

MS3253: OPERATIONS ANALYTICS

Effective Term

Semester A 2022/23

Part I Course Overview

Course Title

Operations Analytics

Subject Code

MS - Management Sciences

Course Number

3253

Academic Unit

Management Sciences (MS)

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 is an introduction to the science of data analysis for operations management. In this course, students will learn data analysis, data visualization and decision analytics and the basics of R programming. Students are not assumed or

required to have previous programming experience. Students will also learn techniques for data science, including how to manipulate data, visualize data, summarize data and estimate statistical models. In this course, students will have the opportunity to apply what they have learned to both real and simulated data sets, and to problems faced in operations management.

Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Understand 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 (similar to SQL joins)		x	
3	Principles for data visualization, and how to plot graphs	x	x	x
4	How to estimate and interpret data and models in the context of operations management	x	x	x
5	How to use data analysis 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.

Teaching and Learning Activities (TLAs)

TLAs	Brief Description	CILO No.	Hours/week (if applicable)	
1	Lecture	Explain key concepts; highlight key concepts with relevant examples.	1, 2, 3, 4, 5	1
2	Tutorial / Lab	Tutorials are designed to enable students to 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, 5	2

3	Quiz	Quizzes give a chance for students to demonstrate their understanding on various programming concepts and apply concepts and techniques for problem solving.	1, 2, 3, 4, 5	
4	Group Project	The group project gives students 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, 5	

Additional Information for TLAs

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, 5	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, 5	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, 5	15	

Continuous Assessment (%)

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

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

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

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

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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

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