

**City University of Hong Kong
Course Syllabus**

**offered by Department of Management Sciences
with effect from Semester A 2024/2025**

Part I Course Overview

Course Title:	Stochastic Operations Research
Course Code:	MS8945
Course Duration:	One Semester
Credit Units:	3
Level:	R8
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: <i>(Course Code and Title)</i>	MS8944 Introduction to Probability Models
Precursors: <i>(Course Code and Title)</i>	Nil
Equivalent Courses: <i>(Course Code and Title)</i>	Nil
Exclusive Courses: <i>(Course Code and Title)</i>	Nil

Part II Course Details

1. Abstract

This advanced PhD course focuses on equipping doctoral students with a robust understanding of stochastic models and their applications in operational decision-making. The curriculum delves into the complexities of decision-making under uncertainty, introducing students to sophisticated techniques such as dynamic programming for sequential decision processes. Key areas of application include inventory control, pricing strategies, and financial management, with a particular emphasis on bridging the gap between high-level financial objectives and operational guidelines. The course explores the profound impact of uncertainty on operational decisions, providing students with the analytical tools to navigate complex business environments. Through a combination of theoretical foundations and practical problem-solving, students will develop proficiency in fundamental models and technical solution methods essential for Operations Research and Operations Management research. This course serves as a cornerstone for PhD candidates, preparing them for advanced research in stochastic modeling and its real-world applications in management science.

2. Course Intended Learning Outcomes (CILOs)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	Demonstrate a comprehensive understanding of the basic concepts of stochastic processes		✓	✓	
2.	Demonstrate a comprehensive understanding of the modelling issues in operations research		✓	✓	
3.	Apply the knowledge of stochastic processes to model and analyze problems in the management science field			✓	✓
		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. Learning and Teaching Activities (LTAs)

LTA	Brief Description	CILO No.			Hours/week (if applicable)
		1	2	3	
Interactive lectures	Students will actively participate in interactive lectures and small-group discussions to develop a comprehensive understanding of the fundamental concepts, analytical techniques, and practical applications of stochastic processes.	✓	✓	✓	3 hours/week
Individual Assignments	Students will complete assigned individual assignments to reinforce the theoretical knowledge, and apply the theory to real-world problems in management science.	✓	✓	✓	3 hours/week

4. Assessment Tasks/Activities (ATs)

Assessment Tasks/Activities	CILO No.			Weighting	Remarks
	1	2	3		
Continuous Assessment: <u>40</u> %					
Assignments	✓	✓	✓		
Examination: <u>60</u> % (duration: 3 hours, if applicable)					
				100%	

5. Assessment Rubrics

Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Homework Assignments	Ability to apply the methodology and techniques to solve problems in management science	High	Significant	Moderate	Not even reaching marginal levels.	Ability to apply the methodology and techniques to solve problems in management science
2. Examination	Evidence of knowledge of subject matters and capability to prove fundamental results in stochastic processes	High	Significant	Moderate	Not even reaching marginal levels.	Evidence of knowledge of subject matters and capability to prove fundamental results in stochastic processes

Applicable to students admitted from Semester A 2022/23 to Summer Term 2024

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
1. Homework Assignments	Ability to apply the methodology and techniques to solve problems in management science	High	Significant	Moderate	Not even reaching marginal levels.
2. Examination	Evidence of knowledge of subject matters and capability to prove fundamental results in stochastic processes	High	Significant	Moderate	Not even reaching marginal levels.

Part III Other Information

1. Keyword Syllabus

Review of Probability Theory, Renewal Theory, Martingales, Random Walks, Brownian Motions, Optimal Stopping Problems and Dynamic Programming

2. Reading List

2.1 Compulsory Readings

1.	Sheldon M. Ross. 1996. Stochastic Processes, Second Edition, John Wiley & Sons
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2.2 Additional Readings

Nil.