Course Number: **EE 315**

Course Title: Probabilistic Methods in Electrical Engineering (Required Course)

Course Description :

Fundamentals of probability theory: single and two discrete and continuous random variable. Probability density function. Gaussian and other distributions. Functions of one and two random variables. Joint and conditional probabilities. Moments and statistical averages. Central limit theorem. Introduction to random process. Concept of stationarity and ergodicity. Correlation function. Power spectrum density. Response of linear systems to random signals.

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Prerequisites :

Prerequisite: EE 207 (Not to be taken for credit with STAT 319)

Textbook :

Peebles, Peyton Z., *Probability, Random Variables, and Random Signal Principles* (4th Edition), 2001, McGraw-Hill, ISBN 0-07-118181-4.

Other useful references and material :

Reference texts:

- Leon-Garcia, A. *Probability and Random Processes for EE* (2nd Edition), 1994, Addison Wesley.
- Ross, S., *A First Course in Probability* (2nd Edition) 1998, Prentice Hall.
- Helstrom, C.W., *Probability and Stochastic Processes for Engineers* (2nd Edition) 1992, Addison-Wesley.
- Walpole, R.E., Myers, R.H. and Myers, S. L., "*Probability and Statistics for Engineers and Scientists*", Prentice Hall, Sixth Edition, 1998.

Course objectives:

After successfully completing the course, the students will be able to

- understand basic concepts of probabilities.
- understand the use of random variables in solving engineering problems,
- understand the basic concepts of random processes
- understand the basic concepts of system analysis using random inputs,
- be able to work in teams to solve engineering problems.

Topics Covered :

- Fundamentals of probability theory
- Single and multiple discrete and continuous random variables
- Probability density function
- Gaussian and other distributions
- Functions of random variables
- Joint and conditional probabilities
- Moments and statistical averages
- Central limit theorem
- Random processes
- Stationarity and ergodicity
- Correlation function
- Power spectrum density
- Gaussian and Poisson random processes
- Response of linear systems to random signals

Class Schedule:

3 lectures per week, 50 minutes each.

Contribution of course to Meeting the professional component :

The students will be able to formulate solutions to real engineering problems such as the effect of random noise on a communication channel. The students should be able to analyze engineering systems driven by random signals. The students will learn the importance of working in teams to solve complex engineering problems.

Course Outcomes:

- An ability to apply knowledge of mathematics, science, and engineering to the analysis and design of electrical circuits
- An ability to identify, formulate, and solve engineering problems in the area circuits and systems.
- An ability to use the techniques, skills, and modern engineering tools such as VHDL and FPGA, necessary for engineering practice.
- An ability to design a system, components or process to meet desired needs within realistic constraints such as economic, environmental, social political, ethical, health and safety, manufacturability and sustainability.

Course Outcomes to Program Outcome Mapping:

Course Outcome	Program Outcome												
	a	b	c	d	e	f	g	h	i	j	k	l	m
1	X												
2					X								
3											X		
4								X				X	

Prepared by : Dr. Wessam Mesbah (July, 2012)