



蘇州大學
Soochow University

MAT 467 Theory of Probability

Summer 2024

Course Credits: 4

Contact Hours: 56 hours

Instructor: TBA

Email: TBA

COURSE OBJECTIVES

Advance your knowledge of probability theory by diving into measure-theoretic foundations and in-depth examinations of probability spaces, random variables, martingales, and limit theorems. Learn about complicated mathematical topics such as probability convergence and large-number rules. Learn about the applications of probability theory in statistics, mathematics, and theoretical physics via theoretical debates and problem solving. Prepare to conduct advanced research and additional study in probability theory and associated fields.

Upon Completion of this Course, students will be able to:

1. Understand advanced ideas in probability theory, including as measure-theoretic foundations, probability spaces, random variables, martingales, and limit theorems.

2. Analyze complicated mathematical ideas such as probability convergence and big number laws, and then apply them to theoretical and practical applications.

3. Engage in theoretical debates and problem-solving exercises to get a better knowledge of probability theory and its applications in statistics, mathematics, and theoretical physics.

4. Apply advanced probability theory knowledge to real-world circumstances to demonstrate your ability to effectively model and evaluate complicated systems.

5. Prepare to conduct advanced research and future studies in probability theory and associated areas by developing a solid theoretical basis and problem-solving abilities.



PREREQUISITES

N/A

GRADING

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:

ITEM	POINTS
Quizzes	20 Points
Midterm 1	15 Points
Midterm 2	15 Points
Project	20 Points
Final Exam	30 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F.$$

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

Rick Durrett, *Probability: Theory and Examples*, 5th Edition, Cambridge University Press, 2019.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
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Module 1	Topics: Topic 1: Measure Theory Topic 2: Product Measures, Fubini's Theorem Topic 3: Weak Laws of Large Numbers Topic 4: Borel-Cantelli Lemmas Assessments: Quiz#1
Module 2	Topics: Topic 5: Strong Law of Large Numbers Topic 6: Central Limit Theorems Topic 7: The De Moivre-Laplace Theorem Topic 8: Martingales Assessments: Quiz#2 Project
Module 3	Topics: Topic 9: Backwards Martingales Topic 10: Markov Chains Topic 11: Ergodic Theorems Topic 12: Birkhoff's Ergodic Theorem Assessments: Midterm#1 Project
Module 4	Topics: Topic 13: Brownian Motion Topic 14: Itô's formula Topic 15: Applications to Random Walk Topic 16: Multidimensional Brownian Motion Assessments: Midterm#2 Project due
Module 5	Topics: Topic 17: Feynman-Kac Formula Topic 18: Dirichlet problem Topic 19: Green's Functions and Potential Kernels Topic 20: Poisson's Equation Assessments: Final Exam

ATTENDANCE



1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS

- 1) Late assignments are not acceptable and are subjected to grade deductions.
- 2) Assignments submitted in the wrong format will be counted as not submitted.
- 3) Failure to submit or fulfill any required course component results in failure of the class.
- 4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
- 5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACADEMIC INTEGRITY POLICY



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Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.