City University of Hong Kong
Course Syllabus

offered by Department of Management Sciences
with effect from Semester A in 2017 / 2018

Part I Course Overview

Course Title:	Quantitative Methods
Course Code:	MS5211
Course Duration:	One semester
Credit Units:	3
Level:	P5
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 introduces a number of quantitative methods in management sciences, including linear programming, integer programming, nonlinear programming, decision analysis, and project management. This course also introduces a number of deterministic and stochastic models such as transportation, assignment, network, and queueing models. In this course, students develop the ability to define, formulate, and model real world decision problems from an analytical point of view. Students also learn advanced quantitative methods to analyze the problems and models of interest.

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 quantitative concepts that are important for practicing managers		√		√
2.	Define decision problems, **formulate and model** the problems using quantitative skills studied; apply appropriate methodologies to find solutions and interpret the solutions found **(Ability)**			√	√
3.	Handle computer software packages to solve the models built			√	√
4.	Critically discuss academic literature and other information sources related to quantitative methods		√	√	√
5.	Prepare reports integrating textual and numerical material and make effective oral communication using a range of traditional and electronic media; undertake a set of tasks associated with improving their career prospects		√		√
		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	5	
1. Lecture	Concepts and general knowledge of quantitative methods are explained. The relevant techniques are developed and applied in the context of real business situations. Examples are used to emphasize the crucial skills of describing and defining the problem before conducting any analysis. Whenever available, computer software packages are introduced as a tool for solving the model, so that students can actually bring what they learnt to their place of work.	√	√	√	√	√	
2. Class discussion	Discussions on major issues related to quantitative methods.	√	√	√	√		
3. Assignment	Case assignment is used to provide training in analysing complex problem situations and solving business problems. Students are required to work in groups, observe existing practices and/or conduct research on related applications. They are expected to apply methodologies learned or design their solution to solve problems. Findings are presented in a report or through presentation, including a reflection upon their learning experiences and challenges.	√	√	√	√	√	

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	5			
Continuous Assessment: __40__%								
Assignment	✓	✓	✓	✓	✓		40%	
Examination: __60__% (duration: 2 hours, 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.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Assignment		Strong evidence of understanding the key concepts and definitions of the learned subject; 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 show some evidence of familiarity with literature.	Sufficient familiarity with the subject matter to enable the student to progress further.	Little evidence of familiarity with the subject matter; limited or irrelevant use of literature.
2. Examination		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 show some evidence of familiarity with literature.	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.

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

The concept of a system and a model. Quantitative models in business applications. Problem solving process.

2. Linear/nonlinear Programming Models

Linear programming applications. Solving a linear program using the graphical method for two decision variables and computer packages (e.g., Excel) for two or more decision variables. Transportation, transshipment and assignment problems. Integer programming, and nonlinear programming.

3. Decision Making Under Uncertainties

Decision tables. Value of information. Decision trees. Bayesian inference for categorical data analysis in decision trees.

4. Project Management

CPM, PERT, and computation of the estimated project time.

5. Queueing Models

Some queuing terminology. Modeling arrival and service processes. Birth-death processes. The balance equation method. M/M/1 queuing system. M/M/s queuing system. M/M/1 or M/M/s with a finite capacity. Economics of Queuing Systems.

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.	Render, B., Stair, R. M., Hanna, M. E., and Hale, T.S. Quantitative Analysis for Management, 12th edition, Pearson Education, 2015 (ISBN-13: 978-0-13-350733-1)

2.2 Additional Readings

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

1.	Winston, W. L., *Microsoft Excel 2010: Data Analysis and Business Modeling*, Microsoft Press, 2011 (e-book)
2.	Keller, G., *Statistics for management and economics*, 9th edition, South-Western College Pub, 2012
3.	Online resource: "The Science of Better" (website of success stories) http://www.scienceofbetter.org/
4.	Online resource: Analytics (internet magazine) http://www.analytics-magazine.com/
5.	Online resource: Statistics Glossary http://www.stats.gla.ac.uk/steps/glossary/index.html