

ISYE 6759: STOCHASTIC PROCESSES IN FINANCE: I

Instructor: Dr. Shijie Deng (deng@gatech.edu)

Course Prefix and Number: ISYE 6759 QCF

Term: Fall 2026

Classroom: TBA.

Course Information

Quantitative modeling of financial markets, derivative securities pricing, and portfolio optimization. Concepts from mathematics, probability and stochastic calculus are introduced as needed. Introduction to the fundamental principles of pricing financial securities through no-arbitrage and the implementation of no-arbitrage pricing models through advanced techniques in probability, stochastic process and dynamic optimization.

Prerequisites:

Math 3215 Probability & Statistics. Basic probability, linear algebra, and calculus; or consent of instructor.

Textbook:

The required textbook is *An Introduction to the Mathematics of Financial Derivatives*, Salih N. Neftci, Academic Press; ISBN: 0125153929; 2nd edition (April 2000).

Course Objective

The objective of this course is to introduce the core concepts and quantitative models in financial asset pricing. Upon completion of the course, students shall be able to apply the core concepts and advanced techniques to solve financial asset pricing problems. Students shall also be able to utilize stochastic processes to construct the discrete-time and continuous-time asset pricing models for analyzing capital investments, pricing financial derivative securities, and managing tradeable risks.

Course Outcomes:

At the end of this course, we hope to help students build the following skills.

- Develop a rigorous technical foundation in **probability theory and stochastic processes** to model the uncertainty inherent in financial markets.
- Gain the ability to apply **no-arbitrage principles and martingale measures** to price contingent claims and derivative securities through **discrete-time and continuous-time models**, ranging from binomial trees to the Black-Merton-Scholes framework.
- Use **Ito processes, stochastic calculus and Ito's formula** as mathematical tools for analyzing asset price dynamics like Brownian motion.
- Implement computational algorithms to simulate asset prices and execute numerical option pricing models.

Software:

Students shall be able to use at least one programming tool (such as Python, C++, or R) to solve problems in homework/project when necessary.

Grading Policy:

Course grades will be based on assessment of students' understanding of the material covered throughout the semester through course assignments, quizzes and exams. Homework and tests are graded for correctness, with partial credit awarded for partial answers (e.g. work shown) or to account for minor errors. Homework assignments, project, tests and their respective weights in the course grade are as follows:

Homework (15%): There will be a homework assignment approximately every 1-2 weeks.

Quizzes (20%): 4-5 in-class, timed-quizzes.

Midterm exam (30%): In-class, closed-book, and closed-notes.

Final Exam (35%): Cumulative exam, in-class, closed-book, and closed-note.

Thresholds for letter grades: $A \geq 85\%$; $85\% > B \geq 75\%$; $75\% > C \geq 65\%$; $65\% > D \geq 50\%$; $F < 50\%$.
The right to adjust the thresholds to avoid certain extreme cases is reserved.

Test Requirements (Quizzes, Midterm and Final Exams):

1. Closed-book, closed-notes.
2. One formula sheet on 8x11 paper allowed, both sides can be used.
3. A scientific calculator or a programmable calculator can be used in the test.

Course Policy:

Participation is important in this class. Class attendance is mandatory and recorded by signing Attendance Sheet. Unexcused absences may affect your final grade. Up to three non-excused absences are allowed without questions asked. Interviews, family trips, meetings for other courses are not excused.

Working together on course assignments is allowed, but your handed-in solutions should be personal and show individual effort (NOT identical to the others' assignments nor the previous solutions). For the regular assignments, the students need to submit their solutions on Canvas by the due date/time (usually 11PM). Penalty will be imposed on late submission of assignments as specified in Late Submission Policy. In addition, we ask students to type homework and project reports in Word or Latex format. Make-up tests are not permitted except in cases of serious illness, Institute Approved absences, Dean's office recommended absences, or GT Athletic Association conflicts with appropriate documentations. All course materials and grades will be posted on Canvas. You are responsible to check if your posted grades are correct. You have three days from the day we return assignment or tests on Canvas for considering re-grading. We reserve the right to re-grade the entire assignment or test. So, you may lose more points than you gain when we re-grade your assignment or test. Please let us know any special situation you may have during the semester ASAP.

Late Submission Policy

- 1) No make-up assignments. 5% grade deduction if submission received within 24 hours passing the due time. 15% grade deduction if submission received within 48 hours passing the due time. 30% grade deduction if submission received later than 48 hours after the due time.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review [Georgia Tech's Honor Code](#) and the student [Code of Conduct](#). Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations document (<https://catalog.gatech.edu/rules/22/>) articulates some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek.

Accommodations for Students with Disabilities:

Georgia Tech provides upon request appropriate academic accommodations for students with disabilities. <https://disabilityservices.gatech.edu/>. If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to discuss the needs and to obtain an accommodations letter. Please also e-mail me as soon as possible to set up a time to discuss your learning needs.

Core IMPACTS

Not applicable. (<https://www.usg.edu/curriculum/core-impacts/> is the University System of Georgia's General Education curriculum.)

Collaboration, Group Work, and Use of Generative AI

You are allowed to work in groups on all homework and out-of-class assignments, but any assignment you turn in must be written in your own hand. Homework, tests and exams are to be your own work.

In general, use of Generative AI as assistant for learning course materials is allowed. However, direct use of AI-generated solutions (without writing them in your own hand) and/or any previous semester course materials (such as homework solutions and project submissions) as submissions to course assignments are prohibited in this course. Using these materials will be considered a direct violation of academic policy and will be dealt with in accordance with the [GT Academic Honor Code](#). When in doubt regarding what constitutes a violation, do not guess the answer and post on Piazza for clarifications.