

**City University of Hong Kong
Course Syllabus**

**offered by College/School/Department of Mathematics
with effect from Semester A 2023 / 24**

Part I Course Overview

Course Title:	<u>Statistical Data Analysis</u>
Course Code:	<u>MA5617</u>
Course Duration:	<u>1 semester</u>
Credit Units:	<u>3 CUs</u>
Level:	<u>P5</u>
Medium of Instruction:	<u>English</u>
Medium of Assessment:	<u>English</u>
Prerequisites: <i>(Course Code and Title)</i>	<u>Nil</u>
Precursors: <i>(Course Code and Title)</i>	<u>Nil</u>
Equivalent Courses: <i>(Course Code and Title)</i>	<u>Nil</u>
Exclusive Courses: <i>(Course Code and Title)</i>	<u>Nil</u>

Part II Course Details

1. Abstract

Statistical data analysis in financial business often involves with using sample data to investigate relationships between financial variables and instruments, with an ultimate goal of creating a statistical model for future prediction. This course offers an introduction to a wide spectrum of statistical modelling techniques, ranging from linear regression, ANOVA, model selection, logistic regression, to nonlinear and nonparametric models.

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 assumptions and context for linear regression, and use it to estimate and predict likely values.	25%	✓	✓	
2.	Be able to create appropriate regression models based on data description.	25%	✓	✓	
3.	Explain how categorical predictors can be included into a regression model and the different ways of coding the categorical predictors.	25%	✓	✓	
4	Develop strategies to transform data in order to deal with problems identified in the regression model, perform model assessment typically encountered in regression contexts.	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. 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	4			
Teaching	Learning through teaching is primarily based on lectures.	✓	✓	✓	✓			3 hours/week
Take-home assignments	Learning through take-home assignments helps students implement advanced theory for better understanding.	✓	✓	✓	✓			After-class

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: 40 %								
Hand-in assignments	✓	✓	✓	✓			20%	
Project	✓	✓	✓	✓			20%	
Examination: 60 % (duration: 2 hrs, if applicable)								
Examination	✓	✓	✓	✓			60%	
							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. Hand-in assignments	1.1 Comprehensive understanding of the mathematical procedure of estimation as well as inferences problems in linear regression.	High	Significant	Basic	Not even reaching marginal levels
	1.2 Ability to apply appropriate statistical tests to test the stated hypotheses.	High	Significant	Basic	Not even reaching marginal levels
	1.3 Ability to interpret the results of hypothesis testing, including p-values and confidence intervals.	High	Significant	Basic	Not even reaching marginal levels
2. Project	2.1 Ability to gather an appropriate dataset and conduct necessary data preprocessing.	High	Significant	Basic	Not even reaching marginal levels
	2.2 Ability to apply the statistical techniques and concepts covered in the course to build a suitable model for the dataset.	High	Significant	Basic	Not even reaching marginal levels
	2.3 Ability to interpret and discuss the results of the fitted models and comment on the limitations of the chosen model.	High	Significant	Basic	Not even reaching marginal levels
3. Examinations	3.1 Understanding of the fundamental concepts, principles, and their application scenarios.	High	Significant	Basic	Not even reaching marginal levels
	3.2 Ability to solve modelling related problems with appropriate methods.	High	Significant	Basic	Not even reaching marginal levels
	3.3 Ability to evaluate the model based on the computed solution and use suitable visualizations to effectively present the results.	High	Significant	Basic	Not even reaching marginal levels

Applicable to students admitted before Semester A 2022/23

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Hand-in assignments	1.1 Comprehensive understanding of the mathematical procedure of estimation as well as inferences problems in linear regression.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	1.2 Ability to apply appropriate statistical tests to test the stated hypotheses.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	1.3 Ability to interpret the results of hypothesis testing, including p-values and confidence intervals.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Project	2.1 Ability to gather an appropriate dataset and conduct necessary data preprocessing.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	2.2 Ability to apply the statistical techniques and concepts covered in the course to build a suitable model for the dataset.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	2.3 Ability to interpret and discuss the results of the fitted models and comment on the limitations of the chosen model.	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Examinations	3.1 Understanding of the fundamental concepts, principles, and their application scenarios.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	3.2 Ability to solve modelling related problems with appropriate methods.	High	Significant	Moderate	Basic	Not even reaching marginal levels
	3.3 Ability to evaluate the model based on the computed solution and use suitable visualizations to effectively present the results.	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.)

linear regression; ordinary least squares; ANOVA; model selection; logistic regression; nonlinear regression; smoothing

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.	Applied Linear Statistical Models by Kutner, Nachtsheim, Neter, and Li, McGraw-Hill Irwin, 2005
2.	
3.	
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2.2 Additional Readings

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

1.	The Statistical Sleuth by Ramsey and Schafer, 3 rd Edition, Cengage Learning
2.	
3.	
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