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: Advanced Topics in Information Theory

Course Code: SYE8108

Course Duration: One semester

Credit Units: 3

Level: R8

Medium of Instruction: English

Medium of Assessment: English

Prerequisites:
(Course Code and Title) Nil

Precursors:
(Course Code and Title) Nil

Equivalent Courses:
(Course Code and Title) SEEM8108 Advanced Topics in Information Theory (offered until 2021/22)
ADSE8108 Advanced Topics in Information Theory (offered until 2023/24)

Exclusive Courses:
(Course Code and Title) Nil

Part II   Course Details

1. **Abstract**

    This course aims to develop PhD/MPhil students the knowledge and skills in one specialized quantitative analysis technique in statistics, operations research, and other relevant areas. After completing this course, students should be able to use these techniques in their research.

2. **Course Intended Learning Outcomes (CILOs)**

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes		
			A1	*A2*	*A3*
1.	understand theories and concepts of a specialized quantitative analysis techniques	50%	✓		
2.	Critique relevant literature relating to the specialized quantitative analysis techniques	15%		✓	
3.	Apply the specialized quantitative analysis techniques and tools in their research	35%		✓	
		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. Learning and Teaching Activities (LTAs)

LTA	Brief Description	CILO No.			Hours/week (if applicable)
		1	2	3	
Class (Lecture)	Class activities are made up of seminar style lectures. Activities include assignments, presentation and discussion.	✓	✓	✓	2 hours/week

4. Assessment Tasks/Activities (ATs)

Assessment Tasks/Activities	CILO No.			Weighting	Remarks
	1	2	3		
Continuous Assessment: 100 %					
Coursework (Assignments, presentation and discussion)	✓	✓	✓	100%	
Examination: __0__ % (duration: , if applicable)					
				100%	

5. Assessment Rubrics

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

Assessment Task	Criterion	Pass (P)/ Fail (F)
1. Coursework 2. Quiz	The assessment includes the student's coursework assignments, presentation, and quiz.	Pass/ Fail

Pass or Fail.

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

Assessment Task	Criterion	Pass (P)/ Fail (F)
1. Coursework 2. Quiz	The assessment includes the student's coursework assignments, presentation, and quiz.	Pass/ Fail

Pass or Fail.

Part III   Other Information

1.   Keyword Syllabus

This course is for students who wish to pursue research in a particular area of quantitative analysis methodologies. It is designed to provide students with the necessary background training in a specialized quantitative technique for their MPhil/PhD research. Student will learn the theories and concept, principles and development of theory and empirical research in one or more selected topics in quantitative analysis. Topics vary depending on the interests and background of students.

1. Quantification of Uncertainty

2. Notion of Likelihood

3. Testing of Hypothesis

4. Testing of Hypothesis

5. Subjective Probability

6. Mutual Information& Distance Measures

7. Axiomatization of Information

8. Extropy and Entropy

9. Information as Utility

10. Information in Experimental Design

11. Application to Reliability and Lifetime Data Analysis

2.   Reading List
2.1   Compulsory Readings

NIL

2.2   Additional Readings

NIL