

Bachelors with Mathematics as Major
8th Semester

MMT822J3: Mathematics/Applied Mathematics:
MATHEMATICAL STATISTICS

Credits: 4 THEORY + 2 TUTORIAL

Theory: 60 Hours & Tutorial: 30 Hours

Objectives: To make the students understand random experiments and their behavior in order to measure degree of occurrence of events in various situations.

Course outcome: The students shall get a solid ground in probability theory and mathematical statistics for predictions and decision making after the completion of this course.

Theory: 4 Credits

Unit- I

The probability set function, the probability density function and the cumulative distribution function and their properties, Mathematical expectations, Characteristic and moment generating functions, Markov's, Chebyshev's and Jensen's inequalities, marginal and conditional distributions, covariance and correlation coefficient, stochastic independence.

Unit – II

Some special distributions: Bernoulli, binomial, negative binomial, geometric, trinomial, Poisson, gamma, chi-square, exponential, beta, normal and bivariate normal distributions.

Unit – III

Limiting distributions, central limit theorem, estimation of parameters, Interval estimation, confidence intervals for mean and variance of a normal distribution, point estimation, unbiased and minimum variance unbiased estimators, Rao-Blackwell theorem, sufficient statistics, Fisher-Neyman factorization theorems.

Unit – IV

Exponential class of pdf's, complete sufficient statistics, Rao-Crammer inequality, efficient and consistent estimators, maximum likelihood estimators.

Testing of hypotheses, Definitions and examples, MP tests, Neyman-Pearson theorem, uniformly most powerful tests.

Tutorials: 2 Credits

Unit – V

Distributions of functions of one or more random variables, Distribution function method, change of variables method and moment generating method.

Unit – VI

Order statistics and their marginal and joint distributions, Distributions of range, mid range and median.

Recommended Books;

1. Hogg and Craig, An Introduction to Mathematical Statistics, Pearson 7th Edition, 2012.
2. Mood and Grayball, An introduction to Mathematical Statistics, McGraw Hill Edu. 3rd edition, 2017.
3. C.R.Rao, Linear Statistical Inference and its applications, Wiley 2nd Edition, 2009.
4. V.K.Rohatgi, An introduction to Probability and Statistics, Wiley 2nd Edition, 2008.