

ECE 413: Probability with Engineering Applications

Class hours: There are two sections for this class.

Section C: Mondays, Wednesdays, and Fridays 10 AM - 10:50 AM in 106B3, Engineering Hall

Section D: Mondays, Wednesdays, and Fridays 11 AM - 11:50 AM in 106B6, Engineering Hall

Prerequisite: ECE 210: Analog Signal Processing

Instructors:

Tamer Başar, CSL 356, tel: 333-3607, e-mail: basar1@uiuc.edu

Ralf Koetter, CSL 126, tel: 244-4471, e-mail: koetter@uiuc.edu

Both sections will be taught by the same instructor in the same week, but which instructor teaches the class depends on the week. A preliminary teaching schedule for the semester is given below.

Home page: <http://courses.ece.uiuc.edu/ece413/fall04/>

Instructor Office hours: Mondays 2 PM-4 PM in the office of the respective instructor of the week

Textbook for the course: S. Ross, "A First Course in Probability" (Sixth edition), Prentice-Hall, 2002.

Teaching assistants: Orhan C. Imer (imer@uiuc.edu) & Irem F. Koprulu (koprulu@uiuc.edu)

TA Office hours: Tuesdays 3-5PM, and Fridays, 4-6PM; both in Room 330N, Everitt Lab

Homeworks: Homeworks will be assigned on a weekly basis, and will be posted on the course home page on Wednesday evening or Thursday morning. They will be due at the beginning of class on the following Wednesday. ***Late homeworks will not be accepted without prior permission.*** If you cannot attend class on the homework due date, you must make arrangements to have your homework turned in to the instructor before class. Homeworks will cover material including the Friday class of the week in which they are assigned. Graded homeworks can be picked up during the office hours of the teaching assistant (more specific information on this will be given in due course, and posted on the course home page).

Exams: There will be two mid-term exams and one final exam. For the mid-terms, a single 8 1/2" by 11" sheet of notes is permitted (you may use both sides); but otherwise the exams are closed book. Laptops, calculators, palm-pilots, tables of integrals etc. will neither be necessary nor be permitted. For the final exam, two 8 1/2" by 11" sheets of notes are permitted (you may again use both sides). The sheets can be hand-written, but the font size should not be too small, necessitating the use of a magnifying glass; as a general rule, any size smaller than the equivalent of a 10 pt font is not permitted.

Schedules for the Exams:

Mid-Term 1: October 5, 7-8:30 PM, 165 Everitt Lab.

Mid-Term 2: November 16, 7-8:30 PM, 165 Everitt Lab.

Final: December 13, 8:00-11:00 AM (room TBA)

Grading system: In determining your grade, scores on homeworks and the three exams will be weighted as shown below:

10 % Homeworks

25 % Each Mid-Term Examination

40 % Final Examination

Books on reserve in the Grainger Library:

S. Ross, "A First Course in Probability" (Sixth edition), Prentice-Hall, 2002.

C. Ash, "A Probability Tutoring Book," IEEE Press, 1992.

H. P. Hsu, "Probability, Random Variables & Random Processes," McGraw-Hill 1997.

R. E. Walpole and R. H. Myers, "Probability and Statistics for Engineers and Scientists," (Fifth edition) Prentice-Hall 1993.

Class schedule: The outline below is roughly how the class will be organized. Powerpoint slides from previous semesters are available at <http://courses.ece.uiuc.edu/ece413/fall03/Slides.html>. However, we emphasize that it is the material covered in class and assigned by the instructors that will be the basis for the two mid-terms and the final!

First class meeting: Wednesday, August 25

Instructor: Ralf Koetter

- Lecture 1: Introduction to ECE 413
 - Lecture 2: The Probability Model
 - Lecture 3: The Axioms of Probability, Part I
 - Lecture 4: The Axioms of Probability, Part II
 - Lecture 5: The Axioms of Probability, Part III
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Instructor: Tamer Başar

- Lecture 6: Random Variables (Wednesday, September 8)
- Lecture 7: Mean, LOTUS, and Variance
- Lecture 8: Independent Trials
- Lecture 9: Statistical Estimation
- Lecture 10: Confidence Intervals
- Lecture 11: Important Counting Random Variables
- Lecture 12: Conditional Probability
- Lecture 13: The Theorem of Total Probability
- Lecture 14: Bayes' Formula

———— material cutoff for mid-term 1 —————

Lecture 15: Decision-making under uncertainty I

Friday, October 1: Class is cancelled

Lecture 16: Decision-making under uncertainty II

Midterm 1 (Tuesday, October 5, 7 pm)

- Lecture 17: Decision-making under uncertainty III
 - Lecture 18: Independent Events
 - Lecture 19: System Reliability I
 - Lecture 20: System Reliability II
 - Lecture 21: The Cumulative Distribution Function
 - Lecture 22: Continuous Random Variables I
 - Lecture 23: Continuous Random Variables II
 - Lecture 24: Continuous Random Variables III
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Instructor: Ralf Koetter

- Lecture 25: Poisson Random Processes (Monday, October 25)
- Lecture 26: Gaussian Random Variables and two associated pictures of parts of a German bank note
- Lecture 27: Functions of Random Variables
- Lecture 28: Hazard Rates and System Reliability
- Lecture 29: Decision-making under uncertainty IV
- Lecture 30: Joint Distributions of Random Variables
- Lecture 31: Joint Probability Mass Functions

———— material cutoff for mid-term 2 —————

Lecture 32: Jointly Continuous Random Variables I

Lecture 33: Jointly Continuous Random Variables II

Lecture 34: Jointly Continuous Random Variables III

Midterm 2 (Tuesday, November 16, 7 pm)

Lecture 35: Functions of Many Random Variables I

Friday, November 19: Class is cancelled

Lecture 36: Functions of Many Random Variables II

Lecture 37: Functions of Many Random Variables III

Lecture 38: Expectation, Covariance, and Correlation

Lecture 39: Jointly Gaussian Random Variables

Lecture 40: Mean-Square Estimation

Lecture 41: Limit Theorems

Final: Monday, December 13, 8 - 11 AM