Day – 01: Introduction to Big Data and Data Science

- **Introduction to Data Science**
- **Thought Experiment**
- **Cases of Big Data and Analytics**
- **Introduction to Cloud Computing**
- **Artificial Intelligence vs. Machine Learning vs. Deep Learning**

Day – 02: Introduction to R

- **Basic Programming constructs**
- **Calculations, Datatypes, Variables, Operators**
- **Vectors, Lists**
- **Matrices and Data frame**
- **Conditional Statements and Loops**

Day – 03: Essentials of Statistics for Machine Learning (Part-1)

- **Into to stats, Types, basics, Probability**
- **Random Variable and types (discrete and continuous) – with numeric examples**
- **Expected Value and spreads - with numeric examples**
- **Probability distributions (Discrete and Continuous)**
- **Bayes' Rule**
- **Central Limit Theorem**

Day – 04: Essentials of Statistics for Machine Learning (Part-2)

- **Descriptive Statistics (Central Tendency and Dispersion)**
- **Inferential Statistics**
- **Confidence Interval**
- **Hypothesis Testing**
- **Box Plots, Histograms**

Day – 05: Exploratory data analysis in R

- **Introduction to Exploratory Data Analysis**
- **Bi-Variate Analysis**
- **Scatter Plots, Co-variance and co-relation**
- **Multi-variate Analysis**

Day – 06: Predictive Analytics and Modelling

- **Introduction to Predictive Analytics**
- **Linear Regression**
- **Multiple Regression**
- **Logistic Regression**
- **Industry case**

Day – 07: Programming in Python and Machine Learning

- **Basic Programming Constructs**
- **Lists and Dictionaries**
- **Control Statement, Functions and Modules**
- **Introduction to Numpy**
- **Pandas for Data Analysis**

Day – 08: Machine Learning (Unsupervised Techniques)

- **Introduction and Overview of Machine Learning**
- **Introduction and Overview of Unsupervised Learning**
- **Various data issues – sparsity, dimensionality, missing values, distributions, etc.**
- **Projection based visualization methods e.g. PCA, etc.**
- **Distance based visualization methods e.g. Multi-dimensional Scaling, etc.**
- **Partitional Clustering (e.g. k-means, etc.)**
- **Hierarchical Clustering (e.g. top-down and bottom-up)**

Day – 09: Machine Learning (Unsupervised and Supervised Techniques)

Unsupervised Machine Learning

- **Fraud detection, Outlier Detection – application of density estimation**
- **Market Basket Data in Retail and other domains**
- **Frequent Item-set Mining problem and challenges**
- **Introduction to MapReduce**

Supervised Machine Learning

- **Goals of Machine Learning in general**
- **Various Machine Learning paradigms**
- **Understanding Data (distributions, visualizations) and Data nuances**
- **Data transformations (linear, non-linear, normalizations, scaling, etc.)**
- **Version Spaces and Decision Trees classifiers**

Day – 10: Machine Learning (Supervised Techniques)

- **K-Nearest Neighbor**
- **Bayesian classifiers - Naïve Bayes, Various Discriminant Analysis**
- **Naïve Bayes Text Classifiers**
- **Support Vector Machines (on Text Classification)**
- **Bias vs. Variance tradeoff**
- **Data Pre-processing, Text Data enrichment**
- **Feature Engineering and incorporating Domain knowledge**

Day – 11: Text Analytics (using NLTK)

- **Introduction and Basic Text Processing**
- **Text Classification and Sentiment Analysis**
- **POS Tagging**
- **Parsing Introduction and Dependency Parsing**
- **Information Extraction Named Entity Recognition**

Day – 12: Introduction to Neural Networks and Deep Learning

- **What is deep learning**
- **Motivations for deep architectures and gradient based learning**
- **Stochastic gradient descent**
- **Multi-layered neural networks**
- **Multi-layered perceptron and Applications**
- **Introduction Convolutional neural networks and Recurrent neural networks**