Stat-222 Regression Analysis
100 Marks: 03 Credits
Number of Class: 35-40

Introduction: Definition, Uses and Importance of Regression Analysis, Regression Model, Population Regression Line, Types of Regression Analysis.

Simple Linear Regression: Simple Linear Regression Model, Model Assumptions, Method of Least Square, Minimum Perpendicular Method, Properties of the Least Square Estimators and Fitted Regression Model, Prediction, Coefficient of Determination, Lack of Fit and Pure Error, Inverse Linear Regression, Confidence Interval and Test of Regression Coefficients.

Multiple Linear Regression: Multiple Regression Model, Regression Model in Matrix Notation, Model Assumptions, Estimation of Model Parameters by Ordinary Least Square (OLS) Method, Properties of OLS Estimators, Properties of Errors. Goodness of Fit and Model Selection Criteria, Inference about Regression Parameters, Confidence Interval and Overall Test, Sequential and Partial F test. The "Extra Sum of Squares" principle. Weighted Least Square, Restricted Least Squares. Bias in Regression Estimates, Inverse regression, Prediction. Regression with Dummy Independent Variables.

Examination of Residuals: Overall Plot, Time Sequence Plot, Plot Against Regression Equation, Plot against Predictor Variables, Other Residual Plots, Statistics for Examination of Residuals, Correlations among Residuals, Outliers, Serial Correlation in Residuals, Examining Runs in Time Sequence Plot of Residuals, Durbin-Watson Test for a Certain Type of Serial Correlation, Detection of Influential Observations.

Selection of Best Regression Equation: All Possible Regression, Best Set of Regression, Backward Elimination Procedure, Stepwise Regression Procedure, Ridge Regression, Predictor Sum of Squares, Principal Component Regression, Latent Root Regression, Stage-Wise Regression Procedure, Robust Regression.

Polynomial and Non-linear Regression: Polynomial Regression Models, Orthogonal Polynomials, Different Types of Non-Linear Regression and their Estimation Process.

Text

1. Draper, N.R. and Smith, H. (1998): *Applied Regression Analysis*, 3rd edition, John Wiley and Sons, New York.
2. Montgomery, D. C., Peck, E. and Vining, G.G. (2003): *An Introduction to Linear Regression Analysis*, 3rd edition, Wiley, New York.

References

1. Birkes, D. and Y. Dodge (1993): *Alternative Methods of Regression*, Wiley Interscience, New York.
2. Bobke, P. (2001): *Correlation and Regression*, 2nd edition, Thousand Oaks, California.
3. Chatterjee, S. and Price, B.: *Regression Analysis by Examples*, Wiley.

4. Dobson A.J. (1990): *An Introduction to Generalized Linear Models*, Chapman and Hall, New York.
5. Graybill   F.A. (1961): *An Introduction to Linear Statistical Models,* Vol.1, McGraw-Hill, New York.
6. Gujarati, D. (2003): *Basic Econometrics*, 4th edition, McGraw-Hill, New York.
7. Johnston, J. (1997) : *Econometric Methods*, 4th edition, McGraw-Hill, New York.
8. Weisberg, S. (1986): *Applied linear Regression*, 2nd ed., Wiley, New York.