ECE 30200-003 Probabilistic Methods for Electrical & Computer Engineering
CRN 18517
3 credit hours
Spring 2023

Lectures: T-Th 1:30pm-2:45pm
Stewart Center 314

Instructional Modality: Lectures: In-person
Exams: In-person
Office hours: Hybrid

Note that Sections 1, 2, and 3 of ECE 30200 are independent, with separate lectures, TAs, assessments, and grade assignments.

Professor: Prof. Mary Comer
email: comerm@purdue.edu

TA: Justin Yang
email: yang1834@purdue.edu

Office Hours:

Prof. Comer
Tuesdays 3:00pm – 4:00pm, MSEE 332
Wednesdays 2:30-3:30, Zoom
Thursdays 12:30pm - 1:15pm, MSEE 332
By appointment, MSEE 332 or Zoom

Justin Yang
Mondays 2:00 pm – 5:00pm, Zoom
Tuesdays 10:30am – 1:00pm, EE43
Thursdays 10:30am - 1:00pm, EE43
By appointment, Zoom

Prof Comer's Zoom Link:

https://purdue-edu.zoom.us/j/98571205156?pwd=bUw5SWIvVWxOMlN5cGJBVjl4OWdlZz09

Justin's Zoom Link:

https://purdue-edu.zoom.us/j/2725572670

Course website: www.ece.purdue.edu/~comerm/302

- Course announcements will be either emailed to all students or posted on the course website.
- After each lecture, notes from the lecture will be posted under the handouts link on the course website.
- Homework assignments will be posted on the course website under the handouts link, and will also be posted on Gradescope.
- Homework solutions will be posted on Brightspace.
- Any posted item that includes information about individual students will be available only on Brightspace or Gradescope.

Contact Information:

- Questions or comments can be emailed to either Prof Comer or Justin at the addresses given above. If you expect to receive a response, it is highly recommended that you include "ECE302" in your subject line. Also, it is best to send emails to one of us, with the other one copied on the email, unless it is a private matter to be discussed with Prof Comer only.
- We will make every attempt to respond to each email within 24 hours of receipt. If you do not receive a response within 48 hours, do not hesitate to resend your message.
- Questions can be posted on Piazza. These questions will be addressed by Justin.

Piazza Link:

https://piazza.com/purdue/spring2023/ece30200

Homework

There will be eleven homework assignments. For each graded homework assignment, you will receive 0 to 3 points, where 0 points is for homework not turned in or mostly blank, and 3 points is for homework that is all or mostly complete and correct. Your homework scores will contribute to your final grade directly, and in addition, for students on the borderline between two grades at the end of the semester, homework performance may be used to determine the final grade.

You will turn your homework in on Gradescope. Homework due dates are as follows:

Homework 1: Thursday, January 26
Homework 2: Thursday, February 2
Homework 3: Thursday, February 9
Homework 4: Thursday, February 16
Homework 5: Thursday, March 2
Homework 6: Thursday, March 9
Homework 7: Thursday, March 23
Homework 8: Thursday, March 30
Homework 9: Thursday, April 13
Homework 10: Thursday, April 20
Homework 11: Thursday, April 27 (not graded)

Each homework is due by 11:59 pm EST on its due date. Note that some of these due dates may be delayed if circumstances warrant. Late homework will not be accepted, except under special circumstances, at the discretion of the instructor. Also, Homework 11 will not be graded, but the material on it will be included on the final exam, so it is highly recommended that you finish it.

There will be one project/programming assignment. It will be due the week before finals week, so it will count as extra credit. More details on the project will be forthcoming, but it is meant to demonstrate how the material in this course can be used to solve some engineering problems. Students may use any programming language, but Python is recommended.

Exams

Two midterms and a final exam will be given. Dates for the midterms are

Midterm 1:	Thursday, February 23 8:00pm FRNY G140
Midterm 2:	Tuesday, April 11 8:00pm FRNY G140
Final exam:	Wednesday, May 3 3:30pm Fowler Hall

The exams will generally consist of a combination of partial credit problems that are similar in format to the homework problems and multiple choice questions.

If you have an unavoidable conflict with a scheduled exam, please let Professor Comer know as soon as possible, and special arrangements can be made, depending on the circumstances. Please do not make travel arrangements for the end of the semester without first ensuring you will be on campus for the final exam.

Final Grade

Final grades will be computed using a weighted average of homework and exam scores, plus extra credit points. Weighting will be

10%	Homework
30%	Midterm 1
30%	Midterm 2
30%	Final exam

The class is graded according to a curve. Scores will be computed based on the above weightings, 0 to 3 points of extra credit will be added to each student's score based on performance on the programming project to get a final score, and then the resulting final scores will be ranked. The letter grade will be determined based on cutoff points in the cumulative

scores, which will be available only after the final exam is graded. However, grade cutoffs will be no higher (after extra credit) than: 93 A-, 83 B-, 73 C-, 63 D-. The cutoff between D- and F can vary greatly from semester to semester, but it is typically significantly lower than 60.

Textbook

A. Leon-Garcia, Probability, Statistics, and Random Processes for Electrical Engineering, Prentice Hall, 3rd Edition, 2008.

While you are not required to purchase the textbook, some students find it helpful as a supplement to the lecture notes and homework problems. Homework problems taken from the textbook are completely written out in the homework assignments, so you will not need the textbook to find the homework problems, but there are many good examples and problems in the textbook that are not assigned as homework.

Topics covered

The following topics will be covered in this course

- Modeling random experiments: the axiomatic approach
  - Set theory
  - The sample space
  - The event space
  - The probability measure
- Conditional probability
- Independent events
- Random variables
  - One random variable
  - Two random variables
  - *n* random variables, for finite *n*
  - Convergence of random sequences
  - Random processes

Course 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.

Learning Outcomes

A student who successfully fulfills the course requirements will have demonstrated:

- An ability to solve elementary probability problems involving random events and random variables.

- An ability to model uncertainty by random variables and analyze the implications in a range of engineering applications.
- An understanding of the idea of a random process, along with some basic examples and applications.

Academic Dishonesty
All students are expected to practice honest and ethical behavior in ECE 302. Cheating will not be tolerated. Any action that might give a student an unfair advantage on homework or exams will be considered cheating. Examples of cheating include, but are not limited to:

- sharing information during an exam,
- using forbidden material or devices during an exam,
- viewing and/or working on an exam before or after the official time allowed,
- requesting a regrade of work that has been altered,
- submitting work that is not your own.

Cases of academic dishonesty may be reported to the Dean of Students office, and may result in punishment. Possible punishments include, but are not limited to, a score of zero on work related to the cheating incident, a failing grade for the course, and, in severe cases, expulsion from the university.

Campus emergencies
In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. In such an event, information will be posted on Brightspace or provided through e-mail.

Non-discrimination Policy

Purdue University is committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. Link to Purdue's nondiscrimination policy statement.

Access for treatment for mental illness

Any student who is struggling with mental illness (major depression, anxiety disorder, etc.) is welcome to see Prof Comer for help finding treatment. She will attempt to assist any student who is having trouble finding adequate treatment.

Disclaimer: This syllabus is subject to change. Note that any changes to the information in this syllabus will be announced in class and on Brightspace.