MS5313: MANAGERIAL DECISION MODELING

Effective Term
Semester A 2026/27

Part I Course Overview

Course Title
Managerial Decision Modeling

Subject Code
MS - Decision Analytics and Operations
Course Number
5313

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

Serving as a foundation course for developing advanced analytical and planning skills, this course aims to sharpen students' ability to creatively design, formulate, and construct quantitative models for managerial decision problems. Specifically, this course is intended to

- Provide students with the key concepts, knowledge, and tools to use data, analytical models and information technology to support practical managerial decision-making.
- Develop students' basic skills and hands-on experiences to uncover useful information and to analyse various business decision problems
- Expose students to the practical cases of how quantitative modelling and analysis skills have generated significant business values and competitive advantages.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Demonstrate the attitude and/or ability to discuss the basic knowledge in concepts, principles and benefits of quantitative methods and analytical models.		x	x	
2	Apply quantitative methods to design, formulate, and create analytical models for managerial decision problems in a precise and creative manner.			x	
3	Evaluate the analytical results and recommend best possible solutions for managerial decision making.			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	Lectures and Discussions	Participate in lectures and class discussions to understand and explain the fundamental concepts, principles, and benefits of quantitative methods and analytical models in managerial decision-making. Engage in interactive sessions to clarify doubts and deepen comprehension.	1	3 hours / week

2	Case Studies and Practical Exercises	Engage in case studies to design and formulate analytical models using quantitative methods, addressing real-world managerial decision problems with precision and creativity. Complete practical exercises to apply tools like Excel Solver for solving constrained optimization problems, including linear, integer, and non-linear programming models.	2, 3	
3	Group Projects and Presentations	Collaborate on group projects to apply quantitative methods, analyze multiple objective decision problems, and utilize decision-making tools. Present and discuss project findings to assess analytical results and recommend the best possible solutions for effective managerial decision-making.	2, 3	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Course Assignment	1, 2, 3	30	-	Yes
2	Group Projects	1, 3	20	-	Yes

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

2

Assessment Rubrics (AR)

Assessment Task

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

Criterion

The depth of understanding and creative application of quantitative methods, precise formulation of models, and the insightful analysis leading to well-justified recommendations.

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

Criterion
The ability to collaborate effectively within a team, contribute meaningfully to project deliverables, demonstrate critical thinking in problem-solving, and produce a high-quality, cohesive outcome that meets the project objectives.

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

Criterion
The accuracy and comprehensiveness of knowledge and understanding, with correct and creative application of methods and models, and insightful analysis and recommendations.

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

Criterion
The depth of understanding and creative application of quantitative methods, precise formulation of models, and the insightful analysis leading to well-justified recommendations.

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Satisfactory

Failure
(F) Not even reaching satisfactory level

Assessment Task
Group Project (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
The ability to collaborate effectively within a team, contribute meaningfully to project deliverables, demonstrate critical thinking in problem-solving, and produce a high-quality, cohesive outcome that meets the project objectives.

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Satisfactory

Failure
(F) Not even reaching satisfactory level

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

Criterion

The accuracy and comprehensiveness of knowledge and understanding, with correct and creative application of methods and models, and insightful analysis and recommendations.

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Satisfactory

Failure

(F) Not even reaching satisfactory level

Part III Other Information

Keyword Syllabus

Deterministic Optimization

- Linear Programming: LP formulation, Sensitivity analysis
- Integer Programming: IP formulation, LP relaxation, Binary variable modeling
- Nonlinear Programming: NLP formulation, Local/global optima, Solution methods

Decision Making Under Uncertainty

- Decision making without distribution information
- Decision making with distribution information
- Monte Carlo Simulation

Game Theory

- Static Games: Dominant/dominated strategies, Iterative elimination, Nash Equilibrium
- Dynamic Games: Game tree, Backward induction, Subgame Perfect Nash Equilibrium

Reading List

Compulsory Readings

	Title
1	Nil

Additional Readings

	Title
1	Balakrishnan, N. (Raju), Render, B., Stair, R. M., & Munson, C. L. (2017). Managerial Decision Modeling: Business Analytics with Spreadsheets, Fourth Edition. De Gruyter.
2	Schecter, S., & Gintis, H. (2016). Game Theory in Action: An Introduction to Classical and Evolutionary Models. Princeton University Press.
3	Ragsdale, C. T. (2022). Spreadsheet Modeling and Decision Analysis: A Practical Introduction to Business Analytics (9th Edition). Cengage Learning.
4	George E. Monahan, Management Decision Making: Spreadsheet Modeling, Analysis, and Applications (2000), Cambridge University Press, Cambridge, England ISBN: 0 521 78118 3
5	S. Christian Albright, Wayne Winston, Christopher Zappe Data Analysis and Decision Making with Microsoft(R) Excel, Revised, 3rd Edition, ISBN-10: 0324662440, ISBN-13: 9780324662443, (C) 2009
6	Taylor, B W, Introductory Management Science, 8/e (2004, Prentice Hall)

7	Levine, D M, Stephan, D, Krehbiel, T C and Berenson, M L: Statistics or Managers, 4/e (2005, Prentice Hall)
8	Wisniewski, M: Quantitative Methods for Decision Makers (2002, Prentice Hall)
9	www.informs.org