Statistical Data Analysis

Duration : 28 Hours	Exam Marks : 50

Objectives:

This course will help students to develop a deeper understanding of the basis underlying probability distributions and modern statistical inference and equip them with a statistical tool kit which will enable them to apply the knowledge and skills to real world tasks.

Module I: Theoretical Continuous distributions	12Hours

Concept of a random variable, discrete and continuous random variable and their probability functions, distribution function and its properties, expectation of a random variable - mean, variance, bivariate probability distribution, marginal and conditional distributions, covariance, independence, conditional expectation and variance, mean and variance of linear combination of random variables.

Bernoulli, Binomial, Poisson, Uniform, Exponential, Normal distributions- definition through probability function, statement of properties and applications.

Module II: Sampling and Sampling distributions	8 Hours

Types of sampling – purposive, random and mixed samples. Sampling Methods -Simple Random, Stratified, Cluster. Relative merits and limitations of the different methods.

Concepts of population, parameter, random sample, statistic, sampling distribution and standard error, distribution of sample mean and variance. Chi-square, t and F distributions - definition through their probability functions, statement of their properties, applications. Central Limit Theorem and its applications.

Module III: Estimation	10Hours

Point estimation: estimator, estimate, unbiasedness, consistency, sufficiency, Methods of estimation (MLE and MME).

Interval estimation: confidence interval, confidence coefficient, confidence limits, one-sided and two-sided confidence intervals, confidence intervals for the mean, difference between means, variance, ratio of variances, proportions and difference between proportions for normal population(s).

REFERENCE BOOKS

1. Hogg & Tanis , Probability & Statistical Inference –6th Edn, Pearson Education.
2. Ross S. M.: Introduction to Probability and Statistics., John Wiley and Sons.
3. Mukhopadhyay. P.(1996) : Mathematical Statistics. Calcutta Publishing House.
4. Irwin Miller and Marylees Miller : Mathematical Statistics with Applications, 7th Edition, Pearson Education.
5. K.C. Bhuyan – Probability, Distribution theory and statistical inference - NCBA
6. Y.P Aggarwal : Statistical Methods : Concepts, Applications and Computation.
7. Prem S. Mann : Introductory Statistics, 4th Edn.
8. Rohatgi V.K. and A.K. Md. Ehsanes Saleh (2002). An Introduction to Probability Theory and Mathematical Statistics. John Wiley (WSE).
9. Bhattacharya and N.L. Johnson (1986) : Statistical concepts . John Wiley.
10. Schaum Series : Probability and Statistics.