Python Programming **20 H** **W1**	**Descriptive Analytics** **20H** **W2-W3**	**Introduction to Data Science using Python** **20H** **W2-W3**	**Predictive Analytics** **20H** **W4-W5**	**Machine Learning** **30H** **W5-W8**	**Big Data Analytics** **30H** **W4 -W8**	**Prescriptive Analytics** **20H** **W7 – W8**
Introduction to Python programming for beginners. Orientation, Expressions, Variables, Functions, Modules and Scripts, Function Definitions, Conditionals, Lists, Loops, Arrays, Tuples, Dictionaries, Objects, Nested-Lists, Classes, Files.	**Introduction to Data Analytics** **Descriptive Statistical Measures** Populations and Samples Measures of location, variability and association Analyzing Distributions Data Cleansing, missing data, outliers **Data Manipulation** Slicing and Extracting Data Variable Conversion Variable Information Understand Variables Importance Feature Vectors Feature Selection **Data Cleaning** **Data Wrangling** **Data Visualization** **Probability: An Introduction to Modeling Uncertainty** **Statistical Inference** Sampling Distributions Interval Estimation Hypothesis Testing	Introduction to data science illustrated Discover the power and flexibility of NumPy, Scipy and Matplotlib advanced module features in probability, statistical testing, signal processing, interpolation, fast Fourier transform, financial forecasting and other applications. Mathematical operations with array data structures, optimization. Perform exploratory data analysis and create data visualizations. Understand critical statistical concepts such as hypothesis testing (A/B testing) and inference. Histogram.	**Introduction Predictive Analytics** **Dimensionality Reduction** Principal Component Analysis Independent Component Analysis (ICA) Singular Value Decomposition (SVD) **Introduction to Regression,** Classification, Clustering Supervised Techniques Introduction Forecasting Introduction Classification **Regression methods** – Forecasting numeric data Simple linear regression Ordinary least squares estimation Correlations Linear Regression Data exploration Data Preparation Building a model Evaluation Improve model performance **Classification: Lazy Learning** Classification using Nearest Neighbor Classification using nearest neighbors' philosophy The kNN algorithm Calculating distance Choosing an appropriate k Preparing data for use with kNN. Why is the kNN algorithm lazy? Predictive Diagnostics **Un-Supervised Algorithms** Clustering	**Introduction to machine learning: Taxonomy of machine learning** Supervised Learning Supervised learning: **Regression and Classification** **Generative vs. discriminative learning** Naïve Bayes Logistic regression Support vector machines Decision Tress Ensemble methods: Bagging, boosting. **Deep learning** Neural networks. Backpropagation algorithm. Autoencoders. **Reinforcement** learning Markov decision processes (MDPs). Bellman equations. Value iteration and policy iteration. Q-learning algorithm. Value function approximation. Policy search. Reinforce.	**Introduction to Big data analytics** **Characteristics of Big Data** **The Process of Data Analysis** **Big Data Modeling and Management** **Processing Big Data Data Exploration** **Hadoop, Map-Reduce and Spark** **Supervised learning for Big Data** **Unsupervised learning for big data**	**Monte Carlo Simulation and Risk Analysis** **Linear Optimization Models** Maximization Problem Minimization Problem Sensitivity Analysis **Integer Linear Optimization Models** **Nonlinear Optimization Models** **Decision Analysis** Decision Analysis without Probabilities Decision Analysis with Probabilities Decision Analysis with Sample Information Computing Branch Probabilities with Bayes' Theorem Utility Theory