**City University of Hong Kong**
**Course Syllabus**

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

---

## Part I Course Overview

| | |
|---|---|
| **Course Title:** | Contemporary Topics in Quantitative Analysis for Business |
| **Course Code**: | MS6712 |
| **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)* | MS5212 Statistical Methods I and MS5213 Statistical Methods II<br>or<br>MS5217 Statistical Data Analysis and MS5218 Applied Linear Statistical Models |
| **Equivalent Courses**: *(Course Code and Title)* | Nil |
| **Exclusive Courses**: *(Course Code and Title)* | Nil |

## Part II Course Details

### 1. Abstract

This course aims to extend the knowledge of students in the use of quantitative analysis and to further develop students the practical skills of some advanced quantitative techniques for business decision problems.

### 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 theories and principles of some advanced quantitative techniques for business decision making. | 50% | ✓ | ✓ | |
| 2. | Apply these techniques to solve real life problems. | 50% | | ✓ | ✓ |
| | | 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 | | | | | |
| Lectures | Students will understand the concepts and statistical properties of the quantitative techniques and their relevance to business. The strengths and weaknesses of the techniques, and how they can be used to tackle different business problems are discussed in details. Case studies and examples are used to illustrate the quantitative techniques in practice. There will also be opportunities for peer interactions in the lectures through group discussions. | ✓ | ✓ | | | | | 2 hours / week |
| Group Discussions & Presentation | Students will have group discussions on major issues in class. Team members take turns to present the contents. | ✓ | ✓ | | | | | 1 hour / week |

## 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: 60 % | | | | | | | | |
| Assignments, or cases report | ✓ | ✓ | | | | | 30% | |
| Project | ✓ | ✓ | | | | | 30% | |
| Examination: 40 % (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 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) |
|---|---|---|---|---|---|---|
| Assignments, or cases report | Core concepts and ideas; use of appropriate statistical methods | Strong evidence of knowing how to apply the key concepts and techniques, and to use computer software in performing data analysis | Evidence of knowing how to apply the key concepts and techniques, and to use computer software in performing data analysis | Some evidence of knowing how to apply the key concepts and techniques, and to use computer software in performing data analysis | Sufficient familiarity with the subject matter to enable the student to progress without repeating the assignment | Little evidence of familiarity with the subject matter |
| Project | 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 project report | 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 | Some evidence of original thinking, 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 | Sufficient familiarity with the subject matter to enable the student to progress without repeating the course | Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature |

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) |
|---|---|---|---|---|---|
| Assignments, or cases report | Core concepts and ideas; use of appropriate statistical methods | Strong evidence of knowing how to apply the key concepts and techniques, and to use computer software in performing data analysis | Evidence of knowing how to apply the key concepts and techniques, and to use computer software in performing data analysis | Some evidence of knowing how to apply the key concepts and techniques, and to use computer software in performing data analysis | Little evidence of familiarity with the subject matter |
| Project | 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 | 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 | Some evidence of original thinking, 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 |

**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.)*

Students in the programme so far follow a programme made up of well-defined syllabuses. In order to make provision for contemporary topics which are of special interest to the students, this course provides an opportunity for students to select a range of topics for study. These topics will include some contemporary advanced quantitative techniques which are either not treated in the general curricula or not dealt with in sufficient detail or are the specialties of visiting scholars. The content would be designed according to the training of the students so that they will have sufficient background to take the course. Likely topics are listed as follows. The topics offered each year depend on student interests and staff availability.

**1. Quantitative Analysis in the Real Estate Market**

In the past decade, the financial analysis of real estate and the real estate market have become more sophisticated. This is due to a greater degree of integration between real estate and the broader economy. The new spirit of cooperation has changed the standard operating in real estate markets in two important ways. First, the analysis of income producing properties has become more systematic by adopting the tools of financial valuation rather than relying solely on experience. Second, new assets have been developed that have redefined the risks involved in real estate investment by securitizing the cash flows generated by real assets. The main objective of this topic is to introduce the fundamental concepts, principles, analytical methods and tools useful for making decision regarding real estate assets. Emphasis will be placed upon the use of the quantitative skills acquired in the programme to analyze behaviour of agents in the real estate. A firm understanding of real estate markets is essential to these analyses. Topics to be covered include characteristics of the real estate market, types of market activities, vacancy and absorption analysis, leasing and lease analysis, hedonic housing price modeling, determination of mortgage interest rates, mortgage payment pattern and loan calculation.

**2. Structural Equations Models in Business**

Structural equation modeling with latent variables is an integrated and powerful technique which includes many typical statistical methods such as path analysis, recursive models, classical econometrics and factor analysis. Structural equations models are particularly helpful in behavioral sciences and have been used to study the relationship between customers' social and economic characteristics and preferences, the determinants of firm profitability, discrimination in employment and other interesting mechanisms. Topics to be covered include latent variables and latent variable models, explanatory and confirmatory factor analysis, path analysis, causality and causal models, and LISREL models.

**3. Statistical Reliability Models**

With increasing intense competition and customer expectation, the key to success and survival of nowadays manufacturers is to produce high quality products. Improving reliability is an important part of the larger picture of improving product quality. Reliability is defined as the probability that a system or equipment will perform its intended function under given conditions for a specified period of time. In essence, reliability is quality over time. This topic will introduce some concepts and terminology in life tests and reliability; and to introduce statistical methods for the analysis of reliability data. Topics to be covered include: life time data, censoring, various probability distributions in reliability; accelerated life models; reliability and hazard rates, reliability modeling techniques for repairable system.

## 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.)*

Reading lists would depend on the topics intended to be covered in the course. The following lists are the corresponding references for the selected topics.

1. Quantitative Analysis in the Real Estate Market

| | |
|---|---|
| 1. | Ball M, Markets and Institutions in Real Estate and Construction, Blackwell. |
| 2. | Corqel J, Smith H and Lang D, Real Estate Perspectives: An Introduction to Real Estate, Richard D Irwin. |
| 3. | Geltner D and Miller N, Commercial Real Estate Analysis and Investments, Cincinnati, South-Western College Publishing Co. |
| 4. | Thalmann, P, Construction and Real Estate Dynamics (Applied Econometrics Association S.), Macmillan. |

2. Structural Equations Models in Business

| | |
|---|---|
| 1. | Bollen K A, Structural Equations with Latent Variables, Wiley. |
| 2. | Everitt, B S, An Introduction to Latent Variables Models, Chapman and Hall. |
| 3. | Bartholomew, D J and Scott, M. Latent Variable Models and Factor Analysis, Hodder Arnold Publication. |
| 4. | Bagozzi, R P, Principles of Marketing Research, Blackwell Publishers. |

3. Statistical Reliability Models

| | |
|---|---|
| 1. | Leemis, L, Reliability: Probabilistic Models and Statistical Models, Prentice Hall. |
| 2. | Meeker, W and Escobar, L, Statistical Methods for Reliability Data, Wiley. |