

SDSC3060: OPERATIONS RESEARCH

Effective Term

Semester A 2024/25

Part I Course Overview

Course Title

Operations Research

Subject Code

SDSC - School of Data Science

Course Number

3060

Academic Unit

School of Data Science (DS)

College/School

School of Data Science (DS)

Course Duration

One Semester

Credit Units

3

Level

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

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

MA1503 Linear Algebra with Applications, MA1508 Calculus and MA2508 Multi-variable Calculus

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

Engineers and managers have to make decisions in operations and data science/engineering problems. This course aims to equip students with necessary modelling skills and solution techniques for formulating various decision-making problems in the domains and solving the formulated problems.

Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1 Define decision variables and formulate objective functions and constraints for problems such as operations planning and decision making.	30	x		
2 Solve mathematical models for problems such as operations planning and decision making using appropriate solution techniques, such as the simplex method, the branch-and-bound method, Hungarian method, Dijkstra's algorithm, the Ford-Fulkerson method, etc.	30	x	x	
3 Describe the theoretical development of some optimization algorithms.	20	x	x	
4 Apply a software (e.g., Matlab) to solve some typical optimization problems.	20	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 Lectures	Students will engage in formal lectures to gain knowledge about operations research	1, 2, 3, 4	39 hours/semester

Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1 Tutorial exercise, quiz, and assignment	1, 2, 3, 4	30	
2 Test	1, 2, 3	30	

Continuous Assessment (%)

Examination (%)

40

Examination Duration (Hours)

2

Additional Information for ATs

Note: To pass the course, apart from obtaining a minimum of 40% in the overall mark, a student must also obtain a minimum mark of 30% in both continuous assessment and examination components.

Assessment Rubrics (AR)

Assessment Task

Coursework

Criterion

Test, tutorial exercises quiz, and assignment

Excellent (A+, A, A-)

Strong evidence of capacity to analyse and synthesize; superior grasp of subject matter.

Good (B+, B, B-)

Evidence of grasp of subject, some evidence of critical capacity and analytic ability.

Fair (C+, C, C-)

Student who is profiting from the university experience; understanding of the subject; ability to develop solutions to simple problems in the material.

Marginal (D)

Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure (F)

Little evidence of familiarity with the subject matter; weakness in critical and analytic skills.

Assessment Task

Examination

Criterion

2-hr final examination (either open or closed book based on instructor's discretion)

Excellent (A+, A, A-)

Strong evidence of capacity to analyse and synthesize; superior grasp of subject matter.

Good (B+, B, B-)

Evidence of grasp of subject, some evidence of critical capacity and analytic ability.

Fair (C+, C, C-)

Student who is profiting from the university experience; understanding of the subject; ability to develop solutions to simple problems in the material.

Marginal (D)

Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

Failure (F)

Little evidence of familiarity with the subject matter; weakness in critical and analytic skills.

Part III Other Information

Keyword Syllabus

- Linear programming formulation, models and solution techniques;
- Integer programming formulation, models and solution techniques;
- Dynamic programming formulation, models and solution techniques;
- Distance network models and network optimization formulation and models;

Reading List

Compulsory Readings

	Title
1	Introduction to Operations Research, 11th Edition, Hillier & Lieberman
2	Lecture notes and slides provided by the instructor

Additional Readings

	Title
1	Operations Research, 3rd Edition, Winston
2	Management Science, Mathur & Solow