

## EE 342 Probability and Statistics

**Credits:** 3

**Categorization of credits:** engineering topic

**Instructor(s):** Anders Host-Madsen, N. Narayana Santhanam, James R. Yee, Anthony Kuh.

### **Text Book and Other Required Materials:**

Text: A First Course in Probability, ninth edition, by Sheldon Ross, Prentice-Hall, 2012.

Reference: Probability, Statistics, and Random Processes for Electrical Engineering, third edition, by Alberto Leon-Garcia, Addison Wesley, 2008.

**Designation:** Required

### **Catalog Description:**

Probability, statistics, random variables, distributions, densities, expectations, limit theorems, and applications to electrical engineering.

**Prerequisites:** EE 315 Signal and Systems Analysis (can be taken concurrently)

**Class/Lab Schedule:** 3 lecture hours per week

### **Topics Covered:**

This course covers the fundamental concepts of probability and statistics. Throughout the course, probabilistic methods are applied to problems which arise in communications, networking, electro-physics, and computer engineering. The topics covered are

- Combinatorial Analysis (2 hrs)
- Axioms of Probability (3 hrs)
- Conditional Probability and Independence (3 hrs)
- Discrete random variables (4 hrs)
- Continuous random variables (5 hrs)
- Random vectors (6 hrs)
- Properties of expectation, variance and correlation (6 hrs)
- Limit theorems (4 hrs)
- Statistics, parameter estimation, mean-square estimation, goodness of fit tests and confidence intervals (5 hrs)
- Monte Carlo simulation (2 hrs)

### **Course Objectives and Their Relationship to Program Objectives:**

The student learns the theory of probability and statistics that are relevant to engineering applications in communications, control, networking, electrophysics and computers.

[Program Objectives this course addresses: 1, 2, 3, and 5.]

### **Course Outcomes and Their Relationship to Program Outcomes:**

The following are the course outcomes and the subset of Program Outcomes (numbered 1-7 in

square braces "[ ]") they address:

- Use of mathematics (probability, statistics, calculus, differential equations, transforms, numerical analysis, linear algebra) to study systems with random components. [1, 2, 7]
- Develop the ability to model engineering and social systems [1, 2, 4, 7]
- Enhance the student's ability to design an experiment and to analyze the resulting data [1, 2, 6, 7]

### **Contribution of Course to Meeting the Professional Component**

Mathematics: 100%

### **Computer Usage:**

Computer usage is minor. Matlab is used to verify some concepts derived in class and in homework problems.

### **Design Credits and Features:**

EE 342 has 0 design credits.

Yingfei Dong. Revised 6/14/2021.