1.5 Days / 12 Hours**

### Program Description

This course introduces the fundamental concepts of machine learning and data science. Learners will understand the broad classification of machine learning into supervised and unsupervised learning. The course covers essential machine learning algorithms, including simple regression techniques, and provides an overview of their use cases in real-world scenarios. By the end of this level, learners will be able to grasp the foundational concepts and begin applying them to datasets for simple predictions.

### Learning Goals

- ❖ Understand the basic principles of Machine Learning and Data Science.
- ❖ Differentiate between supervised and unsupervised learning techniques.
- ❖ Develop an understanding of regression analysis and its applications.
- ❖ Grasp basic concepts of model validation and goodness-of-fit measures.
- ❖ Apply simple machine learning models to solve problems.

### Course Topics

- ❖ Introduction to Machine Learning and Data Science: Overview of machine learning, supervised vs. unsupervised learning, Introduction to regression, Use cases of machine learning.
- ❖ Introduction to Regression : Simple regression analysis, Understanding the concept of estimation and goodness of fit, Applications of regression in predictive modelling.

## Machine Learning Intermediate

**Duration – 4 Days / 32 Hours**

### Program Description

This course provides a comprehensive understanding of essential machine learning techniques, focusing on regression, classification, and clustering. Participants will learn to apply advanced models, evaluate performance using key metrics, and address challenges such as class imbalance and model optimization. The course covers both theoretical foundations and hands-on implementation using real-world datasets.

### Learning Goals

- ❖ Apply multiple regression models and binary logistic regression for more complex data.
- ❖ Gain proficiency in using classification algorithms for supervised learning.
- ❖ Understand model performance metrics such as confusion matrix, ROC, precision, and recall.
- ❖ Enhancing Model Performance with Tree-Based Algorithms (Decision Tree & Random Forest)
- ❖ Apply techniques for handling imbalanced datasets.
- ❖ Master clustering techniques and understand practical issues related to clustering models.
- ❖ Leverage Market Basket Analysis (MBA) to extract valuable business insights.

### Course Topics

- ❖ Regression Techniques: Multiple regression, Binary logistic regression, Goodness of fit measures and diagnostics, Model validation techniques.
- ❖ Classification Techniques: Decision trees, random forests, k-nearest neighbours (KNN), Naïve Bayes classifier, Model evaluation metrics, Ensemble techniques (bagging, boosting, extreme boosting).
- ❖ Handling imbalanced datasets: SMOTE, up-sampling, and down-sampling.
- ❖ Clustering Techniques (Unsupervised Learning): K-Means Clustering, Hierarchical Clustering, DBSCAN.
- ❖ Market Basket Analysis (MBA) for Business Insights

## Machine Learning Advanced

**Duration – 2.5 Days / 28 Hours**

### Program Description

This course focuses on advanced machine learning techniques for predictive modelling, covering ensemble learning, time series forecasting, and clustering. Participants will work with real-world datasets to develop models that capture trends, seasonality, and complex patterns in data. The course emphasizes both theoretical understanding and hands-on implementation.

### Learning Goals

- ❖ Implement ensemble techniques (Boosting) for improved model performance.
- ❖ Apply advanced time series forecasting models for predictive analytics.
- ❖ Develop and validate time series models using ARIMA, exponential smoothing, Holt-Winter models, and Multivariate Arima.
- ❖ MMX (Marketing Mix Modelling) for Strategic Decision-Making
- ❖ Price Optimization Models for Business Growth
- ❖ Apply machine learning techniques to complex, real-world datasets, addressing challenges like seasonality and trends.

### Course Topics

- ❖ Boosting and Ensemble Techniques for Improved Model Performance
- ❖ Advanced Time Series Forecasting Models
- ❖ Developing and Validating Time Series Models (ARIMA, Exponential Smoothing, Holt-Winters, Multivariate ARIMA)
- ❖ Real-World Applications of Clustering and Time Series Forecasting
- ❖ Apply Marketing Mix Modelling (MMX) to optimize business strategies.
- ❖ Develop Price Optimization Models to enhance revenue and profitability.