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:	Statistical Modelling in Marketing Engineering
Course Code:	MS6218
Course Duration:	One Semester
Credit Units:	3
Level:	P6
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

This course aims to develop students' ability to use statistical modelling techniques to solve marketing engineering problems. Special emphasis is placed on the data analysis and modelling of consumer opinions and behaviours.

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.	Describe the purpose and the procedure of conducting statistical modelling techniques in marketing engineering and the difference among the techniques		✓		
2.	Apply the concepts and methods of statistical modelling techniques to solve marketing engineering problems and company problems related to marketing research and survey data			✓	✓
		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	
Interactive Lectures	Students listen to the concepts and methods of statistical modelling techniques in marketing engineering, with emphasis on real-life applications. Students discuss the major issues arising from the applications and case study problems	✓	✓	
Computer Lab	Students practice the use of computer software to solve forecasting problems and discuss the major issues arising from the applications and the use of computer software	✓	✓	

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		
Continuous Assessment: __50__%				
Assignments	✓	✓	0-50%	
Group project	✓	✓	0-50%	
Tests or quizzes	✓	✓	0-50%	
Examination: __50__% (duration: 3 hours, if applicable)				
Examination	✓	✓	50%	
			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

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Assignments	Students work on weekly homework assignments.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Group project	Students work in teams to solve problems.	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Tests or quizzes	Students are assessed on professional knowledge, techniques and applications of part of the course materials.	High	Significant	Moderate	Basic	Not even reaching marginal levels
4. Examination	Students are assessed on professional knowledge, techniques and applications of the whole course materials.	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.)

1. **Introduction–Statistical Modelling in Marketing Engineering**
   Purpose of marketing research. Statistical models. Demand for marketing research. Scientific marketing research. Latent variables. Relations and variance. Some examples of use of statistical models in marketing research.

2. **Describing Two-way Tables obtained from Survey Data**
   Two-way tables. Notations. Ways of comparing proportions from two-way tables. Odds ratio. Summary measures of association. Use of SPSS/SAS.

3. **Statistical Modelling and Application to Two-way Tables**
   Statistical models. Some common statistical distributions. Two important tools in statistical modelling. Maximum likelihood estimator and likelihood ratio test. Goodness of fit and test of independence. Confidence intervals of some parameters for two-way tables.

4. **Models for Binary Response (Logistic Regression Model)**
   Generalised linear models. Logit models for categorical data, logistic regression. Model diagnostics. Application.

5. **Multinomial Response Models**
   Multinomial logit models. The MNL model and the likelihood function. Use of SAS procedures. Brand choice models. Logits for ordinal responses. Cumulative logit modes.

6. **Principal Components Analysis**
   Basic concepts of principal components. Estimation of principal components. Determining the number of principal components. How to perform principal components analysis using computer package. Interpretation of computer output. Business applications such as index construction.

7. **Exploratory Factor Analysis**
   Basic concepts of exploratory factor analysis. Methods of parameter estimation. Orthogonal and oblique rotations of factors. Estimation of factor scores. How to perform exploratory factor analysis using computer package. Interpretation of computer output. Exploratory Factor analysis versus principal components analysis. Business applications such as attitude measurement.

8. **Confirmatory Factor Analysis and Structural Equation Models**
   General purpose and description. Model specification- Measurement model and structural model. Latent variables. Identification. Estimation. Evaluation of fit. Model modification and interpretation.

9. **Conjoint Analysis (Stated Preference Model)**
   Model of stated preference. The theory of conjoint analysis. The pairwise trade-off model. The full profile conjoint model. The hybrid conjoint model. The multinomial logit model revisit. Trade-off and market-share analysis

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.	Agresti A, An Introduction to Categorical Data Analysis, 2nd Edition, John Wiley, 2007.
2.	Allison P D, Logistic Regression using the SAS System, SAS Institute, 2001.
3.	Hair J F, Black B, Babin B, and Anderson R, Multivariate Data Analysis, 7th Edition, Pearson Prentice Hall, 2010.
4.	Johnson R A and Wichern D W, Applied Multivariate Statistical Analysis, 6th Edition, Prentice Hall, 2007.
5.	Lilien G L and Rangaswamy A, Marketing Engineering Revised, 2nd Edition, Trafford Publishing, 2004.
6.	SAS, Getting Started with the Market Research Application, SAS Institute, 1997.
7.	Sharma S, Applied Multivariate Techniques, John Wiley & Sons, 1996.
8.	Train K E, Discrete Choice Methods with Simulation, Cambridge University Press, 2003.
9.	Data sets and SAS programmes used in the text (An Introduction to Categorical Data Analysis): http://www.stat.ufl.edu/~aa/intro-cda/appendix.html
10.	Use of other software, such as S-Plus, R and SPSS to conduct the examples in the text (An Introduction to Categorical Data Analysis): http://www.stat.ufl.edu/~aa/cda/software.html
11.	Marketing Engineering text book and software: http://www.hooverbooks.com/store/index.php?main_page=product_info&cPath=2_1&products_id=3
12.	Marketing Engineering's website: http://www.marketingengineering.com/student/index.cfm
13.	AMOS website: http://www.spss.com/AMOS/
14.	Hong Kong Consumer Satisfaction Index website: http://fbweb.cityu.edu.hk/ms/hkcsi/index.html