City University of Hong Kong
Course Syllabus

offered by College/School/Department of Management Sciences
with effect from Semester A 2021/22

Part I   Course Overview

Course Title:	Data-driven Business Modeling
Course Code:	CB2203
Course Duration:	One Semester
Credit Units:	3
Level:	B2
Proposed Area: *(for GE courses only)*	☐Arts and Humanities ☐Study of Societies, Social and Business Organisations ☐Science and Technology
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	Nil
Precursors: *(Course Code and Title)*	CB2200 Business Statistics; or MA2172 Applied Statistics for Sciences and Engineering or equivalent
Equivalent Courses: *(Course Code and Title)*	Nil
Exclusive Courses: *(Course Code and Title)*	MS3261 Business Modeling with Spreadsheets CB2011 Solving Business Problems with Spreadsheet Modeling

Part II   Course Details

1.   Abstract
(A 150-word description about the course)

This course aims to develop students' ability to formulate, analyse and solve business problems using data modeling. Real problems that companies encounter on a day-to-day basis are presented, with the aim of helping students derive applicable principles and link principles to practice. The goal of the course is to train students to become effective modellers who can derive data models for solving business problems in various functional areas.

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 business problems, collect relevant data, and analyse the data	20%	✓		
2.	formulate data models for the business problems using software	30%		✓	
3.	select appropriate modeling techniques and implement the analysis for different business problems	30%		✓	
4.	validate the results obtained from models, and communicate and explain the analysis and findings to non-specialists	20%		✓	✓

* If weighting is assigned to CILOs, they should add up to 100%.   100%

 # Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

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	In the lectures, students learn the concepts of modeling, formulation of business problems in various functional areas, and tools in modeling.	✓		✓	✓		2

Laboratory Tutorials	Hands-on experience with the techniques and problem-solving activities based on real world business problems. The laboratory tutorials consolidate and supplement what the students learn in lectures.	✓	✓	✓					1
Case Studies	Students solve particular business problems using modeling techniques and tools learned in the course.	✓	✓	✓	✓				

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: 50%								
Assignments The assignments are designed to help students practise their problem-solving skills and obtain hands-on experience using spreadsheet modeling tools.	✓	✓	✓	✓			20%	
Quizzes The quizzes are designed to assess students' ability in problem formulation and business modeling.	✓	✓	✓				30%	
Examination: 50% (duration: 2 hours, if applicable)								
Examination (duration: 2 hours) The examination covers all topics of the course. It is designed to assess students' understanding on the concepts of business modeling, and their ability to apply them to solve business problems.	✓		✓	✓			50%	
The weightings should add up to 100%.							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. Assignments	Assessing students' problem-solving skills and using spreadsheet modeling tools.	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 subject matter.	Some evidence of understanding of the subject; ability to perform basic model building and data analysis.	Adequate familiarity with the subject matter; shows marginal ability to perform basic model building and data analysis.	Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature.
2. Quizzes	Assessing students' ability in problem formulation and business modeling.	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 subject matter.	Some evidence of understanding of the subject; ability to perform basic model building and data analysis.	Adequate familiarity with the subject matter; shows marginal ability to perform basic model building and data analysis.	Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature.
3. Examination	Assessing students' understanding on the concepts of business modeling, and their ability to apply them to solve business problems.	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 subject matter.	Some evidence of understanding of the subject; ability to perform basic model building and data analysis.	Adequate 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.)

<u>Business Modeling and Analysis</u>

Data structure for different applications, Data analysis, Business modeling process, Problem formulation, Relationship analysis, Structural "what-if" analyses, Break-even analysis

<u>Multiple Regression Models</u>

Concept of linear models, Data analysis using multiple regression models, Model significance. Statistical inferences about regression parameters.

<u>Optimization with Excel Solver</u>

Optimization, Use of Excel Solver, Sensitivity analysis, Applications include investment problem, inventory problem, optimal product mix, workforce and project scheduling, assignment problem, production planning, transportation problem

<u>Business Analysis through Simulation</u>

Simulation, Monte Carlo method, Newsvendor problems, Queueing problems, Overbooking problems

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.	B. Render, R.M. Stair Jr., and N. Balakrishnan, "Managerial Decision Modeling with Spreadsheets," latest edition, Prentice Hall.

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

1.	Wayne L. Winston. Microsoft Excel: Data Analysis and Business Modeling. Microsoft Press, latest edition.
2.	Stephen G. Powell and Kenneth R. Baker. Management Science: The Art of Modeling

Teaching Schedule for CB2203 Data-driven Business Modeling

Week	Contents
1	Business Modeling and Analysis • Data structure for different applications • Data analysis • Business modeling process • Problem formulation • Relationship analysis • Structural "what-if" analyses • Break-even analysis
2-3	Multiple Regression Models • Concept of linear models • Data analysis using multiple regression models • Model significance • Statistical inferences about regression parameters
4-6	Optimization with Excel Solver Linear Programming Models • Optimization • Use of Excel Solver • Applications including meal diet problem, product mix problem, blending problem, workforce scheduling, multi-period work scheduling, manufacturing problems, investment problems • Sensitivity analysis
7-8	Optimization with Excel Solver Integer Programming Models • Pure integer programming models • Applications including capital budgeting problem, set covering problem, workforce assignment problem, relationship among projects, linking constraints and fixed cost, capacitated and incapacitated problems
9	Optimization with Excel Solver Non-linear Programming Models • Solution procedures in non-linear programming models • Applications including cost modelling, charity advertising budget problem • Portfolio optimization
10	Business Analysis through Simulation • Randomness • Random observations • Random numbers • Simulation • Monte Carlo method
11	Business Analysis through Simulation • Random number generation by Excel • Newsvendor problems
12	Business Analysis through Simulation • Queueing problems • Overbooking problems
13	Conclusion