

EE 465 Probability for EE and CMPEN

Spring 2025: 1/13/25 - 5/2/25 (lectures)

LECTURES: MWF 12:20-1:10, 107 EE West

INSTRUCTOR: Prof. George Kesidis

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INSTRUCTOR'S OFFICE HOURS: Wed 10AM-noon and by appt (zoom)

FINAL LETTER GRADE:

F if the grade on the midterm exams is less than 50%;

otherwise based on the TOTAL FINAL % GRADE:

D 50%, C 60%, C+ 65%, B- 70%, B 75%, B+ 80%, A- 85%, A 90%

where

TOTAL FINAL % GRADE:

homework 20%

programming projects 20%

two in-class midterm exams 30% each

So, the only way homework and projects count toward your letter grade is if you score 50% or more on the exams.

COURSE TEXT: Y.A. Rozanov. "A concise course in probability." Dover

ISBN-13: 978-0486635446 ISBN-10: 0486635449

COURSE SLIDEWARE: <http://www.cse.psu.edu/~gik2/teach/default.htm>

REQUIRED BACKGROUND:

This course requires some basic background in calculus and linear algebra.

The computer assignments will involve Python programming.

TOPICS:

Fundamentals of probability, sample spaces, combinatorics, and random variables. Distribution functions, expectation, variance, joint distributions and covariance, important distribution types. The law of large numbers and central limit theorem for sequences of independent random variables, confidence intervals, and introduction to hypothesis testing. Example applications will be drawn from communication theory, information theory, machine learning, filtering of wide-sense stationary processes by linear & time-invariant systems (including in the frequency domain, i.e., power spectral density). If time permits, the final lectures will be on AI/ML.

HOMEWORK AND EXAM SCHEDULE:

Homework is due on Fridays in class.

Mon Jan 13: Lectures start

Mon Jan 20: MLK day (no lecture)

Fri Jan 24: Asst 1 due - Rozanov Ch. 1 p. 10,11: 1-4,6-12

Fri Jan 31: Asst 2 due - Rozanov Ch. 2 p. 22-24: 1,2,6,9,11,19

Write a Python script to reproduce a graph
such as on Slides 12,13 from a random sequence
that you generate from
<https://www.random.org/integers/>
Include the script, output and your interpretation
of the results.

Fri Feb 14: Asst 3 due

Rozanov Ch. 1 p. 12: 17

Rozanov Ch. 2 p. 23: 13,14

Rozanov Ch. 4 p. 50-52: 1,12,16

Rozanov Ch. 5 p. 65-66: 2-5,7,8,9b

*note: book's answer to 5.4 is not correct (the answer given

is for ">2" not "2 or more")

Mon Feb 24: in-lecture midterm exam 1

Fri Feb 28: Asst 4 due - Rozanov Ch. 4 p. 51-52: 3,4,5,6,14,15

Fri Mar 07: Project I due - best-of games, computer assignment

Sun Mar 09 - Sat Mar 15: Spring Break (no classes)

Fri Mar 21: Asst 5 due - Chebyshev Inequ (LLN)

Rozanov p. 53: 18,21

Rozanov p. 80: 3

Fri Apr 04: Asst 6 due - Stirling's approx (CLT)

Rozanov Ch. 1 p. 12: 14,15

Rozanov Ch. 2 p. 24: 16

Rozanov Ch. 6 p. 81: 11,13,14

Fri Apr 11: Computer Project II (statistical confidence) due

Fri Apr 18: Asst 7 due - Handout on WSS processes, problems: I-IX

Fri Apr 25: In-lecture midterm exam 2

Mon Apr 28 - Fri May 2: Last lectures on machine learning

No Final Exam

Required Syllabus Statements

All syllabi must include:

Contact information for all course instructors

Required course materials

Course content and expectations

Location of the program (i.e., class meeting times and location)

Course Goals and Objectives

Grade Breakdown by Assessment Type and Percentage

Examination Policy (include evening exam schedule, if applicable)

Statements Required for All Courses

Academic Integrity

Academic integrity is the pursuit of scholarly activity in an open, honest, and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights, and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation, or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

Accommodations for Students with Disabilities

Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. Student Disability Resources (SDR) website provides contact information for every Penn State campus (<https://equity.psu.edu/offices/student-disability-resources/campus-offices>). For further information, please visit Student Disability Resources website (<http://equity.psu.edu/sdr/>).

In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: See documentation guidelines (<http://equity.psu.edu/sdr/guidelines>). If the documentation supports your request for reasonable accommodations, your campus disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early as possible. You must follow this process for every semester that you request accommodations.

Counseling and Psychological Services

Many students at Penn State face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all

students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

Counseling and Psychological Services at University Park (CAPS)

(<http://studentaffairs.psu.edu/counseling/>): 814-863-0395

Counseling and Psychological Services at Commonwealth Campuses

(<https://senate.psu.edu/faculty/counseling-services-at-commonwealth-campuses/>)

Penn State Crisis Line (24 hours/7 days/week): 877-229-6400

Crisis Text Line (24 hours/7 days/week): Text LIONS to 741741

Educational Equity and Reporting Bias

Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, or harassment due to age, ancestry, color, disability, gender, gender identity, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported through Educational Equity via the Report Bias webpage (<http://equity.psu.edu/reportbias/>)

Reporting Sexual Misconduct

Sexual misconduct is never tolerated at Penn State. Prohibited conduct includes sexual and gender-based harassment, stalking, sexual assault, and dating violence. These behaviors are not allowed in the classroom, the campus community, labs, or anywhere students, staff, and faculty are located. Prohibited behaviors can include degrading comments such as belittling female-identified students, LGBTQ+ individuals, and gender-diverse students. It can also include harassment, touching someone without their consent, following someone without consent, repeated calls or messaging, physical acts of violence, and more. In other words, professional and appropriate behavior is always expected, and inappropriate or unprofessional behavior is never tolerated. For more information, please refer to the Student Code of Conduct and Penn State Policies AD85 and AD91. (Title IX Sexual Harassment | Penn State Policies (psu.edu) and Discrimination and Harassment and Related Inappropriate Conduct | Penn State Policies (psu.edu))

If you or anyone you know has experienced or is concerned about inappropriate or unprofessional behavior, you can talk with College, or School leadership, your instructor, academic advisor, or another trusted faculty/staff member, report to police or the Office of Sexual Misconduct Reporting & Response (titleix.psu.edu), or you can seek confidential support and assistance from the Gender Equity Center. The Gender Equity Center supports

any student who has had negative relationship experiences including those impacted by sexual violence, relationship violence, stalking, harassment, and other campus climate issues. Services include one on one crisis intervention/support, advocacy, exploring options, accommodations, safety planning, and referrals. They also promote awareness, build support for survivors, and conduct educational programs and events. All services are free and confidential. Gender Equity Center | Penn State Student Affairs (psu.edu)

* Source: <http://keepteaching.psu.edu/> and <https://senate.psu.edu/> as of 12/5/22

* Last updated February 2, 2024