

**City University of Hong Kong  
Course Syllabus**

**offered by School of Data Science  
with effect from Semester A 2024/25**

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**Part I Course Overview**

<b>Course Title:</b>	Topics in Financial Engineering and Technology
<b>Course Code:</b>	SDSC6013
<b>Course Duration:</b>	One Semester
<b>Credit Units:</b>	3
<b>Level:</b>	P6
<b>Medium of Instruction:</b>	English
<b>Medium of Assessment:</b>	English
<b>Prerequisites:</b> <i>(Course Code and Title)</i>	Nil
<b>Precursors:</b> <i>(Course Code and Title)</i>	Nil
<b>Equivalent Courses:</b> <i>(Course Code and Title)</i>	Nil
<b>Exclusive Courses:</b> <i>(Course Code and Title)</i>	Nil

## Part II Course Details

### 1. Abstract

Innovation of technologies are transforming the financial services industry disruptively in realms of consumer financial services, including mobile payments, foreign exchange, marketplace lending, saving and investing, financial advice (robo-advisers), and personalized insurance. This course aims to understand the economic and technological forces driving this change in areas such as payments, financing, investments, and insurance. We will first review fundamental concepts and models of financial engineering, and then centre around selected cases with industrial applications and study selected academic papers in order to understand the underlying economics, the technology, and the research matters. The course intends to be interactive, including classroom discussion, lectured cases, group projects, and possibly guest speakers.

### 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.	Explain clearly the fundamentals of the financial engineering and financial technologies in the context of specific applications.	15%	✓		
2.	Elaborate in details the key ideas behind each area that enable it to be successful for its purpose.	25%	✓	✓	
3.	Assess prevailing practices in financial engineering and fintech and identify approaches that enhance the existing financial services.	30%	✓	✓	✓
4.	Utilize ideas and methods learned to solve given practical problems in potential areas.	30%	✓	✓	✓
		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 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	
In-class Activities	Students will engage in formal lectures and interactive discussions on identified latest academic research papers and/or industrial practices of identified topics.	✓	✓	✓	✓	26 hours/semester
Project	Students will participate in a term project so that students to learn problem-solving using selected projects pertaining to the subjects discussed.	✓	✓	✓	✓	13 hours/semester

### 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: <u>100</u> %						
<u>Class Participation:</u> Attendance and in-class discussion are strongly emphasized for this course.  In particular, the in-class discussion component will focus on discussing selected research papers and identified industrial practice through student groups.  Scoring favour those demonstrate well in these activities.	✓	✓	✓	✓	0-20%	
<u>Project Presentation:</u> Presenting the independent work of the course project, either single-person or a group, on selected topics provided by the lecture.  Assessments will be based on individual's presentation performance, in terms of clarity, structure, depth, innovation, and quality of answers to questions.	✓	✓	✓	✓	30-40%	
<u>Course Paper:</u> A report paper written in accordance with the course project on selected topics provided by the teacher.  Assessments will be based on the quality of the report paper, in terms of the academic difficulties and the depth of the paper, quality of the empirical/numerical implementation, availability of the codes. Special points will be given to whether there are new discoveries throughout the process of the conducting the project.	✓	✓	✓	✓	50-60%	
Examination: 0 % (duration:    hours, 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)
1. Class Participation	Percentage of classroom attendance  The quality and intensity of participating in-class discussion, answering questions, etc.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Project Presentation	Quality of the presentation.  Clarity, structure, depth, innovation, and quality of answering questions in terms of demonstration of mastering the basic concepts and the ability to apply methods learned to fintech problems.	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Course Paper	Quality of report paper.  Academic depth, implementation quality, and the quality of writing. Particular emphasis will be given to whether there are new discoveries throughout the process of the conducting the project, and whether the report paper show ability to solve conceptual and real-world problems using methods learned in class.	High	Significant	Moderate	Basic	Not even reaching marginal levels

**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)
1. Class Participation	Percentage of classroom attendance  The quality and intensity of participating in-class discussion, answering questions, etc.	High	Significant	Moderate	Not even reaching marginal levels
2. Project Presentation	Quality of the presentation.  Clarity, structure, depth, innovation, and quality of answering questions in terms of demonstration of mastering the basic concepts and the ability to apply methods learned to fintech problems.	High	Significant	Moderate	Not even reaching marginal levels
3. Course Paper	Quality of report paper.  Academic depth, implementation quality, and the quality of writing. Particular emphasis will be given to whether there are new discoveries throughout the process of the conducting the project, and whether the report paper show ability to solve conceptual and real-world problems using methods learned in class.	High	Significant	Moderate	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).*

- Cash Market and Benchmark Interest Rates
- Yield Curves and their Constructions
- Options and Implied Volatilities
- The Fintech Approach to Credit Analytics
- Data-driven Investments and Risk Management
- Other selected topics

**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.	Lecture Notes; Selected Academic Papers.
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**2.2 Additional Readings**

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

*NIL*