Course Code: Fin 523
Course Name：Derivative Pricing
Module 2, Academic Year 2018-2019

Course Information

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Classes:
Lectures:
Venue:

1. Course Description

1.1 Context

Course overview:

This course is tailored for master students with quantitative and finance background. The goal of this course is to help students understand the valuation of options in financial markets, including European option, American option, and possibly other options. We will also study the application in SSE 50 ETF Option and convertible bond in China. After the training, students are supposed to be capable of deriving analytical solutions for some basic options. They are also expected to grasp basic numerical tools for derivative pricing, such as: Monte-Carlo method, finite difference method, and etc. More importantly, they should feel confident of researching option-style assets afterwards.

Prerequisites: Probability Knowledge

Programming Skills: We will teach some basic programming commands for option pricing

1.2 References

1: Options Futures and Other Derivatives, by John Hull, Prentice Hall, 1993.
2: Arbitrage Theory in Continuous Time, by Thomas Bjork, Oxford University Press, 1998.
3: Financial Calculus: An Introduction to Derivative Pricing, by Baxter and Rennie, Cambridge University Press, 1996.
4: Stochastic Calculus for Finance I: The Binomial Asset Pricing Model, by Steven E. Shreve, Springer, 2004.

Lecture notes will be provided in class.

2. Learning Outcomes

2.1 Intended Learning Outcomes

Learning Goals	Objectives	Assessment
1. Our graduates will be effective communicators.	1.1. Our students will produce quality business and research-oriented documents.	Y
	1.2. Students are able to professionally present their ideas and also logically explain and defend their argument.	Y
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.	Y
	2.2. Students will be able to apply leadership theories and related skills.	Y
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.	Y
	3.2. Our students will practice ethics in the duration of the program.	Y
4. Our graduates will have a global perspective.	4.1. Students will have an international exposure.	Y
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.	Y
	5.2. Our students will be prepared to face problems in various business settings and find solutions.	Y
	5.3. Our students will demonstrate competency in critical thinking.	Y

2.2 Course specific objectives

2.3 Assessment/Grading Details

Assessment task	Weighting
Attendance	15%
Assignment	35%
Exam	50%
Total	100%

Assignment: 15%
There will be 15 taught lectures (18 lectures in all, one for exam, and two for final presentation). If you miss one of them without my permission, you will be deducted one mark.

Assignment: 35%
It is a group work and each group consists of 2-3 students subject to the class size. I will randomly assign the group members. The assignment will be distributed by the end of week 6. In week 9, each group will make a presentation for their assignment. The presentation should not exceed 25 minutes, including 5 minutes' Q&A. Grades are given based on the presentation. All group members within one group will get the same score.

Please report 'free rider' problems to me as early as possible and I will investigate the fact.

Exam: 50%
It will be held at the 12th lecture, lasting for 2 hours. It covers all the contents taught before that date, including 5% for the programming.

If you anticipate any conflicts with the exam dates, please inform me as early as possible before the exam. I do not accept travel plans, job/internship interviews as a legitimate reason. For other conflicts with sufficient evidence, we can discuss them case by case.

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.

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

3. Topics, Teaching and Assessment Schedule

Schedule	**Topics**
Lecture 1	Brownian Motion/Wiener Process, Ito Process, Geometric Brownian Motion, Continuous Time Model
Lecture 2	Binomial Distribution and Its Convergence to Continuous Time Model
Lecture 3	Risk Neutral Probability, Real World Probability, Pricing Contingent Claims
Lecture 4	The Black-Scholes Framework, Introduction to Options, Put-Call Parity, Option Bounds, Convexity of the Payoffs Convexity of the Payoffs
Lecture 5	Ito's lemma, Girsanov's Theorem, Radon-Nikodym Theorem, Martingale, Q Measure
Lecture 6	Black-Scholes Formula, BS PDE, Greeks, Delta Hedging Black-Scholes Model with Dividends, Cost of Carry

Lecture 7-8	Binomial Model, No Arbitrage, Complete Market, Arrow-Debreu Security, Its Application in American Option, Stopping Time, Early Exercise Boundary
Lecture 9	Properties for American Option
Lecture 10	Finite Difference Method: Explicit/Implicit/Crank-Nicolson, the 'Log Transform' for American Option
Lecture 11	Monte Carlo Simulation and Least Square Monte Carlo Simulation for American Option
Lecture 12	**Exam**
Lecture 13	Exam review and Random Tree Method for American Option
Lecture 14-16	Convertible Bond in China, SSE 50 ETF Option in China
	I may invite an expert in OTC option market to give us a talk.
Lecture 17-18	**Assignment Presentation**

4. Miscellaneous

Contacts: Please register your correct email when enrolling for this course as this is the main channel we contact each other throughout this course. Please check your email daily when it is possible. Treat these requirements as your own responsibility.

Discipline: I strongly encourage you to attend the class. Besides the attendance mark issue, the questions examined are mostly likely to be those I emphasize in lectures. Besides, if you decide to come, show your respect to both the instructor and your peers. Make sure to come to class on time and not leave early. Switch off your mobile or at least keep it quiet during class.