

Course Title:	<b>Operational research</b>
Course Code:	CSE322
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Dr. Dhekra CHERMITI
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

### A. Course Identification

<b>1. Credit hours:</b>	<b>3 (2-1-0)</b>
<b>2. Course type</b>	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b>	2.1/3
<b>4. Pre-requisites for this course (if any):</b> CSE111, CSE142, Mathematic fundamentals	

### 1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Self-study	Total workload
1	Traditional classroom	.....	35	80
2	Blended	45		
3	E-learning	.....		
4	Distance learning	.....		
5	Other ()	.....		

### 2. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	22.5
2	Laboratory/Studio	
3	Tutorial	22.5
4	Others (specify)	-
	<b>Total</b>	<b>45</b>

## B. Course Objectives and Learning Outcomes

### Course Description

This course introduces the fundamental concepts and techniques of Operational Research (OR), focusing on optimization and decision-making methods. Topics include formulation of optimization problems, linear programming, simplex method, duality, integer programming, and dynamic programming. Students will learn to model real-world problems mathematically and apply computational techniques to solve them efficiently.

### Course Main Objective

This course aims to:

- ✓ Understand fundamental concepts of Operational Research, key algorithms, and their applications.
- ✓ Develop the ability to collect and analyze relevant data for problem-solving.
- ✓ Learn to formulate optimization models for real-world decision-making.
- ✓ Understand the structured approach to modeling problems mathematically.
- ✓ Apply various problem-solving techniques to find optimal solutions.
- ✓ Address design challenges and ethical considerations in Operational Research.
- ✓ Recognize the interdisciplinary nature of Operational Research and its connections to other fields.

### 1. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge and understanding</b>	
1.1	Understand and explain fundamental concepts, algorithms, and applications of Operational Research.	PLOK.2
1.2	Develop the ability to formulate optimization models for real-world decision-making	
1.3	Understand the structured steps required to model problems mathematically and provide a global mathematical perspective.	PLOK.3
2	<b>Skills</b>	
2.1	Collect, analyze, and interpret relevant data to support problem-solving in Operational Research.	PLOS.1
2.2	Apply appropriate problem-solving techniques to identify and achieve optimal solutions.	
2.3	Address design challenges and ethical considerations in Operational Research applications.	
2.4	Effectively synthesize and integrate the fundamental principles and theories of Operational Research with other disciplines.	PLO.S7

### C. Course Content

No	List of Topics	Contact Hours
1	Introduction to Optimization	2
2	Definition of Operations Research	1.5
3	Formulation of an optimization problem	2
4	Linear programming	2.5
5	Solving linear programs	2
6	Graphics resolution	2
7	Simplex Method: Solving by Simplex Tables	3
8	Duality	2
10	Linear problems in integer variables	2
11	Dynamic Programming	3.5
<b>Total</b>		<b>22.5</b>

### C1.1 Tutorials work Content

No	List of Topics	Contact Hours
1	Tutorial 1: Formulation of an optimization problem	5
2	Tutorial 2: Solving linear programs: Graphics resolution	4
3	Tutorial 3: Solving linear programs: Simplex method and Simplex Tables	5
4	Tutorial 4: Linear problems in integer variables	3.5
5	Tutorial 5: Solving linear programs by dynamic Programming	5
<b>Total</b>		<b>22.5</b>

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## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge and understanding</b>		
PLOK.1	Understand and explain fundamental concepts, algorithms, and applications of Operational Research.	Lecturing Tutorial	Assignments, Quizzes , Exams,
PLOK.2	Develop the ability to formulate optimization models for real-world decision-making		
PLOK.3	Understand the structured steps required to model problems mathematically and provide a global mathematical perspective.		
<b>2.0</b>	<b>Skills</b>		
PLOS.1	Collect, analyze, and interpret relevant data to support problem-solving in Operational Research.	Lecturing Tutorial	Assignments, Quizzes, Exams,
PLOS.2	Apply appropriate problem-solving techniques to identify and achieve optimal solutions.		
PLOS.3	Address design challenges and ethical considerations in Operational Research applications.		
PLOS.7	Effectively synthesize and integrate the fundamental principles and theories of Operational Research with other disciplines.		

### 2. Assessment Tasks for Students

	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Practical Work (written or oral)	Weekly	00%
2	Quizzes, Homework assignments	Random	00%
3	First mid Term	8	35%
5	Final Exam	16	65%

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :**

- 1- Office hours
- 2- Blackboard interface

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<ol style="list-style-type: none"> <li>1. <b>Winston, W. L.</b> – Operations Research: Applications and Algorithms, Cengage Learning.</li> <li>2. <b>Taha, H. A.</b> – Operations Research: An Introduction, Pearson.</li> <li>3. <b>Hillier, F. S., &amp; Lieberman, G. J.</b> – Introduction to Operations Research, McGraw-Hill.</li> </ol>
<b>Essential References Materials</b>	NA
<b>Electronic Materials</b>	<ul style="list-style-type: none"> <li>• <b>Video lectures</b> (MIT OpenCourseWare, Khan Academy, edX).</li> </ul>
<b>Other Learning Materials</b>	NA

### 2. Facilities Required

Item	Resources
<b>Accommodation</b>	<b>Classroom board</b> <b>Internet access</b>
<b>Technology Resources</b>	<b>Data projector</b>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment.	Students, course coordinator, Alumni, Employers	Direct/Indirect
Extent of achievement of course learning outcomes.	Faculty, Program Leaders, quality department	Direct
Quality of Learning resources	Faculty, Program Leaders,	Direct, Indirect
Teaching and learning quality and effectiveness.	Students, Faculty Program Leaders,	Direct, Indirect

## H. Specification Approval Data

<b>Council / Committee</b>	Computer Engineering Council
<b>Date</b>	11/09/2023