MT103 Probability and Statistics

Prerequisites: Standard XII Mathematics or equivalent.

Course Contents:

Probability

Experiments and sample spaces, events, algebra of events, probability axioms, conditional probability, independence of events, mutually exclusive events. Baye's rule (10%)

One dimensional random variable:: discrete and continuous random variable, characteristics of distributions, cumulative distribution function, functions of one random variable. (10%)

Two dimensional random variable: marginal and conditional distributions, conditional expectation independence, covariance and correlation, distribution function. (10%)

Special discrete distributions: Bernoulli, Binomial, Poisson (10%)

Special continuous distributions: uniform, exponential, normal **(10%)**

Statistics

Sampling distributions, Parameter Estimation of mean and proportion. (10%)

Hypothesis tests about mean and proportion, Chi-square tests, analysis of variance ,least squares curve fitting, the coefficient of Determination. (15%)

Confidence Intervals in linear Regression, correlation analysis, simple nonlinear regression, Higher dimensional least-squares fit. (15%)

Non parametric tests: sign test, Rank test, Median test (10%)

Main Reading

1. William W. Hines and Douglas C. Montgomery, Probability and Statistics in Engineering and Management Science, Wiley India Pvt. Ltd.
2. T.Veerarajan, Probability, Statistics and Random Processes, Tata McGraw Hill Pub. Co. Ltd.
3. P.S.Mann, Introductory Statistics, Wiley Student edition

MT104 Discrete Mathematical Structures

Prerequisites: Standard XII Mathematics or equivalent.

Course Contents:

Logic, Propositional equivalences, predicates and quantifiers, nested quantifiers, methods of proof, functions. (10%)

Mathematical induction, recursive definitions and structural induction, recursive algorithms, programme correctness, Pigeonhole principle, permutations and combinations. (10%)

Recurrence relations, solving recurrence relations, divide and conquer algorithms and recurrence relations, generating functions, inclusion and exclusion, applications of inclusion and exclusion. (20%)

Relations and their properties, n-ary relations and their applications, representing relations, closures of relations, equivalence relations, partial orderings. (20%)

Introduction to graphs, graph terminology, representing graphs and graph isomorphism, connectivity, Euler and Hamiltonian paths, shortest path problems, planar graphs. (20%)