Course: Fundamentals Of Data Science

Course Outline

S.No	Topic	Duration (In Mins)	Time	Key subtopics
1.1	Introduction to Machine learning	60	10:00 -11:00	• What is statistical learning? • Function Estimation • Supervised Vs. Unsupervised algorithms • Bias-Variance Trade-off
1.2	Probability Distributions & Hypothesis Testing	120	11:00 - 1:00	• Random Variable • Discrete Probability Distributions • Continuous probability Distributions • Hypothesis testing
Lunch Break				
1.3	Linear Regression & Analysis of Variance	180	02:00 - 5:00	• Analysis of variance • Simple Linear Regression • Coefficients estimation • Model Accuracy & Prediction • Potential Issues/problems in • Regression • Case Study in R • Multiple Linear Regression
Day 2				
2.1	Classification: Logistic Regression	120	10:00- 12:00	• Overview of classification • Logistics Model • Model Accuracy & Prediction • Case Study in R
2.2	Linear Classifiers – Building linear prediction models	60	12:00 - 1:00	• Linear Discriminant analysis • QDA Analysis • Bayes Classifier • Naïve Bayes Classifier
Lunch Break				
2.3	Non Linear Classifiers: KNN Classifier – Building non-linear prediction models	120	02:00 - 4:00	• Overview of nonlinear classification • Problem • Nearest Neighbor classifier • KNN comparison with Regression • Case Study in R
2.4	Decision Tree	60	04:00 -05:00	• Building Decision tree • Entropy and Information Gain • Pruning a Decision tree

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Day 3				
3.1	Unsupervised Learning Algorithms	120	10:00 -12:00	• K- Means Clustering • Hierarchical Clustering • Drawbacks of K-means clustering • DB Scan Algorithm • Case study in R
3.2	Feature Selection	60	12:00 -01:00	• Principle Component Analysis • Factor Analysis • Examples in R
Lunch Break				
3.3	Case Study covering all the Techniques	180	02:00 - 05:00	Case study on Analysis of Crime in the US in 1990s

Pre Work:

Please go through below videos. It will be helpful

- A set of 19 short vides taking participants through basics in R https://www.youtube.com/watch?v=SWxoJqTqo08&list=PLjgj6kdf_snYBkIsWQYcYtUZiDpam7ygg
- Basics of discrete probability distributions (Brandon Foltz's YouTube Videos) https://www.youtube.com/playlist?list=PLIeGtxpvyG-LWd2IOW1wveszJXy_aHytX
- Basics of Continuous probability distributions (Brandon Foltz's YouTube Videos)

https://www.youtube.com/watch?v=aCW8wm6nrRw&list=PLIeGtxpvyG-KdqFkNrED9w8j9dEMMLj7e