ECE 30200 - Probabilistic Methods in Electrical and Computer Engineering

Type of Course
Required for the CmpE and EE programs

Catalog Description
An introductory treatment including probability of events, discrete and continuous random variables, multiple random variables, sums of random variables and long-term averages, and elementary random processes. Applications involving uniform, Gaussian, exponential, geometric and related random variables. Introduction to parameter estimation and hypothesis testing. Discussion of wide-sense stationary random processes, including correlation functions, spectral densities and the response of linear time invariant systems. Course examples are drawn from signal processing, wireless communications, system reliability, and data science.

Credits
3

Contact Hours
3

Prerequisite Courses
MA 36300

Corequisite Courses
ECE 30100

Textbook
A. Leon-Garcia, Probability, Statistics, and Random Processes for Electrical Engineering, Pearson, Current Edition.

Course Objectives
This course is designed to serve as an introduction to the concepts of probabilities and their applications to engineering problems.

Course Outcomes
On successful completion of this course, students should be able to:
1. Model uncertainties with probability theory and solve basic probability problems (1).
2. Describe different types of random variables and solve problems with important distribution functions (1).
3. Solve problems with joint distributions of two random variables (1).
4. Derive the distributions of functions of random variables (1).

5. Solve problems with conditional probability models (1).
6. Compute point estimates and confidence intervals for parameters of interest (1).
7. Perform simple statistical inference such as hypothesis testing in the presence of uncertainty (1).
8. Understand the statistical properties, such as mean, autocorrelation, and autocovariance, of random processes (1)

Lecture Topics

1. Experiments, models, and probabilities
2. Sequential experiments
3. Discrete random variables
4. Continuous random variables
5. Multiple random variables
6. Probability models of derived random variables
7. Conditional probability models
8. Point estimates and confidence intervals
9. Hypothesis testing
10. Random processes

Computer Usage

Low

Laboratory Experience

None

Design Experience

None

Coordinator

Chao Chen, Ph.D.

Date

11/05/2021