

**City University of Hong Kong
Course Syllabus**

**offered by Department of Mathematics
with effect from Semester B 2017 / 18**

Part I Course Overview

Course Title: Stochastic Analysis in Finance

Course Code: MA5618

Course Duration: 1 semester

Credit Units: 3 Cus

Level: Level 5

Medium of Instruction: English

Medium of Assessment: English

Prerequisites:
(Course Code and Title) Nil

Precursors:
(Course Code and Title) Nil

Equivalent Courses:
(Course Code and Title) Nil

Exclusive Courses:
(Course Code and Title) Nil

Part II Course Details

1. Abstract

This course aims to introduce concepts and techniques in advanced probability theory and discrete time stochastic processes, as well as their applications to the real-world financial models and risk analysis. It introduces some fundamental concepts in Markov process, Martingales, Change of measure, and provides a needed preparation for its subsequent course “Advanced Stochastic Analysis in Finance”.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	Introduce the notions of martingales and Markov processes in discrete time based on rigorous framework of probability theory	25	V		
2.	presents the no-arbitrage method of option pricing in a binomial model,	25	V	V	
3.	formalize the risk-neutral pricing in terms of martingales and Markov processes, and understand the change of measure associated with asset pricing of derivatives of European types.	25	V	V	V
4	understand the stopping time and formulate asset pricing of American type and other exotic options	25	V	V	V
		100%			

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4	5	6	
teaching	Learning through teaching is primarily based on lectures.	V	V	V	V			3 hours/week
take-home assignments	Learning through take-home assignments helps students implement advanced theory for better understanding	V	V	V	V			After-class

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.						Weighting	Remarks
	1	2	3	4	5	6		
Continuous Assessment: 30%								
Test	V	V					20	
Hand-in assignments	V	V	V	V			10	
Examination	V	V	V	V			70	
Examination: 70% (duration: 3 hrs, if applicable)								
							100%	

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Test	Problem solving ability	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Hand-in assignments	Comprehensive understanding	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examinations	Creativity and problem solving ability based on comprehensive understanding	High	Significant	Moderate	Basic	Not even reaching marginal levels

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

(An indication of the key topics of the course.)

Risk-neutral pricing, Martingale, Binomial model, Arbitrage, Delta Hedging

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

1.	
2.	
3.	
...	

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Stochastic Calculus for Finance I, by Steven Shreve
2.	
3.	
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