Course Title: Probability and Stochastic Processes
Course Code: GC-7002
Credit Hours: 3
Pre-requisite: Undergraduate course in probability

Aims & Objectives:

Probability, random variables and stochastic processes are extremely important concepts in almost all fields of engineering and sciences. Electrical engineers in particular need to have good understanding of probabilistic modeling. This course fulfills this very basic and extremely significant requirement by providing a detailed description of fundamental probability concepts such as conditional probability, random variables, distribution functions, probability density functions, moments of a random variable, characteristic functions, moment generating functions, joint distributions, concepts of stochastic process, correlation and covariance etc. This core course in probability and random signals prepares students for a wide range of courses in communications, signal and image processing etc.

Detailed Course Contents:

See the attached Lecture plan.

Text Book:

Alberto Leon-Garcia, *Probability, Statistics, and Random Processes For Electrical Engineering*, 3rd. Ed. Prentice Hall, 2008.

Reference Books:

Athanasios Papoulis and S Unnikrishna Pillai *Probability, Random Variables and Stochastic Processes,* 4th Ed. McGRAW-Hill, 2002

Schaum's Outline of Probability, Random Variables, and Random Processes

Marks Distribution:

Final Exam ---------- 50
Course Project---------- 20
Mid Term ---------- 20
Quizes---------- 10

Probability and Stochastic Processes (GC-7002)

Week-wise tentative lecture plan

week	Contents	Reference
1,2	Probability: Random experiments, axioms of probability, conditional probability and statistical independence.	
3,4	Random Variables: CDF and PDF, functions of random variables, expected value of random variables, Chebyshev inequality, characteristic function, probability generating function, entropy.	
5,6	Multiple random variables: joint PDF, conditional probability and conditional expectation, correlation and covariance, jointly Gaussian random variables, Mean Square Estimation.	
7,8	Sum of random variables, Law of Large Numbers, Central Limit Theorem, Confidence Intervals.	
9,10	Random Processes: Mean, Autocorrelation and Autocovariance, Ergodicity, Stationarity.	
11,12	Filtering of Random Signals: Power Spectral Density, Response of Linear Systems to Random Signals.	
13,14	Markov Chains and the Elements of Queuing Theory (Time Permitting)	
15	**Revision and/or introduction to advanced concepts**	