

City University of Hong Kong

Information on a Course offered by Department of Management Sciences with effect from Semester A in 2013 / 2014

Part I

Course Title: Foundations of Management Science

Course Code: MS8953

Course Duration: One Semester

Credit Units: 3

Level: R8

Medium of Instruction: English

Prerequisites: Nil

Precursors: Nil

Equivalent Courses: Nil

Exclusive Courses: Nil

Part II

Course Aims

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.

Course Intended Learning Outcomes (CILOs)

Upon successful completion of this course, students should be able to:

No.	CILOs
1.	Formulate problems with linear, convex and dynamic programming

	models.
2.	Understand the fundamental models of inventory and pricing theory
3.	Apply the models/theories in practice/research topics
4.	Able to solve the basic optimization models and analyze the optimal policy of multi-period problem
5.	Able to create new research ideas.

Teaching and Learning Activities (TLAs)

(Indicative of likely activities and tasks designed to facilitate students' achievement of the CILOs. Final details will be provided to students in their first week of attendance in this course)

CILO No.	TLAs
CILO 1,2,3,4	<i>Interactive lecture</i> During lectures, models and theories of optimization models are explained, and topics will be provided for students for group discussion.
CILO 5,	Outside Classroom Activities Important recent research papers will be recommended to read after class. Students are required to evaluate, criticize the research paper and create new research ideas in related topics.

Assessment Tasks/Activities

(Indicative of likely activities and tasks designed to assess how well the students achieve the CILOs. Final details will be provided to students in their first week of attendance in this course)

CILO No.	Type of Assessment Tasks/Activities	Weighting (if applicable)
CILO 1,2,3,4	Assignments	40%
CILO 1,2,3,4	Midterm Exam	30%
CILO 1,2,3,4	Final Exam (3 hours)	30%

Grading of Student Achievement:

Assignments/ Midterm exam/ Final examination

Letter Grade	Grade Point	Grade Definitions	
A+	4.3	Excellent	Extensive knowledge on subject matter and strong evidence of using the techniques to solve the related problems. Original thinking and creative ideas on related research topics.
A	4.0		
A-	3.7		
B+	3.3	Good	Good knowledge on subject matter and good evidence of using the techniques to solve the related problems.
B	3.0		
B-	2.7		

C+	2.3	Adequate	Some knowledge on subject matter and some evidence of using the techniques to solve the related problems.
C	2.0		
C-	1.7		
F	0.0	Failure	Little knowledge on subject matter and little evidence of using the techniques to solve the related problems.

Part III

Keyword Syllabus

- 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

Recommended Reading

- Dimitris Bertsimas and John N. Tsitsikilis: Introduction to Linear Optimization
- Boyd, Vandenberghe: [Convex Optimization](#), Cambridge University Press, 2004
- D. Bertsekas. Dynamic Programming and Optimal Control. Vol 1. Third Edition. 2005
- 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