

**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:	Longitudinal Data Analysis
Course Code:	BIOS8006
Course Duration:	1 Semester
Credit Units:	3 CUs
Level:	R8
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

The course aims to acquaint research students with statistical models and methods utilized for the analysis of longitudinal data. Longitudinal data pertains to information gathered repeatedly from individuals, be it humans, animals, plants, or participants, over time or different locations. The course will primarily emphasize the practical application of statistical models, specifically linear mixed-effects (LME) models, nonlinear mixed-effects (NLME) models, and generalized linear mixed-effects (GLME) models. Through hands-on experience with statistical software, students will gain the ability to directly employ these models. Upon completion of the course, students will possess the skills to proficiently analyze longitudinal data and effectively interpret the resulting analyses.

2. Course Intended Learning Outcomes (CILOs)

No.	CILOs [#]	Weighting	Discovery-enriched curriculum related learning outcomes		
			A1	A2	A3
1.	Explain the fundamental concepts and methods.	20%	✓	✓	
2.	Develop a solid understanding of the techniques.	20%	✓	✓	
3.	Conduct a thorough reading of the literature and know current state-of-the-art tools.	30%	✓	✓	✓
4.	Apply the techniques and methods to real data applications.	30%	✓	✓	✓
		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	4	
Lectures	Learning through teaching is primarily based on lectures	✓	✓	✓	✓	3 hours/week
Assignments	Learning through take-home assignments helps students understand the key concepts and acquire the techniques	✓	✓	✓	✓	After class

4. Assessment Tasks/Activities (ATs)

Assessment Tasks/Activities	CILO No.				Weighting	Remarks
	1	2	3	4		
Continuous Assessment: 60%						
Assignments	✓	✓	✓	✓	40%	Help to train students with basic knowledge, concepts, and analysis techniques
Midterm/quizzes	✓	✓	✓	✓	20%	Test students' capabilities in applying the knowledge to solve relevant problems
Examination: 40% (duration: 3 hours)	✓	✓	✓	✓	40%	Examination questions are designed to see how well students have achieved the learning objectives and acquired the requisite techniques for problem-solving
					100%	

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	Problem solving skills	Consistently exhibits adept comprehension of longitudinal data analysis principles and their practical implementation	Sufficiently applies longitudinal data analysis concepts to moderately complex problems	Demonstrates a moderate understanding of longitudinal data analysis concepts and their practical application to intermediate-level problems.	Displays basic grasp of longitudinal data analysis concepts and their application to straightforward problems.	Shows limited comprehension of longitudinal data analysis concepts and lacks the ability to apply them to problem-solving
2. Midterm/quizzes	Problem solving based on comprehensive understanding	Exhibits a thorough grasp of longitudinal data analysis concepts and effectively applies them to intricate problems	Displays sufficient understanding of longitudinal data analysis concepts and effectively applies them to moderately complex problems	Exhibits a moderate level of comprehension regarding longitudinal data analysis concepts and effectively applies them to intermediate-level problems.	Shows basic comprehension of longitudinal data analysis concepts and applies them to straightforward problems	Displays limited grasp of longitudinal data analysis concepts and lacks the ability to apply them to problem-solving
3. Examination	Problem solving based on comprehensive understanding	Consistently exhibits a deep understanding of longitudinal data analysis concepts and effectively applies them to complex problems	Effectively applies longitudinal data analysis concepts to moderately complex problems, demonstrating sufficient understanding	Applies longitudinal data analysis concepts to intermediate-level problems with a moderate level of understanding.	Applies longitudinal data analysis concepts to simple problems with a basic understanding	Lacks understanding of longitudinal data analysis concepts and cannot apply them to problem-solving

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 exhibits adept comprehension of longitudinal data analysis principles and their practical implementation	Sufficiently applies longitudinal data analysis concepts to moderately complex problems	Displays basic grasp of longitudinal data analysis concepts and their application to straightforward problems.	Shows limited comprehension of longitudinal data analysis concepts and lacks the ability to apply them to problem-solving
2. Midterm/quizzes	Problem solving based on comprehensive understanding	Exhibits a thorough grasp of longitudinal data analysis concepts and effectively applies them to intricate problems	Displays sufficient understanding of longitudinal data analysis concepts and effectively applies them to moderately complex problems	Shows basic comprehension of longitudinal data analysis concepts and applies them to straightforward problems	Displays limited grasp of longitudinal data analysis concepts and lacks the ability to apply them to problem-solving
3. Examination	Problem solving based on comprehensive understanding	Consistently exhibits a deep understanding of longitudinal data analysis concepts and effectively applies them to complex problems	Effectively applies longitudinal data analysis concepts to moderately complex problems, demonstrating sufficient understanding	Applies longitudinal data analysis concepts to simple problems with a basic understanding	Lacks understanding of longitudinal data analysis concepts and cannot apply them to problem-solving

Part III Other Information

1. Keyword Syllabus

Longitudinal study design, repeated measurements analysis, linear mixed-effects model, nonlinear mixed-effects models, generalized linear mixed-effects models

2. Reading List

2.1 Compulsory Readings

Nil.

2.2 Additional Readings

1.	Mixed-Effects Models in S and S- PLUS (Springer) by Pinheiro, J.C. and Bates, D.M.
2.	Linear Mixed-Effects Models Using R: A Step-by-Step Approach (Springer) by Galecki, A. and Burzykowski, T.
3.	Analysis of Longitudinal Data (Oxford University Press, second edition), by Diggle, P.J., Heagerty, P., Liang, K.Y., and Zeger, S.L.