

**City University of Hong Kong
Course Syllabus**

**offered by Department of Biostatistics
with effect from Semester A 2024/25**

Part I Course Overview

Course Title:	Advanced Methods in Biostatistics
Course Code:	BIOS5802
Course Duration:	1 semester
Credit Units:	3 CUs
Level:	P5
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: <i>(Course Code and Title)</i>	Nil
Precursors: <i>(Course Code and Title)</i>	Nil
Equivalent Courses: <i>(Course Code and Title)</i>	Nil
Exclusive Courses: <i>(Course Code and Title)</i>	Nil

Part II Course Details

1. Abstract

This course aims to provide students with the tools to carry out regression analyses involving non-continuous (e.g., binary or count-valued) responses, correlated observations, and censored data. Topics covered include: generalized linear models (GLM) for non-Gaussian response, mixed-effects models and generalized estimating equations (GEE) for correlated observations, longitudinal data analysis, and Cox proportional hazards models for the analysis of survival time outcomes. Examples are drawn from public health and the biomedical sciences.

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.	Develop and fit regression models for discrete responses	40%	√	√	
2.	Develop and fit regression models that adjust for correlated data and censored observations	40%	√	√	√
3.	Interpret regression models and results in public health	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	
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 regression modelling	√	√	√	

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	√	√	√	30%	
Midterm/quiz	√	√	√	30%	
Examination: 40%					
Examination (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 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	Problem solving skills	Consistently demonstrates a thorough understanding of regression analyses concepts and applies them to complex problems	Adequately demonstrates an understanding of regression analyses concepts and applies them to moderately complex problems	Demonstrates some understanding of regression analyses concepts and applies them to simple problems	Demonstrates some understanding of regression analyses concepts but is unable to apply them to problems	Demonstrates no understanding of regression analyses concepts and is unable to apply them to problems
2. Quizzes/ Midterm	Problem solving based on comprehensive understanding	Demonstrates a comprehensive understanding of regression analyses concepts and applies them to complex problems	Adequately demonstrates an understanding of regression analyses concepts and applies them to moderately complex problems	Applies regression analyses concepts and methods to solve simple problems	Applies regression analyses concepts and methods to solve simple problems but is unable to interpret results	Inappropriately or unable to apply regression analyses concepts and methods to solve problems
3. Examination	Problem solving based on comprehensive understanding	Consistently demonstrates a comprehensive understanding of regression analyses concepts and applies them to complex problems	Adequately demonstrates an understanding of regression analyses concepts and applies them to moderately complex problems	Demonstrates some understanding of regression analyses concepts and applies them to simple problems	Demonstrates some understanding of regression analyses concepts but is unable to apply them to problems	Demonstrates no understanding of regression analyses concepts and is unable to apply them to problems

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	Problem solving skills	Consistently demonstrates a thorough understanding of regression analyses concepts and applies them to complex problems	Adequately demonstrates an understanding of regression analyses concepts and applies them to moderately complex problems	Demonstrates some understanding of regression analyses concepts and applies them to simple problems	Demonstrates no understanding of regression analyses concepts and is unable to apply them to problems
2. Midterm/quizzes	Problem solving based on comprehensive understanding	Demonstrates a comprehensive understanding of regression analyses concepts and applies them to complex problems	Adequately demonstrates an understanding of regression analyses concepts and applies them to moderately complex problems	Applies regression analyses concepts and methods to solve simple problems	Inappropriately or unable to apply regression analyses concepts and methods to solve problems
3. Examination	Problem solving based on comprehensive understanding	Consistently demonstrates a comprehensive understanding of regression analyses concepts and applies them to complex problems	Adequately demonstrates an understanding of regression analyses concepts and applies them to moderately complex problems	Demonstrates some understanding of regression analyses concepts and applies them to simple problems	Demonstrates no understanding of regression analyses concepts and is unable to apply them to 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.)

Generalized linear models, correlated observations, censored data, longitudinal data.

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.	Analysis of Longitudinal Data (Oxford Statistical Science Series) 2nd Edition by Peter Diggle, Patrick Heagerty, K.Y. Liang, and Scott Zeger
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2.2 Additional Readings

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

1.	Generalized Linear Models with Examples in R (Springer Texts in Statistics) by Dunn and Smyth
2.	Applied Survival Analysis Using R by Dirk F. Moore