City University of Hong Kong
Course Syllabus

offered by Department of Management Sciences
with effect from Semester A 2017 /18

Part I   Course Overview

Course Title:	Business Process Modeling and Simulation
Course Code:	MS5225
Course Duration:	One Semester
Credit Units:	3
Level:	P5
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	MS5313 Managerial Decision Modeling or equivalent
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:
- Introduce simulation and stochastic modeling as a tool for solving real world problems of a stochastic nature
- Develop students' abilities of constructing simulation experiments of moderate size
- Enable students to use simulation experiments to analyze business 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.	Be able to apply Monte Carlo simulation in real life problems from inventory control, financial analysis, project management and other application areas. As a prerequisite, the students will first learn to generate random variates for various continuous and discrete distributions.	20%		✓	
2.	Master the basic analytical skills for a discrete-event simulation, including input data collection and analysis, model building, model verification and validation, and output analysis.	15%		✓	
3.	Be able to use simulation techniques in several important applications following instructions and draw some insights.	20%	✓		
4.	Be able to apply simulation to solve a real business problem arising from their own companies, working as a team.	25%			✓
5.	Be able to apply simulation techniques in several important applications independently.	20%		✓	
		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. 1	2	3	4	5		Hours/week (if applicable)
Lecture	Concepts on Monte Carlo simulation and discrete event simulations, system modelling techniques. Students listen to lectures and respond to questions after a brief group discussion; They read business cases and related videos that illustrate system modeling and process improvements and demonstrate process improvement techniques.	✓	✓	✓				
Outside-class readings	Students are required to read managerial journal papers related to real life problems and techniques in practice. Each group should present one paper and critically analyse it. Computer laboratory: Students work in groups to apply simulation techniques to problems drawn from operations, revenue management, investment and accounting, etc. Students should critically evaluate the solutions and draw their own insights.	✓	✓	✓				
Case study	A group of students are asked to conduct a case study for a real-world entity including data collection, modelling, a written report, presentation and group discussion.		✓		✓	✓		
Individual assignments	Students are required to apply simulation skills in several business problems.	✓	✓	✓				

4. Assessment Tasks/Activities (ATs)
(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No. 1	2	3	4			Weighting	Remarks
Continuous Assessment: __50__%								
Case Study	✓	✓	✓	✓	✓		30%	
Outside Class Reading and In-Class Exercises	✓	✓	✓				10%	
Individual Assignments	✓	✓	✓				10%	
Examination: __50__% (duration: 2 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.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Case Study	Evidence of knowing how to apply simulation to solving real problems.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Outside Class Reading and In-Class Exercises	Evidence of knowing how to apply simulation to solving given problems according to given instructions;	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Individual Assignments	Evidence of knowing how to apply simulation to solving given problems according to given instructions;	High	Significant	Moderate	Basic	Not even reaching marginal levels
4. Examination	Evidence of knowing how to apply simulation to solving given problems according to given instructions;	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.)

    Introduction
    Introduction to simulation. Business Applications. Modern simulation technology.

    Random Variates Generation
    Random number generator. Generating random variates.

    Monte Carlo simulation.
    Applications in inventory control, financial analysis and project management, etc.

    Input Data Collection and Analysis
    Collect data necessary for modeling the system
    Selecting input probability distributions. Parameter Estimation. Test goodness-of-fit.

    Model building
    Building Models using various techniques. ProModel or Arena.

    Model Verification and Validation
    Verification and validation. Face validity. Validation of model assumptions. Validate input-output transformations.

    Output Data Analysis
    Output analysis for a single system and comparison of alternative system configurations.

    Simulation Workshop
    Cases involving manufacturing, logistics and service 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.	W. L. Winston, S. C. Albright, M. Broadie (2002). Practical Management Science, 2nd edition, Thomson Learning.
2.	C. Harrell, B K. Ghosh, R. O. Bowden (2003) Simulation Using Promodel, 2nd edition, International Edition, McGraw Hill.

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

1.	Averill M. Law, W. David Kelton (2000) Simulation modeling and analysis, 3rd edition, Boston: McGraw-Hill.