ELEC2600   Probability and Random Processes in Engineering

Course Description

An introduction to statistical inference and random processes in electrical engineering, including the necessary probabilistic background. Random variables, distribution and density functions, characteristic functions, conditional statistics, expectation, moments, stochastic processes. *Exclusion(s):* ELEC 2600H, MATH 2421 *Prerequisite(s):* A passing grade in AL Pure Mathematics OR MATH 1003 OR MATH 1014 OR MATH 1020 OR MATH 1024 *Corequisite(s):* MATH 2011 OR MATH 2023

List of Topics

Lecture 1   Probability and Random Processes in Engineering
Lecture 2   Build a Probability Model
Lecture 3   Computing Probabilities Using Counting Method
Lecture 4   Conditional Probability, Independence
Lecture 5   Sequential Experiments
Lecture 6   Discrete Random Variables
Lecture 7   Expectation, Variance and Moments of a Random Variable
Lecture 8   Conditional Probability
Lecture 9   Important Discrete Random Variables
Lecture 10   Mixed Single Random Variables
Lecture 11   Continuous Random Variables
Lecture 12   Functions of A Random Variable
Lecture 13   Pairs of Discrete Random Variables
Lecture 14   Pairs of Continuous Random Variables
Lecture 15   Expectation of Function of 2 Variables
Lecture 16   Conditional Probability and Conditional Expectation
Lecture 17   Functions of Two Random Variables
Lecture 18   Multiple Random Variables and Expectation
Lecture 19   Jointly Gaussian RVs
Lecture 20   Laws of Large Numbers
Lecture 21   Transform Methods, Central Limit Theorem
Lecture 22   Definition of a Random Process, Specifying a Random Process
Lecutre 23   Mean and Autocorrelation of Random Processes
Lecture 24   Discrete-Time Random Processes
Lecture 25   Continuous-Time Random Processes
Lecture 26   Stationary Random Processes

Statement of Objectives/Outcomes:

On successful completion of this course, students will be able to:

CO1 - understand the mathematic basis of probability models and their application to engineering

CO2 -   manipulate probability models to solve engineering problems

CO3 - recognize probabilistic experiments and develop relevant probability models for representing such experiment

CO4 - use software tools to manipulate, process, analyze and plot quantities relating to engineering probability models

Textbook(s):

A. Leon-Garcia, *Probability and Random Processes for Electrical Engineering*, Addison-Wesley, 3rd ed., 2009

Reference Books/Materials:

P. Z. Jr. Peebles, *Probability, Random Variables and Random Processes*, 4th ed., Mc-Graw Hill, 2001

P. G. Brown and P. Y. C. Hwang*, Introduction to Random Signals and Applied Kalman Filtering*,3rd ed., New York: John Wiley & Sons, 1997

G.R. Grimmet and D.R. Strizaker, *Probability and Random Processes*, 2nd ed., Oxford Science Publishers, 1992

A. Papouils, *Probability, Random Variables and Stochastic Processes*, 3rd ed., Mc-Graw Hill, 1991

H. Stark and J. W. Woods, *Probability, Random Processes and Estimation Theory for Engineers*, 2nd ed., Prentice Hall, 1994

Relationship of Course to Program Outcomes:

Please refer to the Report Section 4.3.2 (iii).

Grading Scheme:

Homework	8%
Quiz	50%
Final Examination	40%
Attendance	2%