**Specialised Program on Machine Learning**

Machine Learning is a technique behind innovations such as facial recognition, self-driving cars, predictive results in search, Predictive text etc. The objective of this training program is to understand how machines can learn from its past experience which is considered as the core of AI. We focus on creating strong fundamental knowledge sets on building algorithms by mastering the principles of statistical analysis, machine learning and deep learning.

**Objectives:**

1. Gain an in-depth understanding of data structure and data manipulation in python programming
2. Gain expertise in mathematical computing using the NumPy and Scikit-Learn and handling data using Pandas
3. Comprehend the principles, algorithms, and applications of Machine Learning
4. Learn the applications of Machine Learning across various use cases like customer service, financial services, healthcare and more
5. Understand supervised and unsupervised learning models including linear regression, logistic regression, clustering, classification, K-NN
6. Master the concepts recommendation engine and time series modeling, search algorithms, neural networks, and NLP

**Introduction to Python Programming**

Installing Python, Introduction to Python Basic Syntax, Data Types, Variables, Operators, Input/output, Python data structure, Introduction to Strings, Lists, Tuples, Dictionaries, Sets. Flow of Control (Modules, Branching) If, If- else, Nested if-else Looping, For, While, Nested loops Control Structure, Uses of Break & Continue ,Functions and methods and Exception Handling, OOPs Concepts, Python classes and objects

**Advanced Python Programming**

Introduction and Installation of Machine learning packages like PANDAS, NUMPY, SKLearn, Matplotlib, Seaborn. Mathematical Computing with Python (NumPy), Data Manipulation with Pandas, Machine Learning with Scikit–Learn. Data Visualization in Python using matplotlib, Seaborn

**Machine Learning Algorithms**

What is machine learning? Algorithm types of Machine learning, Supervised and Unsupervised Learning, Uses of Machine learning, Evaluating ML techniques, Data Preprocessing concepts and hands on practice using python packages. Unsupervised Algorithms: Clustering, Hierarchical Clustering & K means, Evaluation of Clusters, Clustering Case Study ,Principal Component Analysis, Supervised Algorithms: Linear Regression, Decision Trees, Regression Trees, Decision Trees case study , Bayesian analysis and Naïve bayes classifier , Assigning probabilities and calculating results , Naïve Bayes case study, K-Nearest Neighbors Algorithm and case study. Ensemble Learning: Concept of Model Ensembling, Random forest, Gradient boosting Machines, Model Stacking, Support vector Machines, Basic classification principle of SVM, Linear and Non linear classification (Polynomial and Radial), Neural Network and its applications, Activation Functions: Sigmoid, Hyperbolic Tangent, ReLu , Overview of Back propagation of errors, Association rules mining, Apriori and FP-growth algorithms, Time series Modeling: Moving average, Exponential Smoothing, Auto-correlation (ACF & PACF), Auto-regression, Auto-regressive Models, Moving Average Models, ARMA & ARIMA

**Deep Neural Network**

Introduction to Deep Neural Network, RNN, CNN, LSTM, Autoencoders, Deep Belief Network, Training deep neural network, Introduction toTensorflow, building Multi-layer Perceptron model using tensorflow, building a basic neural network using Keras with Tensor Flow, Troubleshoot deep learning models, building deep learning project. Transfer Learning, Deep Learning Tools & Technique

**Data Analytics**

Introduction to Data Analytics, Descriptive Statistical Measures, Probability Distribution and Data, Sampling and Estimation, Predictive modelling and analysis, Regression Analysis, Forecasting Techniques, Simulation and Risk Analysis, Optimization, Linear, Non linear, Integer, Decision Analysis, Making Right Business Decisions based on data, Exploratory Data Analysis, Visualization and Exploring Data, Text analytics,  Social network analysis

**Natural Language Processing**

Understanding Language, NLP Overview, BNF, Grammars, Parsing, Introduction to Language Computing, language models, text classifications, Information retrieval & extraction, Basics for Computational Linguistics, Morphology, Parsing,  shallow & deep parsing, semantic interpretation, POS Tagging, chunking, semantic aspects, Pragmatics, Deep Processing for NLP, Statistical Approaches, Methods for NLP, Phonetics, Application domains,  MT, IR, Speech, NLG, , Syntactic Analysis, Semantic Analysis, Machine Translation, Information Retrieval

**Project Work**