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:	Applied Probability and Statistics
Course Code:	SYE8203
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)*	SEEM8203 Applied Probability and Statistics (offered until 2021/22) ADSE8203 Applied Probability and Statistics (offered until 2023/24)
Exclusive Courses: *(Course Code and Title)*	Nil

Part II   Course Details

1.   **Abstract**

This course provides students with a solid foundation of the concepts, theory, and methods in probability and statistics, including random variable and distributions, statistical estimation and inference methods, and multivariate statistics and linear models. Emphasis will be placed on intuitive and rigorous understanding of the fundamentals of probability statistics but implementation of the methods via computer programming in R or Matlab will be an important part of the course as well.

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

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes		
			A1	*A2*	*A3*
1.	**Define** the various fundamental concepts and principles in probability and statistics.	30%	✓	✓	
2.	**Derive** probability theory and statistical inference formulas and procedures from given assumptions.	20%	✓	✓	
3.	**Perform** probability analysis for real-world problems	25%		✓	✓
4.	**Perform** statistical analysis for the real-world problems.	25%	✓		✓
		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. 1	2	3	4	5	Hours/week (if applicable)
Large Class Activities	Learning through teaching is primarily based on lectures. Mini-lectures and tutorials will be used to facilitate understanding and applications of various concepts and methods.	✓	✓	✓	✓	✓	26 hrs/ semester
Tutorial Exercises	The homework exercises provide students with the opportunities to familiarize themselves with the methods learnt during the lectures.	✓	✓	✓	✓	✓	21 hrs/ semester

4. Assessment Tasks/Activities (ATs)

Assessment Tasks/Activities	CILO No. 1	2	3	4	5	Weighting	Remarks
Continuous Assessment: 75 %							
Midterm exam	✓	✓	✓	✓	✓	25%	
Assignments	✓	✓	✓	✓	✓	50%	
Examination: 25 % (duration: 2 hrs , 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

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. Assignments	Students' ability to apply relevant procedures, draw informed conclusions in probability theory, data analysis, and perform statistical analysis.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Midterm exam	It assesses students' understanding of the concepts, theory, and methods.	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Final exam	It assesses students' understanding of the concepts, theory, and methods.	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. Assignments	Students' ability to apply relevant procedures, draw informed conclusions in probability theory, data analysis, and perform statistical analysis.	Excellent	Good	Marginal	Failure
2. Midterm exam	It assesses students' understanding of the concepts, theory, and methods.	Excellent	Good	Marginal	Failure

3.	Final exam	It assesses students' understanding of the concepts, theory, and methods.	Excellent	Good	Marginal	Failure

Part III   Other Information

1.   Keyword Syllabus

- Random variables
- Discrete and continuous random variables
- Point Estimation
- Confidence Intervals
- Hypothesis Testing
- Linear Regression
- Analysis of Variance

2.   Reading List
2.1   Compulsory Readings

1.	Wasserman, L. (2013). All of statistics: a concise course in statistical inference. Springer Science & Business Media.

2.2   Additional Readings

1.	Khuri, A. I. (2003). *Advanced calculus with applications in statistics* (Vol. 486). John Wiley & Sons.
2.	Rosenthal, J. S. (2006). *A first look at rigorous probability theory*. World Scientific Publishing Co Inc.
3.	Blitzstein, J. K., & Hwang, J. (2014). *Introduction to probability*. CRC Press.
4.	Martinez, W. L., & Martinez, A. R. (2007). *Computational statistics handbook with MATLAB* (Vol. 22). CRC press.
5.	Manuel D. Rossetti. (2015). *Simulation Modeling and Arena*, 2nd Edition. Wiley.