

**City University of Hong Kong
Course Syllabus**

**offered by Department of Management Sciences
with effect from Semester A 2022/23**

Part I Course Overview

Course Title:	<u>Applied Linear Statistical Models</u>
Course Code:	<u>MS5218</u>
Course Duration:	<u>One semester</u>
Credit Units:	<u>3</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>MS5217 Statistical Data Analysis</u>
Precursors: <i>(Course Code and Title)</i>	<u>Nil</u>
Equivalent Courses: <i>(Course Code and Title)</i>	<u>MS5213 Statistical Methods II</u>
Exclusive Courses: <i>(Course Code and Title)</i>	<u>Nil</u>

Part II Course Details

1. Abstract

The aims of this course are to

- introduce the statistical concepts and methodology of linear statistical models. The curriculum emphasizes the use of regression modeling and analysis of variance techniques in solving business problems.
- develop students' analytic ability to integrate and apply the knowledge and quantitative skills, in particular linear statistical model methods, gained in the course to solve business problems.
- provide students with the opportunity to develop their skills in presenting the findings of their own project.

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.	Formulate real-world business problems using linear model methods and interpret the results of their analyses.	N.A.	✓	✓	✓
2.	Evaluate critically the use of linear model methods in solving business problems and assess their appropriateness, accuracy and limitations.	N.A.	✓	✓	
3.	Demonstrate competence in using popular statistical software packages to analyze business data with linear model methods.	N.A.		✓	✓
4.	Provide an opportunity for students to communicate the results effectively in written and electronic formats using common business practice such as the preparation of a presentation.	N.A.		✓	✓
		N.A.			

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	
Lectures	Concepts and specific subject knowledge are explained	✓	✓			2.0
Class discussion	Problem and cases are given in class for discussion. Students will be asked to explore possible solutions to these problems and cases. The instructor will provide instant feedback and support for students' queries.		✓	✓		0.5
Computer laboratory sessions	Provide demonstration and hand-on experience of using statistical packages to analyse data sets. They have to formulate the problems into a statistics model and analyse the data with the support of the statistical packages.	✓	✓	✓		0.5
Project	A real-life case with data is assigned to the class. Students have to analyse and explore issues related to the case. Then, they have to integrate the techniques learned in the course to analyse the data set and design an efficient solution for the problems presented in the case. Details of the findings have to be summarized in a slide deck and presented in class.	✓	✓	✓	✓	N.A.

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: <u>60</u> %							
Project/Assignment	✓	✓	✓	✓		30%	
Test	✓	✓	✓			30%	
Examination: <u>40</u> % (duration: 3 hours, if applicable)							
Examination	✓	✓	✓			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)
Project/Assignment	Ability in using the appropriate statistical methods to solve the business problem	Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base	Evidence of original thinking, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature	Some evidence of original thinking, little evidence of critical capacity and analytic ability; reasonable understanding of issues	Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature
Test	Core concepts and ideas; use of appropriate statistical methods	Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base	Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature	Some evidence of original thinking, little evidence of critical capacity and analytic ability; reasonable understanding of issues	Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature
Examination	Core concepts and ideas; use of appropriate statistical methods	Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base	Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature	Student who is profiting from the university experience; understanding of the subject; ability to develop solutions to simple problems in the material	Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature

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)
Project/Assignment	Ability in using the appropriate statistical methods to solve the business problem	Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base	Evidence of original thinking, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature	Little evidence of original thinking, little evidence of critical capacity and analytic ability; reasonable understanding of issues	Sufficient familiarity with the subject matter to enable the student to progress without repeating the case report	Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature
Test	Core concepts and ideas; use of appropriate statistical methods	Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base	Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature	Some evidence of grasp of subject, little evidence of critical capacity and analytic ability; reasonable understanding of issues	Sufficient familiarity with the subject matter to enable the student to progress without repeating the case report	Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature
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Part III Other Information

1. Keyword Syllabus

(An indication of the key topics of the course.)

1. Multiple Regression Model

Formulation and assumptions of a multiple regression model. Inference of the regression parameters. General form of hypotheses testing. Sums of squares.

2. Regression Models for Quantitative and Qualitative Variables

Polynomial models. Indicator variables. Piece-wise linear regression model. Modeling interactions between quantitative and qualitative variables.

3. Model Building and Variable Selection

Standard criteria for comparing models. Cp, AIC, BIC and other criteria. Sequential F-ratios. Forward, backward and stepwise selection regression. Multi-collinearity. Regularized estimation.

4. Diagnostics and Remedial Measures

Diagnosis of residuals. Remedial actions when model assumptions are violated. Transformation of variables.

5. Analysis of Variance

ANOVA.

6. Logistic Regression

Ordered/unordered logit. Probit

7. Time Series

White Noise. Stationarity. ARMA. Heteroscedasticity.

2. Reading List

2.1 Compulsory Readings

1.	Kleinbaum D G, Kupper L L, Muller K E and Nizam A, Applied Regression Analysis and Other Multivariable Methods, Thomson
2.	Mendenhall W and Sincich T, A Second Course in Statistics: Regression Analysis, Pearson
3.	Dielman T E, Applied Regression Analysis for Business and Economics, Duxbury
4.	Woodward W A, Gray H L, Elliott A C, Applied Time Series Analysis with R, Taylor & Francis

2.2 Additional Readings

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

Nil