FIN 514
Applied Stochastic Processes
2018-19 Module 1 (Fall 2018)

Course Information

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Classes:
Lectures: Tuesday & Friday 1:30–3:20 PM
Venue: PHBS Building, Room 211

Course Website:
https://github.com/PHBS/2018.M1.ASP

1. Course Description

1.1 Context

Course overview: *Applied Stochastic Processes (ASP)* is intended for the students who are seeking advanced knowledge in stochastic calculus and are eventually interested in the jobs in financial engineering. As the name indicates, the course will emphasis on applications such as numerical calculation and programming. On completion of this course, the students will learn how financial observations (e.g. stock prices and FX rate) are modelled with stochastic processes and how they can be computed using analytics or computer simulations.

Prerequisites: *Stochastic Finance (FIN 519)*, a year 1 required course for quantitative finance program, is also highly recommended as it provides theoretical background. Undergraduate-level knowledge in probability, statistics, linear algebra and programming skill (Python) are highly recommended. The students without these recommended prerequisites are expected to take extra efforts.

1.2 Textbooks and Reading Materials
  - *Monte Carlo Methods in Finance* by Peter Jaeckel
  - *Option Valuation under Stochastic Volatility* by Alan Lewis
  - *Stochastic Calculus and Financial Applications* by J. Michael Steele
  - *Python for Data Analysis* by Wes McKinney

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 30%, Assignments 20%, Course Project 30%

- Mid-term exam will be taken on **Oct 23 in the 7th week.** There will be **no final exam**
- Attendance will be checked randomly. The score is calculated as 20 – 2x(#of absence)
- Leave request should be made 24 hours before except for emergency
- Job interview **cannot** be a valid reason for leave

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

Tentative course schedule is as below;

Week	Dates	Topics and the corresponding textbook chapters
1	Sep 4 & 7	Review on preliminaries: Probability, Statistics, Monte-Carlo simulation
2	Sep 11, **12** & 14	Brownian motion, Ito's Calculus Python crash course (Numpy) Stochastic differential equations
3	Sep 18 & 21	Application 1: Black-Scholes and Bachelier model
4	Sep 25 & 28	Application 2: spread and basket options
	Oct 2 & 5	No class due to National day break
5	Oct 9 & 12	Course project assignment Application 3: Stochastic Alpha-Beta-Rho (SABR) model
6	Oct 19 (No class on Oct 16)	Application 3: (continued) (**Oct 16** class rescheduled to **Sep 12**)
7	**Oct 23** & 26	**Mid-term exam**
8	Oct 30 & Nov 2	Follow up on Applications and course project
9	Nov 6 & 9	Course project presentation

4. Miscellaneous

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