

MS8945: STOCHASTIC OPERATIONS RESEARCH

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Stochastic Operations Research

Subject Code

MS - Decision Analytics and Operations

Course Number

8945

Academic Unit

Decision Analytics and Operations (DAOS)

College/School

College of Business (CB)

Course Duration

One Semester

Credit Units

3

Level

R8 - Research Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

MS8944 Introduction to Probability Models

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

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 decision analytics.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if DEC-A1 DEC-A2 DEC-A3 app.)			
1	Demonstrate a comprehensive understanding of the basic concepts of stochastic processes		x	x	
2	Demonstrate a comprehensive understanding of the modelling issues in operations research		x	x	
3	Apply the knowledge of stochastic processes to model and analyze problems in the operations research/operations management field			x	x

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 real-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.

Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	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.	1, 2, 3	3 hours/week

2	Individual Assignments	Students will complete assigned individual assignments to reinforce the theoretical knowledge, and apply the theory to real-world problems in decision analytics.	1, 2, 3	3 hours/week
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Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks ("- " for nil entry)	Allow Use of GenAI?
1	Assignments	1, 2, 3	40	A declaration is required if generative AI is used in completing the tasks.	Yes

Continuous Assessment (%)

40

Examination (%)

60

Examination Duration (Hours)

3

Minimum Continuous Assessment Passing Requirement (%)

0

Minimum Examination Passing Requirement (%)

0

Assessment Rubrics (AR)**Assessment Task**

Homework Assignments (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to apply the methodology and techniques to solve problems in management science

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Not even reaching marginal levels.

Failure

(F) Ability to apply the methodology and techniques to solve problems in management science

Assessment Task

Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Evidence of knowledge of subject matters and capability to prove fundamental results in stochastic processes

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Not even reaching marginal levels.

Failure

(F) Evidence of knowledge of subject matters and capability to prove fundamental results in stochastic processes

Assessment Task

Homework Assignments (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to apply the methodology and techniques to solve problems in management science

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate

Failure

(F) Not even reaching marginal levels.

Assessment Task

Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Evidence of knowledge of subject matters and capability to prove fundamental results in stochastic processes

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate

Failure

(F) Notevenreaching marginal levels.

Part III Other Information

Keyword Syllabus

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

Reading List**Compulsory Readings**

Title	
1	Sheldon M. Ross. 1996. Stochastic Processes, Second Edition, John Wiley & Sons

Additional Readings

Title	
1	Nil.