City University of Hong Kong
Course Syllabus

offered by Department of Systems Engineering
with effect from Semester A 2024 / 25

Part I Course Overview

Course Title:	Financial Engineering for Engineering Managers
Course Code:	SYE6103
Course Duration:	One Semester
Credit Units:	3
Level:	P6
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	Nil
Precursors: *(Course Code and Title)*	Basic statistics knowledge equivalent to that of typical undergraduate science/engineering students
Equivalent Courses: *(Course Code and Title)*	SEEM6103 Financial Engineering for Engineering Managers (offered until 2021/22)/ ADSE6103 Financial Engineering for Engineering Managers (offered until 2023/24)
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

This course introduces the essential aspects of financial engineering to engineering management students. No prior background in finance is assumed. The topics of the course include: a brief review of basic probability and statistics; introduction to time series models; calculation of investment returns; portfolio theory; the Capital Asset Pricing model; option pricing; value-at-risk; and real options valuation. The students will learn to apply the financial engineering tools to aid managerial decision making and managing risk in engineering enterprises.

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 the role of financial engineering in an engineering enterprise.	5%	✓		
2.	Perform basic probability and statistics calculations relevant to financial engineering. Apply basic time series models such as AR, MA, ARMA and ARIMA to fit time series data.	20%	✓	✓	
3.	Compute net returns, gross returns, log returns. Describe the returns using the random walk model. Apply basic portfolio theory to design portfolio with given desired characteristics. Apply the Capital Asset Pricing model to compute fundamental parameters, including the beta and the expected return of a portfolio.	20%	✓	✓	
4.	Apply the binomial tree model and the Black-Scholes formula to determine the price of a European option.	20%	✓	✓	
5.	Estimate the value-at-risk of a portfolio.	20%	✓	✓	
6.	Apply the financial engineering tools such as the Capital Asset Pricing model, the binomial tree model, and value-at-risk to aid making managerial decisions and managing risk in engineering enterprises.	15%	✓	✓	
		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	**5**	**6**	
Lecture and in-class discussions	Lectures, in-class exercises, in-class Q&A and discussions	✓	✓	✓	✓	✓	✓	39 hours/sem

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: __50__ %								
Coursework (Assignments and a Term Project/Presentation)	✓	✓	✓	✓	✓	✓	50 %	
Examination: __50__ % (duration: 2 hours , if applicable)								
							100%	

For a student to pass the course, at least 30% of the maximum mark for the examination should be obtained.

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. Examination	Based on **submitted written work** to evaluate understanding of subject matter, evidence of knowledge base, capacity to analyse and synthesize, and evidence of original and critical thinking.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Coursework (Assignments and a Term Project/ Presentation)	Based on **submitted written work and oral presentation** to evaluate understanding of subject matter, evidence of knowledge base, capacity to analyse and synthesize, and evidence of original and critical thinking.	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. Examination	Based on **submitted written work** to evaluate understanding of subject matter, evidence of knowledge base, capacity to analyse and synthesize, and evidence of original and critical thinking.	High	Significant	Moderate/Basic	Not even reaching marginal levels
2. Coursework (Assignments and a Term Project/ Presentation)	Based on **submitted written work and oral presentation** to evaluate understanding of subject matter, evidence of knowledge base, capacity to analyse and synthesize, and evidence of original and critical thinking.	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.)

- Review of basic probability and statistics. Introduction to time series models.
- Calculation of investment returns. Random walk model of returns.
- Portfolio theory. The Capital Asset Pricing model.
- Option pricing with the binomial tree model and the Black-Scholes formula.
- Value-at-risk calculation.
- Managerial decision making and risk management in engineering enterprises using financial engineering tools.

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.	Investments, 9th Edition, Z. Bodie, A. Kane and A. Marcus, McGraw-Hill.

2.2 Additional Readings

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

1.	Modeling Risk, 2nd Edition, J. Mun, John Wiley & Sons.
2.	Investment Science, D. G. Luenberger, Oxford University Press.
3.	Analysis for Financial Management, 10th Edition, Robert C. Higgins, McGraw-Hill
4.	A Course in Financial Calculus, A. Etheridge, Cambridge University Press.
5.	Statistics and Finance: An Introduction, David Ruppert. Springer