

DISCIPLINE SPECIFIC ELECTIVE COURSE – 3d: REGRESSION ANALYSIS (Not for category I)

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Regression Analysis	4	3	0	1	Class XII pass with Mathematics	knowledge of sampling distributions and matrix theory

Learning Objectives

The learning objectives include:

- Be able to carry out and interpret Correlation Analysis
- Be able to carry out and interpret inference procedures for simple linear regression.
- Know the simple and multiple linear regression models, and be able to state and explain the standard methods of estimation for these models.

Learning Outcomes:

After completing this course, students will develop a clear understanding of:

- Basic concept of matrix, its types and operations,
- correlation and regression techniques, the two very powerful tools in statistics,
- Linear and Multiple Linear regression,
- regression diagnostics, multicollinearity, residual plots and estimation and tests for regression coefficients.
- concept of coefficient of determination and inference on partial and multiple correlation coefficients.

SYLLABUS OF DSE-3d

Theory

UNIT I

(15 hours)

Introduction

Correlation, Types of correlation, Methods of studying simple correlation - Scatter diagram, Covariance between two variables: Definition, computation, effect of change of origin and scale, Karl Pearson's coefficient of correlation, Spearman's Rank correlation coefficient.

UNIT II

(15 hours)

Linear Regression

Linear Regression: Meaning of regression, difference between correlation and regression, simple linear regression model, Estimation of regression parameters by least squares method (fitting of regression

model), Interpretation of parameters. Test of significance of regression and confidence interval, Concept of residual, Residual plots, comparison of two models on the basis of residual sum of squares.

UNIT III

(15 hours)

Multiple Linear Regression

Multiple linear regression: Estimation of regression parameters by least square method and their properties, Interpretation of parameters. Concept of coefficient of determination R^2 and adj R^2 . Testing of hypothesis and bias in regression estimates.

PRACTICAL/LAB WORK – (30 hours)

List of Practical:

1. Computation of covariance, coefficient of correlation, checking for independence and uncorrelatedness of two variables.
2. Lines of regression, angle between lines and estimation of parameters.
3. Lines of regression and regression coefficients.
4. Spearman rank correlation with/without ties.
5. Fitting of simple linear regression model
6. Testing of hypothesis in SLRM
7. Fitting of multiple linear regression model
8. Testing of hypothesis in MLRM
9. Bias in regression parameters

Practical work to be conducted using electronic spreadsheet / EXCEL/ Statistical Software Package/ SPSS/ calculators.

ESSENTIAL READINGS

- Draper, N. R. and Smith, H. (1998). Applied Regression Analysis. 3rd Edition. John Wiley.
- Montgomery, D. C., Peck, E. A. and Vining, G. G. (2013). Introduction to Linear Regression Analysis. 5th Edition. Wiley.

SUGGESTIVE READINGS:

- Hosmer, D. W., Lemeshow, S. and Sturdivant R.X. (2013). Applied Logistic Regression, Wiley Blackwell.
- Neter, J., Kutner, M. H., Nachtsheim, C.J. and Wasserman, W. (1996). Applied Linear Statistical Models, 4th Edition, Irwin USA.
- Gun, A.M., Gupta, M.K. and Dasgupta, B. (2005). An Outline of Statistical Theory, Volume II, World Press.
- Arora, S. and Bansal, L. (1968). New Mathematical Statistics, 1st Ed., Vanita Printers.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch University of Delhi, from time to time.