Course Specifications

Course Title:	Operations Research
Course Code:	202368-3
Program:	Bachelor in Computer Engineering
Department:	Computer Engineering
College:	Computers and Information Technology
Institution:	Taif University

VISION رؤية
2030
المملكة العربية السعودية
KINGDOM OF SAUDI ARABIA

تميز NCSEE   مسار MASAR   اعتماد   قياس

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Table of Contents

A. Course Identification

1. Credit hours:	

2. Course type

a.   University ☐   College **X**   Department ☐   Others ☐

b.   Required **X**   Elective ☐

3. Level/year at which this course is offered: 8/4

4. Pre-requisites for this course (if any)**:**

Linear Algebra (202262-3)

5. Co-requisites for this course (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	3	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	45
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	45

B. Course Objectives and Learning Outcomes

1. Course Description

The course introduces techniques for modelling and optimizing real-world problems using mathematics, statistics and computers. Topics may include linear programming, integer linear programming, non-linear programming, dynamic programming, game theory and queuing theory. The primary emphasis will be on Linear programming: the simplex method and its linear algebra foundations, duality, post-optimality and sensitivity analysis; the transportation problem; the critical path method; non-linear programming methods.

2. Course Main Objective

1. To appropriately model realworld problems and find their optimal solutions.
2. The course introduces techniques for modelling and optimizing realworld problems using mathematics, statistics and computers.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Formulate a certain class of problems as a linear or a mixed integer program.	K1
1.2	Understand the characteristics of different types of decision making problems and the appropriate approaches and tools to be used in each type.	K1
1.3	Solve LP problems by Simplex method.	K1
1.4	Solve a linear or integer program using appropriate software.	K1
1.5	Interpret the optimal solution and perform sensitivity analysis.	K1
1.6	Formulate and solve the transportation and assignment problems.	K1
1.7	Describe and solve the minimal spanning tree the shortest path problem and the maximal flow problems.	K1
1.8	Explain the basic definitions in the field of graphs and network planning.	K1
1.9	Explain queue models and the role of Poisson and the Exponential distributions in such models.	K1
1.10	Use Markov chains for classification.	K1
2	**Skills :**	
2.1		
2.2		
3	**Values:**	
3.1		

C. Course Content

No	List of Topics	Contact Hours
1	Review Course Plan	4
2	Understand the characteristics of different types of decision making problems and the appropriate approaches and tools to be used in each type	4
3	Solve LP problems by Simplex method.	4
4	Interpret the optimal solution and perform sensitivity analysis.	4
5	Mid term	4
6	Describe and solve the minimal spanning tree, the shortest path problem and the maximal flow problems.	5
7	Explain the basic definitions in the field of graphs and network planning	5
8	Explain the basic definitions in the field of graphs and network planning	5
9	Explain queue models and the role of Poisson and the Exponential distributions in such models.	5
10	Explain queue models and the role of Poisson and the Exponential distributions in such models. Use Markov chains for classification.	5
Total		45

D. Teaching and Assessment

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

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Formulate a certain class of problems as a linear or a mixed integer program.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.2	Understand the characteristics of different types of decision making problems and the appropriate approaches and tools to be used in each type.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.3	Solve LP problems by Simplex method.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.4	Solve a linear or integer program using appropriate software.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.5	Interpret the optimal solution and perform sensitivity analysis.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.6	Formulate and solve the transportation and assignment problems.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.7	Describe and solve the minimal spanning tree the shortest path problem and the maximal flow problems.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.8	Explain the basic definitions in the field of graphs and network planning.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.9	Explain queue models and the role of Poisson and the Exponential distributions in such models.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.10	Use Markov chains for classification.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.7	Describe and solve the minimal spanning tree the shortest path problem and the maximal flow problems.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.8	Explain the basic definitions in the field of graphs and network planning.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.9	Explain queue models and the role of Poisson and the Exponential distributions in such models.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.10	Use Markov chains for classification.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
2.0	**Skills**		
2.1			
2.2			
…			
3.0	**Values**		
3.1			
3.2			
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments, Quizzes	Continues	%20
2	Midterm Exam	7	%20
3	Final Exam	16	%60
4			
5			
6			
7			
8			

Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:
Teaching staff provide at least 6 office hours for students to help them in the course as well as in any other academic issues.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Abdul Hamid `Introduction to Operations` Edition1, Taif University 2002
Essential References Materials	Abdul Hamid `Introduction to Operations` Edition1, Taif University 2002
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Traditional Classrooms
Technology Resources (AV, data show, Smart Board, software, etc.)	Data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Extent of achievement of course learning outcomes	Students	Indirect (Survey)
Effectiveness of teaching and assessment	Students	Indirect (Survey)
Extent of achievement of course learning outcomes	Faculty	Course Report

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	