

MA4536: MATHEMATICAL METHODS OF OPERATIONS RESEARCH

Effective Term

Semester A 2022/23

Part I Course Overview

Course Title

Mathematical Methods of Operations Research

Subject Code

MA - Mathematics

Course Number

4536

Academic Unit

Mathematics (MA)

College/School

College of Science (SI)

Course Duration

One Semester

Credit Units

3

Level

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

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

MA2503 Linear Algebra / MA1503 Linear Algebra with Applications; and
MA2508 Multi-variable Calculus; and
MA2504 Discrete Mathematics / MA2509 Discrete Mathematics

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

This course provides the fundamental concepts of mathematical programming. It develops students' ability in applying basic techniques to solve a range of problems in operations research.

Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1 explain clearly basic concepts of linear, dynamic and integer programming.	15	x		
2 create and formulate algorithms/methods of operations research in solving problems on mathematical programming.	25	x	x	x
3 develop and apply mathematical techniques in network models and scheduling problems.	15		x	
4 analyze and solve basic mathematical models of games with strategic considerations.	15		x	
5 formulate real-life applications in terms of appropriate deterministic/stochastic models of operations research.	15		x	x
6 the combination of CILOs 1-5	15	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 Lectures	Learning through teaching is primarily based on lectures.	1, 2, 3, 4, 5, 6	39 hours in total
2 Take-home Assignments	Learning through take-home assignments helps students understand basic methods of operations research and applications to a range of problems on mathematical programming.	1, 2, 3, 4, 5	after-class

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Test	1, 2, 5	15	Questions are designed for the first part of the course to see how well the students have learned basic techniques of linear programming and their applications in formulating/solving problems.
2	Hand-in assignments	1, 2, 3, 4, 5	15	These are skills based assessment to help students understand concepts and methods of mathematical programming, as well as the applications in a diversity of problems.
3	Formative take-home assignments	1, 2, 3, 4, 5	0	The assignments provide students chances to demonstrate their achievements in operations research methods learned from this course.

Continuous Assessment (%)

30

Examination (%)

70

Examination Duration (Hours)

3

Additional Information for ATs

30% Coursework

70% Examination (Duration: 3 hours, at the end of the semester)

For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

Assessment Rubrics (AR)**Assessment Task**

1. Test

Criterion

Ability in problem solving

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. Hand-in assignments

Criterion

Understanding of concepts and applications

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. Formative take-home assignments

Criterion

Study attitude

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

Criterion

Comprehensive ability in independent problem solving

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

Part III Other Information**Keyword Syllabus**

Linear programming, simplex method, duality, sensitivity analysis, shortest route problem, dynamic programming, game theory, integer programming.

Reading List**Compulsory Readings**

Title	
1	Nil

Additional Readings

Title	
1	Nil