

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: Theoretical Underpinnings of Decision Making Under Uncertainty

Course Code: SYE6104

Course Duration: One Semester

Credit Units: 3

Level: P6

Medium of Instruction: English

Medium of Assessment: English

Prerequisites:
(Course Code and Title) University level mathematics or mathematical maturity

Precursors:
(Course Code and Title) One or more courses in probability and statistics is highly desirable and strongly recommended

Equivalent Courses:
(Course Code and Title) SEEM6104 Theoretical Underpinnings of Decision Making Under Uncertainty (offered until 2021/22) /ADSE6104 Theoretical Underpinnings of Decision Making Under Uncertainty (offered until 2023/24)

Exclusive Courses:
(Course Code and Title) Nil

Part II Course Details

1. Abstract

This course aims to introduce students and other interested professionals in business, engineering, mathematics, social sciences (economists) and statisticians to the foundational & philosophical issues underlying the quantification of uncertainty via probability, its relationship to utility, and to decision making under uncertainty. The course will focus on the theoretical underpinning, and a historical perspective on some of the most commonly used methodologies, like significance tests, odds ratios, hypotheses testing, Bayes' factors, etc.

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.	Describe the use of statistical methods in science, engineering, business, and finance.	25%	✓		
2.	Explain the theoretical underpinning of probability and statistics in the quantification of uncertainty and risk.	25%		✓	
3.	Apply the commonly used probability and statistics techniques in the quantification of uncertainty and risk.	30%			✓
4.	Develop new methodologies/techniques to evaluate risks and uncertainties in real world problems.	20%			✓
		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	
Lecture	Absolutely mandatory to attend lectures	✓	✓	✓	✓	26 hours/sem
Office Hours/ Tutorial	Required of all participants	✓	✓	✓	✓	13 hours/sem
Self-Assignment	Self reading of assigned papers.	✓	✓	✓	✓	69 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		
Continuous Assessment: <u>25</u> %						
Assignment	✓	✓	✓	✓	25%	
Examination: <u>75</u> % (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. Assignment	25%	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Examination	75%	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. Assignment	25%	High	Significant	Moderate/Basic	Not even reaching marginal levels
2. Examination	75%	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.)

Probability, possibility, chance, information, inference, Bayesian statistics, utility.

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.)

NIL

2.2 Additional Readings

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

1.	Making Decision by LINDLEY
2.	Reliability & Risk by SINGPURWALLA