Philadelphia University

Faculty of Engineering - Department of Communications and Electronics Engineering

Course Information

Title: Probability and Random Variables (650364)

Prerequisite: Signals and Systems (650320)

Credit Hours: 3 credit hours (16 weeks per semester, approximately 44 contact hours)

Textbook: "Probability, Random Variables, and Random Signal Principles", Peyton Z. Peebles, 4th edition, McGraw-Hill, Inc, 2001.

References:

- Probability and Statistics for Engineering and the Sciences (6th Edition), by Jay L. Devore, 2004
- "Probability, Random Variables, and Stochastic Processes" A. Papoulis, 3rd edition, McGraw-Hill, Inc., 1991.
- "Probability and Stochastic Processes for Engineers " Carl W. Helstrom, 2nd edition, Macmillan Pub. Co, 1991.

Catalog Description: The course is a requirement for Electrical, Communication and Electronics engineering students. It introduces the topics of probability, random variables, and random processes at the undergraduate level.

Course Topics

Week	Topic
1,2,3	**Probability:** (Introduction, Set definitions and operations, Joint and conditional Probability, Bayes' Theorem, Independent events)
4,5,6	**The Random Variable:** (The Random variable concept, Discrete and continuous random variables, Density function, Distribution functions, Gaussian random variable, Other density functions)
7,8	**Statistics of Random Variables:** (Expectation, Moments, Transformations of a random variable)
9,10	**Multiple Random Variables & Operations on Multiple Random Variables:** (Vector random variables,, Joint density and distribution functions, Statistical independence, Central limit theorem, Multiple random variables)
11,12	**Random Processes:** (Deterministic and nondeterministic processes, Correlation functions)
13,14	**Spectral Characteristics of Random Processes:** (Power spectral density, autocorrelation function, White and colored noise)
15	**Linear Systems with Random Input**
16	**Review, and final exam**

Course Learning Outcomes and Relation to ABET Student Outcomes:

Upon successful completion of this course, a student should be able to:

1.	Convert an Engineering statement problem into a mathematical probabilistic statement.	[a , e]
2.	Use statistical principles and the properties of random variables to solve probabilistic problems.	[a , e]
3.	Calculate standard statistics, distribution and density functions.	[a]
4.	Calculate the autocorrelation and spectral density functions of a random process and recognize the relation between them..	[a]
5.	Understand stochastic phenomena such as white and colored noise.	[e]
6.	Understand linear systems and their output characteristics.	[e]

Assessment Instruments:

Evaluation of students' performance (final grade) will be based on the following categories:

Exams: Two written exams will be given. Each will cover about 4-weeks of lectures

Quizzes: 10-minute quizzes will be given to the students during the semester. These quizzes will cover material discussed during the previous lecture(s).

Homework: Problem sets will be given to students. Homework should be solved individually and submitted before the due date.

Copying homework is forbidden, any student caught copying the homework or any part of the homework will receive zero mark for that homework

Final Exam: The final exam will cover all the class material.

Grading policy:

First Exam	20%
Second Exam	20%
Quizzes and Homework	20%
Final Exam	40%
Total:	100%

Attendance policy:

Absence from classes and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse, acceptable to and approved by the Dean of the relevant college/faculty, shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

February, 2017