

**Unit 1 Linear Algebra:** Basic Matrix theory: linear system of equations, the geometry of linear equations, Gaussian elimination, linear independence, rank of a matrix, Determinants, Properties of determinants, Cramer's Rule, inverse of a matrix.

**Unit 2 Vector Spaces and Subspaces:** Subspaces, linear independence, basis and dimension, eigenvalues, eigenvectors and their importance to research. Special type of matrices: Symmetric matrix, rotation matrix, diagonalization of matrix, upper triangle matrix, positive definite matrix. Orthogonality and Basis, Dimensionality theorem, null space and Linear transformations.

**Unit 3 Probability:** Basic permutation and combination theory. Definition of Sample space, Venn diagrams, conditional probability, Bayes Theorem, independence, mutually exclusive, discrete probability distributions, continuous probability distributions, probability density functions and maximum likelihood functions.

**Unit 4 Random Variables and Stochastic Processes:** Definition of Random Variables, discrete random variables, discrete random variables expected value and variance, continuous random variables, manipulation of continuous random variables, Markov chains and least square approach

**Unit 5 Linear Programming:**

**Reference Books:**

Erwin Kreyszig: Advanced Engineering Mathematics

Gilbert Strang Linear Algebra and its applications:

Sheldon M Ross: A first course in Probability

Sheldon M Ross: Stochastic processes

**Evaluation Scheme:**

20% marks for Class tests,

50% marks for Assignments

30% marks for Aural examination at the end of the Course by a panel of three experts.