PROBABILITY AND RANDOM VARIABLES (THEORY)
EE-231

Pre-requisite: Applied Calculus
Credit Hours 03
Contact Hours 48

RECOMMENDED BOOKS

‘‘Probability, Statistics, and Random Processes for Electrical Engineering’’ by Alberto Leon-Gar Recommended Books cia , 3rd Edition

REFERENCE BOOKS

‘‘Probability and Stochastic Processes’’ by Roy D. Yates & David J. Goodman, Latest Edition, John Wiley and Sons Inc.

OBJECTIVE OF COURSE

The main aim of this course is to help the students to learn the basic ideas of probability theory and random variables. The theoretical part is supported by the examples of applicable nature especially from the domains of Electrical Engineering. The course will help students to deal with the problems of probability and random functions later in their engineering degree program when the study various core courses like Communication Systems, Satellite Communication, Wireless Communication etc.

S.NO	CLO/PLOs MAPPING	DOMAIN	PLO
01	**Explain** basic probability concepts and their use in different problems	C2	01
02	**Compare** different types of random variables and their usage in science and engineering. **Illustrate** the use of CDFs, PDFs and PMFs of continuous as well as discrete nature	C3, C4	01
03	**Apply** knowledge of probability to solve problems from the field of electronic, electrical and communications of applicable nature, falling in both discrete and continuous domain.	C3	02

COURSE CONTENTS

Fundamental Concepts of Probability

- Probability Models in Electrical Engineering

- Specifying Random Experiments
- Set Operation
- Sample Space
- Events and Probabilities
- Computing Probabilities using Counting Methods
- Axioms of Probability
- Conditional Probability
- Independence of Events
- Sequential Experiments
- Bayes' Theorem

Discrete Random Variables
- The notation of Random Variables
- Probability Mass Function
- Bernoulli, Geometric, Binomial ,Uniform and Poisson Random Variable
- Expected Value, Variance and Standard Deviation
- Conditional Probability Mass Function

Continuous Random Variables
- CDF of Continuous Random Variables
- Probability density function
- Expected Value
- Uniform, Exponential, Gaussian, Standard Normal Random Variables
- Functions of Random Variables and Q-Functions
- Conditional Expected Values of Continuous Random Variables

Pairs of Random Variables
- Joint CDF
- Joint PMF
- Marginal PMF
- Joint PDF
- Functions of Two Random Variables
- Covariance
- Correlation