IE 1070: PROBABILITY, RANDOM VARIABLES, AND DISTRIBUTIONS

Fall 2025 Course Syllabus

Credit: 3

Lecture Hours

Section 2: Tuesday 1:50-4:25 pm, S206
Section 3: Wednesday 8:15-11:00 am, S206
Section 4: Wednesday 1:50-4:25 pm, S206

Instructor

Dr. Xiaomei Tan
Email: xiaomei.tan@scupi.cn
Office: N417
Office Hours:

- 9:00am – 12:00pm, Tue
- 12:50pm – 1:50pm, Mon&Tue&Wed
- 4:30pm – 5:30pm, Mon&Tue&Wed

Contact instructor:

- Attend office hour or via email
- Extra office hours will be offered by appointment.

Teaching Assistants

Mingyang Wu
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Nuoxi Lin
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TA Responsibilities: TAs primarily support the instructor across a range of tasks, including grading homework, in-class exercises, and exams, addressing student inquires, and contributing to the smooth functioning of educational environments.
Contact TAs: QQ or via email

Note:

- Modifications to this syllabus may occur. Please stay informed about any revisions announced during class or on the Blackboard website. Lecture materials, reading lists, grading details, and announcements will all be accessible through Blackboard.
- Important dates and information will be announced during class. Students should stay informed about announcements on Blackboard and via emails sent to their SCU email address.

- While emailing the instructor or TAs, please kindly include **"IE 1070"** in the subject line for efficient communication. Please use your university email account (student_ID_number@stu.scu.edu.cn), as emails from other sources could be caught by the SCU spam filter.

Textbook

Walpole R. E., Myers R. H., Myers S. L., & Ye K. (2012). *Probability & Statistics for Engineers & Scientists* (9th ed.). Prentice Hall. (Available on Blackboard)

Course Description

Probability, Random Variables, and Distributions is a core undergraduate course that introduces the fundamental principles of probability theory. Topics include sample spaces, events, probability measures, and a range of probability distributions. The course emphasizes both theoretical foundations and practical applications, enabling students to analyze uncertainty, compute probabilities, and model random phenomena. It provides essential preparation for advanced study in mathematics, statistics, engineering, economics, and other disciplines where probabilistic reasoning plays a central role.

Course Objectives

By the end of this course, students should be able to:

- understand the basic principles of probability, including sample spaces, events, and probability axioms.
- compute probabilities for simple and complex events using techniques such as permutations, combinations, and conditional probability.
- analyze and work with probability distributions, both discrete and continuous, including the binomial, Poisson, normal, and exponential distributions.
- apply probability theory to real-world situations, demonstrating the ability to model and analyze random phenomena, make predictions, and solve practical problems involving uncertainty.

Learning Outcomes

Upon successful completion of this course, students will be able to:

- demonstrate a solid understanding of fundamental probability concepts and principles.
- compute probabilities accurately for both simple and complex events, using appropriate methods.
- analyze and work with various probability distributions, applying them to relevant scenarios.
- apply probability theory to practical situations, including modeling random events and solving problems involving uncertainty.
- utilize probabilistic reasoning to make informed decisions in diverse fields, showcasing the ability to think critically and solve problems effectively in uncertain environments.

Grading

- Midterm exam: 30%
- Final exam: 40%
- Homework & Case study: 20%
- Attendance / In-class exercise: 10%

Course grades are assigned based on a 100-point scale. The numerical equivalence to letter grades is as follows:

Total Scores	Grades	Total Scores	Grades
>=90	A	>=70	C+
>=85	A-	>=66	C
>=80	B+	>=63	C-
>=76	B	>=60	D
>=73	B-	Below 60	F

*Round up policy: For example, if you get a final score of 89.5, we will round it up to 90. If you get 89.4 unfortunately, we are not able to round it up to 90. We keep this rule the across all students.

Attendance

Attendance at lectures is mandatory and will be monitored periodically using in-class exercises and a sign-in sheet. **NO makeup in-class exercises will be permitted.** In case of foreseeable absences, it is the students' responsibility to **inform the instructor prior to the class** and provide **written verification** of the reason for the absence. **Missing three or more sessions will result in a loss of all the attendance points. Absences of five or more will lead to failure (F grade) in the course.**

Homework & Case Study

[Due] Homework assignments will be distributed periodically throughout the semester and will be due at the start of the subsequent class. **Late homework and case study will NOT be accepted**, unless certified medical proof is given. It is advised that assignments be submitted in advance of the designated deadline to avoid any potential lateness. It is the students' responsibility to ensure **accurate and timely submission**.

