

PCL105 Statistical Methods and Algorithms (For all branches of ME/MTech)

L	T	P	Cr
3	0	2	4.0

Course Objective: This course aims to shape the attitude of learners regarding the field of statistics and sampling and also instil the belief that statistics is important for scientific research.

Introduction: Nature and objectives of research, Study and formulation of research problem. Scope and formulation of hypothesis. Preparation and presentation of research proposal using statistical package.

Review of Probability: Appraisal of axiomatic approach of probability, Conditional probability, Baye's rule, Conditional distributions, and conditional expectations.

Markov chains: Basics of markov chains, Finite state space, Markov chains, Transition and stationary markov chains. Continuous time markov process, Kolmogorov, Forward and backward equations, Pure birth, Pure death, Birth and death process.,

Analysis of variance: One Way Classification: ANOVA for fixed effect model, ANOVA for Two-way Classification (one observation per cell): ANOVA for fixed effect model.

Design of Experiments: Completely Randomised Design, Randomised Block Design, Latin Square Design, their statistical analysis and variance of estimates, Analysis of Covariance.

Multivariate Data Analysis: Introduction, multivariate normal distributions, Mean vector, Variance-covariance matrix, Correlation matrix and their estimation for multivariate data., Step wise regression, Selection of best set of variables, Classification and discrimination problems. Factor analysis and principal component analysis. Illustrative examples and Multivariate data analysis using statistical package.

Time Series and forecasting: Components of time series, Analysis of time series, Measurement of trend, Measurement of seasonal variations , Measurement of cyclic variations , Auto-Regression Analysis, Auto-correlation , Random component in time series.

Laboratory Work: Implementation of statistical techniques using statistical packages viz. SPSS, Mathematica including evaluation of statistical parameters and data interpretation, Regression Analysis, covariance, Analysis of variance, multivariate data analysis and problems based on time series and forecasting.

Course Learning Outcomes (CLO): Upon the completion of this course, the students will be able to:

1. compute the probabilities of composite events along with an understanding of the random variables.
2. perform and interpret the various design of experiments and their implementation using different statistical software.
3. measure the different components of the time-series.
4. learn the Markov processes with a study of stochastic process, multivariate data and their applications to real word problems.

Recommended Books:

1. Medhi, J., Stochastic Processes, New Age International (2005).
2. Populis,A., Random Variables and Stochastic Processes, Tata McGraw Hill (2002).
3. Montgomery, Introduction to Statistical Quality Control, John Wiley and Sons (2005).
4. Bhuyan,K.C., Multivariate Analysis and Its Applications, New Central Book Agency (2002).
5. Anderson,T.W., An Introduction to Multivariate Statistical Analysis, John Wiley and Sons (2003).
6. Goon, Das, Gupta, Fundamental of Statistics Vol.-II, World Press (1999).