



## 1. General Information

Course Subject	FINA
Course Number	4354
Course Title	Financial Engineering
Academic Years	2023-2024
Grading Method	Letter

## 2. Instructors

Dr Buehlmaier, Matthias  
Office: Room 1106 /F K.K. Leung Building  
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Subclasses: 1A

## 3. Teaching Assistants

Mr Frankie HO Chi Fung  
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## 4. Course Description

Course Description	Financial engineering is the process of constructing new instruments by using bonds and individual derivatives such as forwards, calls, puts, and exotic options as basic building blocks. The process involves designing, pricing, and managing the instruments. In this course, we anatomize a few popular structured products. We then discuss how to price these products by studying the price of the embedded exotic options. We study the risk exposure of the investors and the risk management of the issuer. We also discuss some topics on the market for volatility trading, numerical methods for option-pricing, and models beyond Black-Scholes.
Prerequisites	FINA3350: Mathematical Finance

## 5. Course Objectives

1. Provide students with career opportunities in financial engineering.
2. Enable students to structure products that take into account investors' preferences by matching them with particular payoff structures.
3. Provide students with in-depth understanding of structured products that can be profitably applied in the finance industry.
4. Help students avoid potential pitfalls when modeling complex derivatives products.

6. Faculty Learning Goals
Goal 1: Acquisition and internalization of knowledge of the programme discipline
Goal 2: Application and integration of knowledge
Goal 3: Inculcating professionalism
Goal 4: Developing global outlook
Goal 5: Mastering communication skills
Goal 6: Cultivating leadership

7. Course Learning Outcomes						
Course Teaching and Learning Activities	Aligned Faculty Learning Goals					
	1	2	3	4	5	6
CLO1. Learn how to anatomize a traded structured product	✓	✓	✓	✓		✓
CLO2. Learn how to price and hedge embedded exotic options.	✓	✓	✓	✓		✓
CLO3. Understand how to design a new structured product by applying option pricing theory.	✓	✓	✓	✓		✓
CLO4. Be familiar with volatility trading.	✓	✓	✓	✓		✓
CLO5. Be able to make convincing and coherent presentations.			✓		✓	✓
CLO6. Be able to speak and write effectively, using the terminology of financial engineering.			✓		✓	✓

8. Course Teaching and Learning Activities		
Course Teaching and Learning Activities #	Expected Study Hours	Study Load (% of study)
T&L1. Lectures	36	26.5
T&L2. Review questions and/or assignments	20	14.7
T&L3. Tutorials (depending on class size, there may or may not be a tutorial)	12	8.8
T&L4. Self-study	48	35.3
T&L5. Group project	20	14.7
	Total: 136	Total: 100

9. Assessment Methods			
Assessment Methods	Description	Weight %	Aligned Course Learning Outcomes
A1. Midterm exam		30%	1,2,3,4
A2. Group project:		15%	5,6

## 9. Assessment Methods

Individual presentation			
A3. Group project: Group report		25%	1,2,3,4
A4. Final Exam		30%	1,2,3,4

## Assessment Rubrics

A1. Midterm exam	
A+,A,A-	Idea development is insightful and sophisticated; Supporting evidence is convincing, accurate and detailed. Well written with clear focus.
B+,B,B-	Idea development is clear and thoughtful; Supporting evidence is sufficient and accurate. Well written.
C+,C,C-	Idea development is simplistic and lacking in relevance; Supporting evidence insufficient but accurate. Somewhat well written.
D+,D	Idea development is superficial and ineffective; Supporting evidence is insufficient and inaccurate. Writing is unclear.
F	Idea development is absent; Supporting evidence is vague or missing. Poorly written.
A2. Group project: Individual presentation	
A+,A,A-	Professional presentation style, comprehensive content coverage, well-articulated on critical issues, effective use of management concepts, and quality interaction with audience.
B+,B,B-	Decent presentation style, appropriate content coverage, clear discussion of critical issues, moderately effective use of management concepts, and acceptable interaction with audience.
C+,C,C-	Mediocre presentation style, limited content coverage, marginally acceptable discussion of critical issues, infrequent use of management concepts, and limited interaction with audience.
D+,D	Weak presentation style, key content omitted, unclear focus on critical issues, very limited use of management concepts, and poor interaction with audience.
F	Unacceptable presentation style, questionable content coverage, omitting critical issues, zero use of management concepts, and no interaction with audience
A3. Group project: Group report	
A+,A,A-	The financial product's economic motivation is extremely well presented, its pricing methodology is extremely efficient, and its hedging strategy is extremely effective.
B+,B,B-	The financial product's economic motivation is very well presented, its pricing methodology is very efficient, and its hedging strategy is very effective.
C+,C,C-	The financial product's economic motivation is presented in a mediocre way, its pricing the methodology is moderately efficient, and its hedging strategy is moderately effective.

