City University of Hong Kong
Course Syllabus

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

Part I Course Overview

Course Title:	Foundations of Management Science
Course Code:	MS8953
Course Duration:	One Semester
Credit Units:	3
Level:	R8
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)*	Nil
Equivalent Courses: *(Course Code and Title)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

(A 150-word description about the course)

Provide students a comprehensive understanding of linear programming, convex optimization, dynamic programming and stochastic control. Decision making under deterministic and stochastic environments. Applications in inventory control and pricing strategy. This course is designed to introduce fundamental models and technical tools of solving real world problems to PhD students, and to train their original thinking skills and prepare them for advanced research.

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.	Formulate problems with linear, convex and dynamic programming models	20%		✓	
2.	Understand the fundamental models of inventory and pricing theory	20%		✓	
3.	Apply the models/theories in practice/research topics	20%		✓	
4.	Able to solve the basic optimization models and analyse the optimal policy of multi-period problem	30%		✓	
5.	Able to create new research ideas.	10%			✓
		100%			

** If weighting is assigned to CILOs, they should add up to 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	5		
Interactive lecture	During lectures, models and theories of optimization models are explained, and topics will be provided for students for group discussion.	✓	✓	✓	✓			
Outside Classroom	Important recent research papers will be recommended to read after					✓		

Activities	class. Students are required to evaluate, criticize the research paper and create new research ideas in related topics.							

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: __70__%								
Assignments	✓	✓	✓	✓			40%	
Midterm Exam	✓	✓	✓	✓			30%	
Examination: __30__% (duration: 3 hours, if applicable)								
Examination	✓	✓	✓	✓			30%	
** 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	Assignment is designed to enhance students' understanding of the model and skills of applying methodology learnt to the related problems.	High	Significant	Moderate	Basic	Not even reaching marginal level
2. Midterm Exam	Assess students' knowledge on the concepts, techniques and ideas learnt in the first half of the semester.	High	Significant	Moderate	Basic	Not even reaching marginal level
3. Final Exam	Assess students' knowledge on subject matter and using the techniques to solve the related problems. To test students' creative ideas on related research topics.	High	Significant	Moderate	Basic	Not even reaching marginal level

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.)

- Linear Optimization: Formulation, geometry, optimality, simplex method, duality, sensitivity analysis, interior point method, complementary-slackness condition
- Convex Optimization: convexity, epigraph, conjugate function, Lagrangian dual, Newton's method, KKT condition, semi-definite programming
- Dynamic programming, Optimal Control, Newsvendor Problem, Newsvendor Problem with Price-effect, Finite Horizon Inventory Control, Integration of Inventory and Pricing

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.	Dimitris Bertsimas and John N.Tsitsikilis: Introduction to Linear Optimization
2.	Boyd, Vandenberghe: Convex Optimization, Cambridge University Press, 2004
3.	D. Bertsekas. Dynamic Programming and Optimal Control. Vol 1. Third Edition. 2005
4.	D. Simchi-Levi. X.Chen and J. Bramel. The Logic of Logistics; Theory, Algorithms, and Applications for Logistics and Supply Chain Management. Second Edition. 2005