[Submission] Each assignment must be submitted in **one PDF format file through the Blackboard**. Please also answer the problems according to the order of problems assigned. (Notes: The homework can be typed or handwritten to take photos. The HW done on iPad can be directly generated by the software to generate PDF files, and the handwritten work can be merged to generate PDF as well.)

[Naming Format] Student ID Name. (Example: 2023141520151吴明阳)

[Grading Criteria] The full score of each assignment is 100 points. **Five points will be lost** if you fail to submit it in the correct format and order of the problems. Extra points will be lost if you miss answering problems. Directly copying and pasting solutions generated by Generative AIs is prohibited and will result in a complete loss of points for that question.

[HW Solution] HW solutions will be posted on Blackboard after grading is completed.

Exams

[Format] Exams are scheduled following the course timetable. **Closed book. Three A4-sized cheat sheets are allowed** with content handwritten on both sides.

[Attendance] Attendance for exams is mandatory. In case of foreseeable absences, it is the students' responsibility to inform the instructor **one week prior to the exam** and provide **written verification** of the reason for missing the exam. For unforeseen emergencies, it is the students' responsibility to provide written verification **within one week after the event**. Makeup exams will be arranged as needed. Failure to give prior notice for an absence will result in a "**ZERO**" score, except in exceptional cases.

Class Policy

1. Class participation

Regular class attendance as well as active participation in course activities is expected. It is the students' responsibility to complete all assigned in-class tasks. Any required student absences should be reported to the instructor in advance via email or if not possible in advance, shortly thereafter.

2. Academic integrity

Academic integrity is the pursuit of scholarly activity in an open, honest, and responsible manner. In this course, students are expected to uphold the dignity, rights, and property of their peers. All exam work and homework must be a product of individual effort.

Any violation of academic integrity will be taken very seriously. This includes, but is not limited to, plagiarism (such as uncredited copying, closely paraphrasing others' work without proper citation, or submitting work that is not your own) and any form of cheating during exams or assignments. **Penalties for academic dishonesty may range from a one-letter grade reduction to failure of the course, depending on the severity of the offense. In more serious cases, incidents may also be reported to the university for further disciplinary action in accordance with institutional policies.**

Tentative Course Schedule (September 8, 2025)

Lecture	Date	Topic
1	9/9 9/10	Probability (sample space, events, counting sample points)
2	9/16 9/17	Probability (probability of an event, additive rules)
3	9/23 9/24	Probability (conditional probability, independence, product rule, Bayes' rule)
4	9/23 9/26	Random Variables and Probability Distributions (random variable, discrete/continuous probability distributions)
5	9/28 (Tue) 9/30 10/11 (Wed)	Random Variables and Probability Distributions (joint probability distributions)
6	10/14 10/15	Mathematical Expectation (mean, variance, covariance of random variables)
7	10/21 10/22	Mathematical Expectation (means and variances of linear combinations of random variables, Chebyshev's theorem); Review
	TBD	Midterm Exam
8	11/4 11/5	Some Discrete Probability Distributions (binomial and multinomial distributions, hypergeometric distribution)
9	11/11 11/12	Some Discrete Probability Distributions (negative binomial and geometric distributions, Poisson distribution, Poisson process)
10	11/18 11/19	Some Continuous Probability Distributions (continuous uniform distribution, normal distribution, areas under the normal curve)
11	11/25 11/26	Some Continuous Probability Distributions (normal approximation to the binomial, Gamma and exponential distributions)
12	12/2 12/3	Some Continuous Probability Distributions (Chi-squared distribution, Beta distribution, lognormal distribution, Weibull distribution)
13	12/9 12/10	Some Joint Probability Distributions (joint binomial distribution, joint Poisson distribution, joint uniform distribution, joint exponential distribution, mixed joint distribution)
14	12/16 12/17	Functions of Random Variables (transformations of variables); Review
	TBD	Final Exam