ADSE3060: OPERATIONS RESEARCH

Effective Term
Semester A 2023/24

Part I Course Overview

Course Title
Operations Research

Subject Code
ADSE - Advanced Design and System Engineering
Course Number
3060

Academic Unit
Systems Engineering (SYE)

College/School
College of Engineering (EG)

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
MA1201 Calculus and Basic Linear Algebra II or MA1301 Enhanced Calculus and Linear Algebra II

Equivalent Courses
SEEM3060 Operations Research

Exclusive Courses
Nil

Part II Course Details

Abstract
Engineers and managers have to make decisions in intelligent manufacturing, production and operations planning and scheduling. This course aims to equip students with necessary modelling skills and solution techniques for formulating

various practical decision-making problems in intelligent manufacturing, production and operations planning and scheduling as optimization models and solving these models.

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 intelligent manufacturing, production and operations planning and scheduling.	30			
2	Apply the principles of dynamic programming to solve problems such as intelligent manufacturing, production and operations planning and scheduling.	25			
3	Represent a decision-making problem in forms of directed or undirected graphs.	15			
4	Solve mathematical models for problems such as intelligent manufacturing, production and operations planning and scheduling using appropriate solution techniques, such as the simplex method, the branch-and-bound method, Hungarian method, Dijkstra's algorithm, the Ford-Fulkerson method, CPM, etc.	30			

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	Lectures	1, 2, 3, 4	39 hours/semester

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignments, and Test and/or Project	1, 2, 3, 4	40	

Continuous Assessment (%)

40

Examination (%)

60

Examination Duration (Hours)
2

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

Assessment Rubrics (AR)

Assessment Task
Homework sets, and test and/or project

Criterion
Submitted written work

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;
* Decision making under uncertainty.

Reading List

Compulsory Readings

	Title
1	Lecture notes and slides provided by the instructor.

Additional Readings

	Title
1	Operations Research, 3rd Edition, Winston
2	Introduction to Operations Research, 8th Edition, Hillier & Lieberman
3	Management Science, Mathur & Solow
4	Online learning material is provided via University computer network