



蘇州大學
Soochow University

MAT 355 Mathematics of Finance

Winter 2024

Course Credits: 4

Contact Hours: 56 hours

Instructor: TBA

Email: TBA

COURSE OBJECTIVES

This course provides a comprehensive introduction to fundamental concepts of financial engineering and mathematical techniques essential for understanding and solving financial problems. Topics covered include time value of money, rates of return, investment cash-flow sequences, utility functions, stochastic processes, mean-variance analysis, portfolio selection, hedging strategies, the Capital Asset Pricing Model (CAPM), and the Black-Scholes theory of options. Emphasis will be placed on the application of mathematical tools to solve real-world financial problems.

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

1. Develop a solid understanding of various financial instruments, including stocks, bonds, futures, forwards, options, and other derivatives;
2. Gain knowledge and skills in arbitrage-free pricing and hedging strategies;
3. Understand the significance of risk-neutral probability measures and the application of stochastic calculus in mathematical finance
4. Learn the basics of continuous time models and Black-Scholes option pricing formula;
5. Utilize mathematical software such as MATLAB to price and manage the risks of financial instruments in discrete-time models;
6. Apply mathematical models and techniques to solve real-world financial problems and make informed financial decisions.



PREREQUISITES

MAT 260 Calculus III
MAT 270 Introduction to Probability and Statistics

GRADING

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

ITEM	POINTS
Quizzes	20 Points
Assignments	20 Points
Midterm 1	15 Points
Midterm 2	15 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:

M. Capinski and T. Zastawniak, *Mathematics for Finance*, Springer, 2003.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
Module 1	Topics: Topic 1: An Overview of Basic Probability



	Topic 2: A Simple Market Model Topic 3: The Time Value of Money Topic 4: Interest Rates and Compounding Assessments: Quiz#1
Module 2	Topics: Topic 5: Rates of Return Topic 6: Dynamics of Stock Prices Topic 7: Binomial Tree Model Topic 8: Discrete Time Market Models Assessments: Assignment#1 Quiz#2
Module 3	Topics: Topic 9: Portfolio Management Topic 10: Two Securities Portfolio, Several Securities Portfolio Topic 11: Capital Asset Pricing Model Topic 12: Stochastic Process Assessments: Midterm#1
Module 4	Topics: Topic 13: Forward Contracts Topic 14: Futures Option Pricing Topic 15: Options Topic 16: Option Pricing Assessments: Assignment#2 Midterm#2
Module 5	Topics: Topic 17: Black-Scholes Formula Topic 18: Hedging Strategies Topic 19: Case Studies: Hedging Business Risk, Speculating with Derivatives Topic 20: Final Exam Review 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 (e.g., note taking, reading course documents).

ACADEMIC INTEGRITY POLICY

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



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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.