Assessment Rubrics	
D+,D	The financial product's economic motivation is not presented well, its pricing methodology is not efficient, or its hedging strategy is not effective.
F	The financial product's economic motivation is nonsensical, its pricing methodology is wrong, or its hedging strategy is flawed.
A4. Final Exam	
A+,A,A-	Idea development is insightful and sophisticated; Supporting evidence is convincing, accurate and detailed. Well written with clear focus.
B+,B,B-	Idea development is clear and thoughtful; Supporting evidence is sufficient and accurate. Well written.
C+,C,C-	Idea development is simplistic and lacking in relevance; Supporting evidence insufficient but accurate. Somewhat well written.
D+,D	Idea development is superficial and ineffective; Supporting evidence is insufficient and inaccurate. Writing is unclear.
F	Idea development is absent; Supporting evidence is vague or missing. Poorly written.

10. Course Grade Descriptors	
A+,A,A-	Exhibited high level of understanding of the course materials through excellent performance in class discussion, assignments, presentations and exams.
B+,B,B-	Exhibited reasonably high level of understanding of the course materials through good performance in class discussion, assignments, presentations and exams.
C+,C,C-	Exhibited fair level of understanding of the course materials.
D+,D	Evidence of basic familiarity with the subject.
F	Candidate has demonstrated a poor grasp of the subject with evidence of largely inaccurate understandings of principles, concepts and arguments presented within this course.

12. Required/Recommended Readings & Online Materials	
Textbook	Recommended textbook: Wilmott, P., 2007, Paul Wilmott Introduces Quantitative Finance, 2nd edition, Wiley.

13. Means / Processes for Student feedback on Course	
✓	Conducting mid-term survey in additional to SETL around the end of the semester
	Online response via Moodle site
	Others

## 14. Course Policy

### **Class Conduct**

Students are required to attend all classes on time. If you miss a class, it is entirely your responsibility for what you have missed. In case you have to leave the class early, please inform the instructor beforehand and leave quietly.

No use of mobile phone or chatting is allowed when the class is in session. Remember to turn off or mute the phone before each session. The instructor has the discretion to give penalty in case of class misconduct.

Respect your instructors and your fellow students. Be considerate to others.

### **Academic Dishonesty**

Plagiarism and misconduct cases will be permanently recorded in the School of Economics and Finance for future reference.

The University Regulations on academic dishonesty will be strictly enforced! Please check the University Statement on plagiarism on the web: <http://www.hku.hk/plagiarism/>

Academic dishonesty is any act that misrepresents a person's own academic work or that compromises the academic work of another. It includes (but not limited to) cheating on assignments or examinations; plagiarizing, i.e., representing someone else's ideas as if they are one's own; sabotaging another's work.

If you are caught in an act of academic dishonesty or misconduct, you will receive an "F" grade for the subject. The relevant Board of Examiners may impose other penalty in relation to the seriousness of the offense.

To avoid intellectual property and copyright infringement, and/or violation of the Personal Data (Privacy) Ordinance, DO NOT upload HKU teaching-related materials including but not limited to course materials, marking schemes, examination papers, etc. to websites. If you have done so in the past, you are asked to take steps to take down relevant materials immediately.

## 15. Additional Course Information

- Announcements, assignments, and lecture slides will be posted on the course website. Hardcopy of lecture notes will not be provided.
- No late assignments will be accepted.
- Special examinations are not granted to students taking up summer internships. Please avoid starting your internships before the end of the examination period.