北京大学 汇丰商学院
Peking University HSBC Business School

FIN 519
Stochastic Finance
Module 3 (Spring), 2016-17

Course Information

Instructor: Jaehyuk CHOI
Office: PHBS Building, Room 755

Phone: 86-755-2603-0568
Email: jaehyuk@phbs.pku.edu.cn
Office Hour: Wed 3-5 PM or by appointment

***Teaching Assistant: Chenru LIU* (刘晨茹)**
Email: 1501213463@sz.pku.edu.cn

Classes:
Lectures: Monday & Thursday 3:30 – 5:20 PM
Venue: PHBS Building, Room 229

Course Website:
https://github.com/PHBS/2016.M3.StoFin

1. Course Description

1.1 Context

Course overview: *Stochastic Finance* is designed to provide students with probability and statistics theory for applications in finance. In the course, students will be introduced to the topics such as Random walk, martingale, Brownian motion, stochastic process and Ito's calculus. With those background, students will learn Black-Sholes-Merton model, various option pricing and hedging as applications in finance.

Prerequisites: Undergraduate-level knowledge in probability, statistics, and linear algebra is highly recommended. The students without these backgrounds can still take the course but are expected to take extra efforts. Computer programming is not going to be used in this course, so coding skill is not a prerequisite. (The programming will be covered in *Applied Stochastic Processes*. See below.)

Target audience: *Stochastic Finance* is a new required course for the students in quantitative finance program from the class of 2016-17, so the course is customized as such. However, this course is open to any student.

Relation to *Applied Stochastic Processes*: This course is a mandatory prerequisite for the application-focused advanced level course, *Applied Stochastic Processes,* which is offered by the same professor in module 1 every year. Therefore the students who have a plan to take *Applied Stochastic Processes* is required to take this course first.

1.2 Textbooks and Reading Materials

- *Stochastic Calculus and Financial Applications* by J. Michael Steele (see author's webpage on the book for some exercise problem solutions)

- *Adventures in Stochastic Processes (2002 ed.)* by Sidney I. Resnick

- *On Exponential Functionals of Brownian Motion and Related Processes* by Marc Yor

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.	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;
Attendance 20%, Mid-term Exam 25%, Assignments 25%, Final Exam 30%

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

Week	Dates	Topics and the corresponding textbook chapters
1	Feb 20 & 23	Review on undergraduate level probability and statistics knowledge required the course (Resnick Ch. 1~2)
2	Feb 27 & Mar 2	Introduction to random walk and Martingales (Steele Ch. 1~3, HW set 1 due on Thurs)
3	Mar 6 & 9	Definition of Brownian motion and the representations (Steele Ch. 3~4, Resnick Ch. 6)
4	Mar 13 & 16	Various properties of Brownian motion (Steele Ch. 5, Resnick Ch. 7, HW set 1 due on Thurs)
5	Mar 20 & 23	Mid-term exam (on Tues), A quick introduction to R/Python computer language for Monte Carlo simulation (on Thurs)
6	Mar 27 & 30	Introduction to Ito integration, the intuition and the examples (Steele 6, 8)
7	April 3 & 6	Introduction to stochastic differential equations (SDE) (Steele 9, HW set 3 due on Thurs)
8	April 10 & 13	Derivation of Black-Scholes formula and other derivative pricing examples (Steele 10-11)
9	April 17 & 20	Introduction to other advanced concepts: Girsanov theorem, Arbitrage-free condition, Feynman-Kac theorem (Steele 13-15, HW set 4 due on Thurs)
Final Exam on April 24 or 25		Two hours open-book exam without computer/calculator Exact time and location: TBA

4. Miscellaneous

- The email (jaehyuk@phbs.pku.edu.cn) is the preferred method of communication.