City University of Hong Kong
Course Syllabus

offered by Department of Biostatistics
with effect from Semester A 2023/24

Part I Course Overview

Course Title:	**Probability**
Course Code:	**BIOS5800**
Course Duration:	**1 semester**
Credit Units:	**3 CUs**
Level:	**P5**
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)*	**Nil**
Exclusive Courses: *(Course Code and Title)*	**Nil**

Part II Course Details

1. Abstract

The course aims to present the fundamental principles behind probability and lay down the foundations for understanding various topics such as statistical inference, multivariate analysis, regression modelling and survival analysis. Students will learn how to implement probabilistic methods in various types of applications. Topics covered include: axioms of probability, random variables, distribution functions in one or more dimensions, correlation, moments, conditional probabilities and densities; pseudo-random number generation; survival functions, hazard functions and odds ratios; moment generating functions and characteristic functions; infinite sequences of random variables, weak and strong laws of large numbers and the multivariate central limit theorem.

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.	Understand the fundamental principles of probability	40%	√	√	
2.	Ability to formulate probabilistic models in various types of applications involving public health	40%	√	√	√
3.	Appreciate the relevance of probabilistic thinking in data analysis	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 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. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.			Hours/week (if applicable)
		1	2	3	
Teaching	Learning through teaching based on lectures	√	√	√	3 hours/ week
Assignments	Learning through assignments allows students to perform critical problem analysis and develop hands-on skills involving probability	√	√	√	

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		
Continuous Assessment: 60%					
Assignments	√	√	√	40%	
Midterm/quizzes	√	√	√	20%	
Examination: 40%					
Final exam (duration: 2 hours)	√	√	√	40%	
				100%	

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Applicable to students admitted in Semester A 2022/23 and thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
1. Assignments	Problem solving skills	Consistently demonstrates a thorough understanding of probability concepts and applies them to complex problems	Adequately demonstrates an understanding of probability concepts and applies them to moderately complex problems	Demonstrates some understanding of probability concepts and applies them to simple problems	Demonstrates little understanding of probability concepts and is unable to apply them to problems
2. Quizzes	Problem solving based on comprehensive understanding	Consistently applies probability concepts and methods to solve complex problems	Adequately applies probability concepts and methods to solve moderately complex problems	Applies probability concepts and methods to solve simple problems with limited success	Inappropriately or unable to apply probability concepts and methods to solve problems
3. Midterm Exam	Problem solving based on comprehensive understanding	Demonstrates a comprehensive understanding of probability concepts and applies them to complex problems	Adequately demonstrates an understanding of probability concepts and applies them to moderately complex problems	Demonstrates some understanding of probability concepts and applies them to simple problems	Demonstrates little understanding of probability concepts and is unable to apply them to problems
4. Final Exam	Problem solving based on comprehensive understanding	Consistently demonstrates a comprehensive understanding of probability concepts and applies them to complex	Adequately demonstrates an understanding of probability concepts and applies them to moderately complex problems	Demonstrates some understanding of probability concepts and applies them to simple problems	Demonstrates little understanding of probability concepts and is unable to apply them to problems

		problems			

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.)

Axioms of probability, random variables, distributions, conditional probabilities, laws of large numbers, central limit theorem

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.	Introduction to Probability, Second Edition (Chapman & Hall/CRC Texts in Statistical Science), by Joseph K. Blitzstein and Jessica Hwang