MS3253: OPERATIONS ANALYTICS

Effective Term
Semester B 2024/25

Part I Course Overview

Course Title
Operations Analytics

Subject Code
MS - Department of Decision Analytics and Operations
Course Number
3253

Academic Unit
Department of Decision Analytics and Operations (DAOS)

College/School
College of Business (CB)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
CB2200 Business Statistics

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract
This course introduces students to the science of data analysis within the context of operations management. Students will explore fundamental concepts in data analysis, data visualization, and decision analytics, along with the basics of R

programming, without the need for prior programming experience. The course covers essential data science techniques, including data manipulation, data visualization, data summarization, and estimation of statistical models. Through a combination of theoretical instruction and practical application, students will work with both real and simulated data sets to solve problems encountered in operations management. By the end of the course, students will possess a solid foundation in using data analytics tools and techniques to make informed decisions in operational contexts. This hands-on approach ensures that students can effectively apply data-driven insights to real-world challenges in operations management.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the fundamentals of R programming, and create programs to solve simple problems			x	
2	Manipulate data (reading/writing to files, subsetting, cleaning, sorting), summarize data, merging data, perform data visualization.			x	
3	Estimate and interpret data and models in the context of operations management		x	x	x
4	Discuss in groups on how to use data analytics to solve problems in operations management		x	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	Lecture	Students will understand more on the key concepts; the class will highlight key concepts with relevant examples.	1, 2, 3, 4	1
2	Tutorial / Lab assignments	Students will apply concepts into practice and be proficient in R. At the end of each tutorial class period, each student group is required to submit their solutions to programming problems.	1, 2, 3, 4	2

3	Drill and Practice	Students will demonstrate their understanding on various programming concepts and apply concepts and techniques for problem solving.	1, 2, 3, 4	
4	Peer Discussion	Students will get an opportunity to apply the techniques learned in the course to explore and derive insights from a real-life data set	1, 2, 3, 4	

Additional Information for LTAs

The class will be taught as a weekly 3-hour combined lecture and tutorial session. Students will be required to bring their own laptops to complete the programming and data analysis tasks. Parts of each class will be a lecture, and other parts will be a tutorial, where students are given the chance to apply what they have learned.

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Tutorial Exercises During the weekly lab sessions, students will be given lab exercises to teach them how to use the R programming language to analyze data and perform statistical analysis.	1, 2, 3, 4	15	
2	Quizzes Students will sit for short multiple-choice quizzes as well as computer-based programming quizzes, where they will be assessed on their ability to analyze data and perform statistical analysis using the R programming language.	1, 2, 3, 4	20	
3	Group Projects Students will tackle larger data analysis tasks as a group, or present impactful applications of operations analytics in the real world.	1, 2, 3, 4	15	

Continuous Assessment (%)

50

Examination (%)

50

Examination Duration (Hours)

3

Additional Information for ATs

Examination Students will sit for a computer-based examination, where they will be assessed on their ability to analyze data and perform statistical analysis using the R programming language.

Assessment Rubrics (AR)

Assessment Task

Tutorial Exercises

Criterion

Ability to apply the concepts for problem solving

Excellent (A+, A, A-)

Strong evidence of ability to apply the concepts for problem solving

Good (B+, B, B-)

Evidence of ability to apply the concepts for problem solving

Fair (C+, C, C-)

Little evidence of ability to apply the concepts for problem solving

Marginal (D)

Very little evidence of ability to apply the concepts for problem solving

Failure (F)

No evidence of ability to apply the concepts for problem solving

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Assessment Task

Quizzes

Criterion

Ability to understand programming concepts and interpret statistical models

Excellent (A+, A, A-)

Strong evidence of ability to understand programming concepts and interpret statistical models

Good (B+, B, B-)

Evidence of ability to understand programming concepts and interpret statistical models

Fair (C+, C, C-)

Little evidence of ability to understand programming concepts and interpret statistical models

Marginal (D)

Very little evidence of ability to understand programming concepts and interpret statistical models

Failure (F)

No evidence of ability to understand programming concepts and interpret statistical models

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Assessment Task

Group Projects

Criterion
Ability to apply programming techniques and estimate and interpret statistical models

Excellent (A+, A, A-)
Strong evidence of ability to apply programming techniques and estimate and interpret statistical models

Good (B+, B, B-)
Evidence of ability to apply programming techniques and estimate and interpret statistical models

Fair (C+, C, C-)
Little evidence of ability to apply programming techniques and estimate and interpret statistical models

Marginal (D)
Very little evidence of ability to apply programming techniques and estimate and interpret statistical models

Failure (F)
No evidence of ability to apply programming techniques and estimate and interpret statistical models

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Assessment Task
Examination

Criterion
Ability to understand programming concepts and interpret statistical models

Excellent (A+, A, A-)
Strong evidence of ability to understand programming concepts and interpret statistical models

Good (B+, B, B-)
Evidence of ability to understand programming concepts and interpret statistical models

Fair (C+, C, C-)
Little evidence of ability to understand programming concepts and interpret statistical models

Marginal (D)
Very little evidence of ability to understand programming concepts and interpret statistical models

Failure (F)
No evidence of ability to understand programming concepts and interpret statistical models

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Part III Other Information

Keyword Syllabus
Operations Analytics; Data types and data frames; Data manipulation and cleaning data; Data visualization; Demand forecasting; Demand uncensoring; Data classification and clustering; Simulation

Reading List

Compulsory Readings

	Title
1	Gerbing, David W. R data analysis without programming. Routledge, 2013.
2	Davies, Tilman M. The Book of R: A First Course in Programming and Statistics. No Starch Press, 2015.
3	Maindonald, John, and John Braun. Data Analysis and Graphics Using R: An Example-Based Approach. 3rd edition Cambridge University Press, 2010.
4	de Jonge, Edwin, and Mark van der Loo. "An introduction to data cleaning with R." Statistics Netherlands, The Hague (2013): 53.

Additional Readings

	Title
1	Nil