EXPLORATORY DATA ANALYSIS SYLLABUS

Module 1: Introduction to Exploratory Data Analysis

- Introduction to Exploratory Data Analysis (EDA)
- Steps in EDA
- Data Types
    - Numerical Data
        - Discrete Data
        - Continuous Data
    - Categorical Data
- Measurement Scales
    - Nominal
    - Ordinal
    - Interval
    - Ratio
- Comparing EDA with Classical and Bayesian Analysis
- Software Tools for EDA

Module 2: Data Transformation

- Transformation Techniques
    - Performing Data Deduplication
    - Replacing Values
    - Discretization and Binning
- Introduction to Missing Data
- Handling Missing Data
    - Traditional Methods
    - Maximum Likelihood Estimation

Module 3: Correlation Analysis and Time Series Analysis

- Types of Analysis
    - Univariate Analysis
    - Bivariate Analysis
    - Multivariate Analysis
- Time Series Analysis (TSA)
    - Fundamentals of TSA
    - Characteristics of TSA
    - Time-Based Indexing
    - Visualizing Time Series
    - Grouping Time Series Data
    - Resampling Time Series Data

Module 4: Data Summarization and Visualization

- Statistical Summary Measures
- Data Elaboration
- 1-D Statistical Data Analysis
- 2-D Statistical Data Analysis
- Contingency Tables
- n-D Statistical Data Analysis
- Visualization
    - Scatter Plots
    - Dot Charts
    - Bar Plots

Module 5: Clustering Algorithms

- Introduction to Spectral Clustering
- Document Clustering
- Minimum Spanning Tree Clustering
- Overview of Model-Based Clustering
    - Expectation-Maximization Algorithm

    - Hierarchical Agglomerative Model-Based Clustering
- Outlier Detection Using Clustering

Module 6: Dimensionality Reduction

- Linear Methods
    - Principal Component Analysis (PCA)
    - Singular Value Decomposition
    - Factor Analysis
    - Intrinsic Dimensionality
- Non-Linear Methods
    - Multidimensional Scaling
    - Manifold Learning
    - Self-Organizing Maps

Module 7: Model Development and Evaluation

- Constructing Linear Regression Model
- Evaluation
    - Computing Accuracy
    - Understanding Accuracy
- Understanding Reinforcement Learning
    - Difference Between Supervised and Reinforcement Learning
    - Applications of Reinforcement Learning