Predictive Analytics

Unit 1: Introduction
- Understand the difference between diagnostic and prognostic models.
- Analyze the bias-variance trade-off in predictive analytics models.

Unit 2: Linear Regression
- Apply the least square method to fit a regression line.
- Develop simple linear regression models.
- Construct multiple linear regression models with both quantitative and qualitative predictors.
- Evaluate regression diagnostics such as outlier detection, leverage, influential point, Cook's distance.
- Utilize dummy variables in regression modeling.
- Compare and select models using AIC, BIC, and adjusted R-Square.
- Implement K-nearest neighbor regression for predictive analysis.

Unit 3: Classification
- Implement logistic regression for binary classification problems.
- Extend logistic regression to multiple logistic regression for multiple categories.
- Apply multi-category logistic regression for parameter estimation and prediction.
- Understand and apply multiclass discriminant analysis.
- Develop decision trees using CART and CHAID algorithms for classification tasks.

Unit 4: Model Selection and Regularization
- Utilize subset selection methods like forward and backward stepwise selection for model selection.
- Apply shrinkage methods such as penalized likelihood and Bayesian linear regression.
- Implement regularization techniques such as Ridge regression, LASSO, and Elastic NET.
- Analyze applications of dimension reduction techniques in predictive analytics.