

MS8942: SPECIAL TOPICS IN OPERATIONS RESEARCH

Effective Term

Semester B 2024/25

Part I Course Overview

Course Title

Special Topics in Operations Research

Subject Code

MS - Decision Analytics and Operations

Course Number

8942

Academic Unit

Decision Analytics and Operations (DAOS)

College/School

College of Business (CB)

Course Duration

One Semester

Credit Units

3

Level

R8 - Research Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

MS8941 Linear and Discrete Optimization

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

To introduce postgraduate students to the concept of randomized algorithms, as well as the techniques of exploring the LP solution structures to LP based approximation algorithms. Application on classical models will be explained and some recent progress will also be explored.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Understand the key concepts of NP-Completeness, Randomization, Approximation, Learn the fundamental theorems and tools for the topics.		x	x	
2	Work in groups to modify and apply the techniques learned for specific problems			x	x
3	Able to independently read and understand research papers of the topics.		x	x	
4	Work collaboratively in a team and effectively communicate and present information in oral and written format.		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 the fundamentals of the special topics.	1, 2	
2	Individual Assignment	Students will work on assignment problems to consolidate knowledge on the research topic.	1, 2	

3	Group Project	Students will work on problems or to conduct a study on a project that consolidates knowledge on the research topic. Students will submit this group work in a written report with a focus on evaluation, analysis and synthesis of the work and present the results of the assignment in a group presentation. Groups can be tested on their knowledge with questions from the lecturer and fellow students.	1, 2	
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Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Assignment	1, 2, 3, 4	50	
2	Written Report and Presentation	1, 2, 3, 4	50	

Continuous Assessment (%)

100

Examination (%)

0

Assessment Rubrics (AR)

Assessment Task

Assignment (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Solve the problems correctly with good understanding of the concepts and methods

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

Written Report and Presentation (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Clear and precise written report and presentation

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

Assignment (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Solve the problems correctly with good understanding of the concepts and methods

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Basic

Failure

(F) Not even reaching marginal levels

Assessment Task

Written Report and Presentation (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Clear and precise written report and presentation

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Basic

Failure

(F) Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

NP-Complete, Randomization, Relaxation, Rounding, Approximation, Duality, Complementary slackness conditions, Primal-Dual Schema, Set Cover Problem, Facility Location Problem, Parallel Machine Scheduling

Reading List**Compulsory Readings**

Title	
1	Nil.

Additional Readings

Title	
1	Approximation Algorithms, Vijay V. Vazirani, 2003. Berlin: Springer.
2	Other reading materials from books and journals will be provided.