City University of Hong Kong
Course Syllabus

offered by Department of Economics and Finance
with effect from Semester A 2024/25

Part I   Course Overview

Course Title:	Financial Computing
Course Code:	EF5213
Course Duration:	1 semester
Credit Units:	3
Level:	P5
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	Nil
Precursors: *(Course Code and Title)*	EF5050 Derivatives and Risk Management EF5210 Option Pricing EF5250 Stochastics & Calculus for Finance
Equivalent Courses: *(Course Code and Title)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II   Course Details

1.   **Abstract**

This course aims to enable students to apply integrated spreadsheet programming skills to solve real-life financial problems, to equip students with the capability of performing numerical computations in financial engineering, to provide students with the practical knowledge of modern financial models.

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.	Apply integrated programming skills to design effective solution for real-life financial problems.	-	√	√	
2.	Discuss the key elements of numerical computation in financial engineering, and develop flexible and robust solutions with good programming practices.	-	√	√	
3.	Apply the numerical techniques in financial engineering to design complex algorithms and solutions for modern financial models.	-		√	√
4.	Apply the practical knowledge in financial modelling to develop integrated numerical solutions for real market products.	-		√	√
		-			

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 real-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. Learning and Teaching Activities (LTAs)
(LTAs designed to facilitate students' achievement of the CILOs.)

LTA	Brief Description	CILO No.				Hours/week(if applicable)
		1	2	3	4	
Lectures, class discussions, and computer laboratories	Students will engage in formal lectures that will explain key concepts and theories of modern financial models and numerical computation in lectures. Deliver key numerical techniques and practical knowledge for computer implementation in laboratories.	√	√	√	√	3

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		
Continuous Assessment: 100 %						
Assignments and laboratory work	√	√	√	√	100 %	-
Examination: 0% (duration: , if applicable)						
					100%	

5. Assessment Rubrics

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

Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
Assignments and laboratory work	Demonstrates understanding of the financial models. Ability to deliver effective, efficient, flexible, and robust computer solutions with good programming practices.	High	Significant	Moderate	Basic	Not reaching marginal level

Applicable to students admitted from Semester A 2022/23 to Summer Term 2024

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
Assignments and laboratory work	Demonstrates understanding of the financial models. Ability to deliver effective, efficient, flexible, and robust computer solutions with good programming practices.	High	Significant	Basic	Not reaching marginal level

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.)

   Numerical and Statistical Computations
   GARCH(1,1) Model
   Finite Difference Method and Crank-Nicholson Scheme
   Portfolio Mean-Variance Optimization and Markowitz Algorithm
   Multi-variable Newton-Raphson Procedure
   Yield Curve Construction using Cubic Spline
   Binomial Tree Pricing of Exotic Options
   Black-Derman-Toy Model for Interest Rate Derivatives
   Monte-Carlo Option Pricings
   Least-Square Monte-Carlo Pricings of American Options

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.	Humphrey Tung, Donny Lai, and Michael Wong with Stephen Ng, <u>Professional Financial Computing Using Excel & VBA</u> , John Wiley & Sons, Singapore, 2010, ISBN 978-0-470-82439-9.

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