

Course Learning Objectives (CLOs):

Acquaint with principles of Probability theory, Random process, Linear Algebra, and apply the knowledge in the **applications of Computer science and engineering applications.**

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1 to 4)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Apply the idea of random variables (discrete/continuous) and probability distributions in analyzing the probability models arising in random processes.		3,6	
CO-2	Use different techniques for estimating the parameters of a given distribution.		3,6	
CO-3	Understand each technique and use appropriate method to analyze multivariate data.		3,6	
CO-4	Apply Linear Algebra for decomposition and dimension-reduction of large data.	3,6		
CO-5	Apply the mathematical concepts in fields of computer science and engineering		3,6	

POs	1	2	3	4	5	6
Mapping Level			2.2			2.2

Pre-requisites:

1. Basic probability theory.
2. Random variables.
3. To obtain Statistical Averages.

Content:

1. Probability

Probability mass, density, and cumulative distribution functions, Parametric families of distributions, Expected value, variance, conditional expectation, Applications of the univariate and multivariate Central Limit Theorem, Probabilistic inequalities, Markov chains.

12 Hrs.

2. Sampling

Random samples, sampling distributions of estimators, Methods of Moments and Maximum Likelihood. **10 Hrs.**

3. Statistics

Statistical inference, Introduction to multivariate statistical models: regression and classification problems, principal components analysis, The problem of overfitting model assessment. **10 Hrs.**

4. Linear Algebra

Computation of Eigen values and Eigen vectors of real symmetric matrices- Given's method. Orthogonal vectors and orthogonal bases. Gram-Schmidt orthogonalization process. QR decomposition, singular value decomposition, least square approximations. **10 Hrs.**

5. Computer science and engineering applications

Applications to varying fields of CSE like bioinformatics, soft computing, machine learning, data mining, computer vision, Network protocols, analysis of Web traffic, computer security, operating systems, distributed systems.

10 Hrs.

REFERENCE BOOKS

1. Verma, Foundation Mathematics for Computer Science, 1986.
2. K. Trivedi. Probability and Statistics with Reliability, Queuing, and Computer Science Applications. Wiley.
3. Kenneth Hoffman and Ray Kunze, "Linear Algebra", 2nd Edition, PHI, 2011.
4. *Richard Bronson*, "Schaum's Outlines of Theory and Problems of Matrix Operations", McGraw-Hill, 1988.