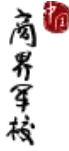




PHBS
北京大学汇丰商学院



FIN 519

Stochastic Finance

Module 4, 2024-2025

Course Information

Instructor: Yu SUN

Office: PHBS Building, Room 747

Phone: 86-755-2603-3096

Email: yusun017@gmail.com

Office Hour: Monday 10:00 AM – 12:00 PM; Tuesday & Friday 16:00 – 17:00

Teaching Assistant:

Phone:

Email:

Classes:

Lectures: Tuesday & Friday 10:30 AM – 12:20 PM

Venue: PHBS Building, Room

Course Website:

If any.

1. Course Description

1.1 Context

Course overview:

This course introduces stochastic calculus, a fundamental tool in continuous-time finance, and explores risk-neutral pricing theory in financial engineering. Practical examples will be provided to demonstrate applications in option pricing and financial modeling. The course consists of the following parts:

- A review of general probability theory;
- Brownian motion and its properties;
- Ito's formula and Black-Scholes option pricing theory;
- Risk-neutral pricing and the fundamental theorems of asset pricing;
- Stochastic differential equations and the Feynman-Kac formula;
- Financial derivatives with various payoff structures (European-style, American-style and Exotic options).

Prerequisites:

Calculus, Linear Algebra, Probability.

1.2 Textbooks and Reading Materials

Textbook:

S. E. Shreve, Stochastic Calculus for Finance II: Continuous-Time Models. Springer.

Reading Materials:

S. E. Shreve, Stochastic Calculus for Finance I: The Binomial Asset Pricing Model. Springer.

T. Bjork, Arbitrage Theory in Continuous Time. 3rd Edition. Oxford University Press.

2. Learning Outcomes

2.1 Intended Learning Outcomes

Learning Goals	Objectives	Assessment (YES with details or NO)
1. Our graduates will be effective communicators.	1.1. Our students will produce quality business and research-oriented documents.	YES
	1.2. Students are able to professionally present their ideas and also logically explain and defend their argument.	YES
2. Our graduates will be skilled in team work and leadership.	2.1. Students will be able to lead and participate in group for projects, discussion, and presentation.	YES
	2.2. Students will be able to apply leadership theories and related skills.	
3. Our graduates will be trained in ethics.	3.1. In a case setting, students will use appropriate techniques to analyze business problems and identify the ethical aspects, provide a solution and defend it.	
	3.2. Our students will practice ethics in the duration of the program.	
4. Our graduates will have a global perspective.	4.1. Students will have an international exposure.	YES
5. Our graduates will be skilled in problem-solving and critical thinking.	5.1. Our students will have a good understanding of fundamental theories in their fields.	YES
	5.2. Our students will be prepared to face problems in various business settings and find solutions.	YES
	5.3. Our students will demonstrate competency in critical thinking.	YES

2.2 Course specific objectives

See the course overview in 1.1.

2.3 Assessment/Grading Details

Tentative weights are as below:

Assignments 30%, Mid-term Exam 35%, Final Exam 35%.

2.4 Academic Honesty and Plagiarism

It is important for a student's effort and credit to be recognized through class assessment. Credits earned for a student work due to efforts done by others are clearly unfair. Deliberate dishonesty is considered academic misconducts, which include plagiarism; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; or altering, forging, or misusing a University academic record; or fabricating or falsifying of data, research procedures, or data analysis.

All assessments are subject to academic misconduct check. Misconduct check may include reproducing the assessment, providing a copy to another member of faculty, and/or communicate a copy of this assignment to the PHBS Discipline Committee. A suspected

plagiarized document/assignment submitted to a plagiarism checking service may be kept in its database for future reference purpose.

Where violation is suspected, penalties will be implemented. The penalties for academic misconduct may include: deduction of honour points, a mark of zero on the assessment, a fail grade for the whole course, and reference of the matter to the Peking University Registrar.

AI tools requirements:

Assignments should be completed independently with original thought. AI tools may be used to aid in understanding related mathematical concepts but must not be used to generate answers directly. Any violation of this rule will result in a score of zero for the assignment.

For more information of plagiarism, please refer to PHBS Student Handbook.

3. Topics, Teaching and Assessment Schedule

Week	Date	Topics (Subject to changes)
Week 1	Apr 22 and 25	Review of Basic Probability Theory; One Period Financial Market Model
Week 2	Apr 29 and May 2	Information and Conditioning; No class on May 2 (International Labor Holiday)
Week 3	May 6 and 9	No class on May 6 (International Labor Holiday); Random Walk; Properties of Brownian Motions
Week 4	May 13 and 16	Ito Integral and Ito Processes; Ito Formula
Week 5	May 20 and 23	Black-Scholes Option Pricing Formula
Week 6	May 27 and 30	Change-of-Measure and Girsanov Theorem; Midterm Examination during class time on May 30
Week 7	Jun 3 and 6	Risk-Neutral Pricing
Week 8	Jun 10 and 13	Fundamental Theorems in Asset Pricing; Feynman-Kac Formula
Week 9	Jun 17 and 20	Exotic Option Pricing I (Barrier, Lookback, and Asian Options)
Week 10	Jun 24 and 27	Exotic Option Pricing II (American Derivative Securities)
	Jun 30	Final Examination

4. Miscellaneous

- The email (yusun017@gmail.com) is the preferred method of communication.
- Both the midterm and final examinations are closed-book; however, an A4-sized two-sided cheat sheet is allowed.