

MS5225: BUSINESS PROCESS MODELING AND SIMULATION

Effective Term

Semester B 2024/25

Part I Course Overview

Course Title

Business Process Modeling and Simulation

Subject Code

MS - Decision Analytics and Operations

Course Number

5225

Academic Unit

Decision Analytics and Operations (DAOS)

College/School

College of Business (CB)

Course Duration

One Semester

Credit Units

3

Level

P5, P6 - Postgraduate Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

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

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	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		x	
2	Demonstrate 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		x	
3	Apply simulation techniques in several important applications following instructions and draw some insights.	20	x		
4	Build simulation models to solve a real business problem arising from their own companies, working as a team.	25			x
5	Apply simulation techniques in several important applications independently.	20		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	Lecture	Concepts on Monte Carlo simulation and discrete event simulations, system modelling techniques. Students listen to lectures and respond to questions after brief group discussions; They read business cases and related videos that illustrate system modelling and process improvements and demonstrate process improvement techniques.	1, 2, 3	
2	Outside-class readings	Students are required to read managerial journal papers related to real life problems and techniques in practice. 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.	1, 2, 3	
3	Case study	Students are required to form groups to conduct a case study for a real-world entity including data collection, modelling, a written report, presentation and group discussion.	2, 4, 5	
4	Individual assignments	Students are required to apply simulation skills in several business problems.	1, 2, 3	

Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Case Study	1, 2, 3, 4, 5	30
2	Outside Class Reading and In-Class Exercises	1, 2, 3	10
3	Individual Assignments	1, 2, 3	10

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Assessment Rubrics (AR)

Assessment Task

1. Case Study (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Evidence of knowing how to apply simulation to solving real problems.

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

2. Outside Class Reading and In-Class Exercises (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Evidence of knowing how to apply simulation to solving given problems according to given instructions;

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

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

Criterion

Evidence of knowing how to apply simulation to solving given problems according to given instructions;

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

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

Criterion

Evidence of knowing how to apply simulation to solving given problems according to given instructions;

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

1. Case Study (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Evidence of knowing how to apply simulation to solving real problems.

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate

Failure

(F) Not even reaching marginal levels

Assessment Task

2. Outside Class Reading and In-Class Exercises (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Evidence of knowing how to apply simulation to solving given problems according to given instructions;

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate

Failure

(F) Not even reaching marginal levels

Assessment Task

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

Criterion

Evidence of knowing how to apply simulation to solving given problems according to given instructions;

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate

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(F) Not even reaching marginal levels

Assessment Task

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

Criterion

Evidence of knowing how to apply simulation to solving given problems according to given instructions;

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Moderate

Failure

(F) Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

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.

Reading List

Compulsory Readings

Title	
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.

Additional Readings

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