

PMA102 Research Methodology (For M.Tech. - ENV, BT, CHE, MM, MP)

L	T	P	Cr
2	0	2	4.0

Course Objective: The aim of this course is to motivate the students an intrinsic interest in statistical thinking and 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 and project proposals, Selection of thrust research.

Introduction to Statistical Analysis: Measures of central tendency and dispersion, Mean, Median, Mode, Range, Mean deviation, Standard deviation.

Random Variables and Probability Distribution: Definition, Distributions, Functions, Mathematical Expectation, Binomial, Poisson, Geometric, Negative binomial, Exponential, Normal and log-normal distributions.

Hypothesis Testing: Tests of significance based on normal, t and Analysis of variance technique.

Linear Regression and Correlation: Linear regression, Least square principle and fitted models, Karl Pearson's correlation coefficient, Rank correlation, Lines of regression.

Time series and forecasting: Components of time series, Analysis of time series, Measurement of trend, Measurement of seasonal variations.

Laboratory Work: Implementation of statistical techniques using statistical packages viz. SPSS including evaluation of statistical parameters and data interpretation, Regression Analysis, Covariance, Hypothesis testing.

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

- create, simulate and analyse elementary probability models
- apply fundamental concepts in exploratory data analysis
- understand industrial strength by statistical analysis
- predict the inference of the sample statistics on the population

Recommended Books:

1. Dowdy, S., Wearden, S. and Chilko, D., Statistics for Research, Wiley series (2004).
2. Walpole, R.E., Myers, R.H., Myers, S.L. and Ye, K., Probability and Statistics for Engineers and Scientists, Pearson Education (2002).
3. Jhonson, R.A, Gupta C. B., Miller and Freund's Probability and Statistics for Engineers, Pearson Education (2006).
4. Meyer, P.L. Introductory Probability and Statistical Applications, Addison Wesley (1970).
5. Medhi, J. Stochastic Processes, New age International (2005).
6. Goon, Gupta, DasGupta, Fundamental of Statistics. Vol-I and II, World Press (1995).