IEDA 4331 Quantitative Methods in Financial Engineering

2026 Spring

Instructor:	Wei JIANG	**Office hour:**	By appointment
Email:	weijiang@ust.hk	**Office:**	5548

Course Description

This course covers key quantitative methods commonly used in financial engineering to model, analyze, and solve fundamental problems in finance. It begins with discrete-time models for option pricing, and then introduces stochastic calculus and continuous-time stochastic differential equations used in option pricing. These tools are applied to the valuation of various derivative securities, including American and exotic options. The course concludes with an overview of related topics such as risk management and financial technology (FinTech).

Course Prerequisite

(FINA 3203 OR IEDA 3330) AND (IEDA 3250 OR ISOM 2500).

Class Time and Location

The lectures are from 10:30AM to 11:50AM on Tuesday and Thursday at classroom 2898, Lift 25-26. In addition, the lab hour is from 9:00AM to 10:20AM on Wednesday at Rm 3207. In regular lectures, you will learn theoretical models and quantitative methods. In lab hours, the TA Mr. Weinan Wu will give tutorials and answer questions from lectures and homework.

Course Schedule

The schedule is tentative and subject to change

- Week 1: Introduction
- Week 2 to 3: Forward, Future, and Options
- Week 4 to 5: Binomial tree model
- Week 6 to 7: Continuous-time method and Black-Scholes model
- Week 8 to 9: American options, Risk-neutral pricing
- Week 10 to 11: Exotic options
- Week 12 to 13: Credit risk, Risk management, Fintech, and other Miscellaneous topics

Books

Options, Futures, and Other Derivatives by John Hull
Stochastic Calculus and Finance by Steven Shreve (more mathematical)

Objective

After the course, the students are expected to understand the quantitative aspects of the financial markets, including how to model stock prices (random variables, binomial tree, geometric Brownian motion, stochastic volatility, etc.), and the mechanism of pricing derivatives (risk neutral pricing, Black-Scholes, no arbitrage). The students will be endowed with basic skills that are required for most entry-level quantitative financial positions, including derivative pricing via both binomial tree and continuous time frameworks, risk hedging and risk management, etc.

Homework and Exams

There are about 3-5 times of homework. Homework is usually posted on Thursday. For homework, the due time will be posted and you are expected to submit the e-copy to Canvas. There will be two exams: midterm exam and final exam.

Grade

Tentative: Participation (5%), homework (25%), midterm exam (25%), final exam (25%), group project (20%).

Learning Resources

Google, stackoverflow, office hour.

Teaching Philosophy

- Financial engineering is hard. It requires a reasonably solid background of mathematics, programming, and financial intuition.
- You are encouraged to ask questions in class. No questions are stupid. Usually it is because I didn't explain it clearly enough or the problem is difficult.
- Quantitative finance is a topic that can span three or more courses. I'll only go through the most important topics/theories. The more you get curious about, the more you read/ask me after class, the more you learn.
- For homework, discussing with classmates is allowed; copying without thinking and digesting is not.

Academic Honesty

Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation. Questions related to course assignments and the academic honesty policy should be directed to the instructor.

☞ I certainly impose a sanction on the student committed to any academic fraud. It varies depending upon the instructor's evaluation of the nature and gravity of the offense. Possible sanctions include but are not limited to, the following: (1) Require the student to redo the assignment; (2) Require the student to complete another assignment; (3) Assign a grade of **zero** to the assignment; (4) Assign a final grade of **zero** for the whole course.