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: **Programming and Computing in Financial Engineering**

Course Code: **MA6628**

Course Duration: **1 semester**

Credit Units: **3 CUs**

Level: **Level 6**

Medium of Instruction: **English**

Medium of Assessment: **English**

Prerequisites: **MA5616 Financial Mathematics in Derivative Markets**
(Course Code and Title) **MA5618 Stochastic Analysis and in Finance**

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

- develop students' comprehensive capability of applying numerical methods to formulate and analyze problems in financial products; and
- explain and evaluate techniques of realizing financial and insurance models through optimal algorithms and computer programming.

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.	describe basic issues and framework of computation in finance	20	V		
2.	explain clearly concepts and basic methods of solving partial differential equations.	20	V	V	
3.	implement numerical and computational methods such as finite-difference method, Monte-Carlo simulation, etc. for evaluating more complicated mathematical problems in finance.	20	V	V	
4	analyze, design and implement solutions using appropriate programming language(s) to assess financial risks and construct financial models in practice	20	V	V	V
5	apply numerical methods to model financial phenomena and analyze other practical problems	20	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	V		26 hours in total
tutorials	Learning through tutorials is primarily based on interactive problem solving/hand-on computer exercises allowing instant feedback.	V	V	V	V	V		13 hours in total
take-home assignments	Learning through take-home assignments helps students implement basic numerical methods of mathematical finance and actuarial science to analyze solutions of problems with programming tools.	V	V	V	V	V		After class
project(s)	Learning through project(s) enables students to formulate more sophisticated financial and actuarial problems in a numerical framework with the aid of methods and computing techniques introduced in this course					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: 100%								
Test	V	V	V				25--50%	
Hand-in assignments	V	V	V	V	V		0 -- 25%	
Essay					V		25--50%	
Examination: 0% (duration: 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. Essays	Creativity based on learning	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.)

Introduction to partial differential equations. Finite difference method. Monte Carlo simulation. Basic computational issues in finance

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.	Derivatives Markets, by Robert L. McDonald,
2.	
3.	
…	