



## Course Specifications

<b>Course Title:</b>	Operations Research
<b>Course Code:</b>	202368-3
<b>Program:</b>	<b>Bachelor in Computer Science</b>
<b>Department:</b>	Department of Mathematics
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Taif University</b>

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## A. Course Identification

<b>1. Credit hours:</b> 3
<b>2. Course type</b>
a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input 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> 9/3
<b>4. Pre-requisites for this course (if any):</b> Probability and Statistics (202364-3)
<b>5. Co-requisites for this course (if any):</b> None

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

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	5	100%
2	Blended	0	0
3	E-learning	0	0
4	Distance learning	0	0
5	Other	0	0

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

No	Activity	Contact Hours
1	Lecture	50
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify)	0
	<b>Total</b>	50

## 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

To appropriately model real world problems and find their optimal solutions and introduces techniques for modelling and optimizing real-world problems using mathematics, statistics and computers

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
<b>1</b>	<b>Knowledge and Understanding</b>	
1.1	Understand the characteristics of different types of decision making problems and the appropriate approaches and tools to be used in each type.	K1
1.2	Describe and solve the minimal spanning tree the shortest path problem and the maximal flow problems.	K1
1.3	Explain the basic definitions in the field of graphs and network planning.	K1
1.4	Explain queue models and the role of Poisson and the Exponential distributions in such models.	K1
<b>2</b>	<b>Skills :</b>	
2.1	Formulate a certain class of problems as a linear or a mixed integer program.	S1
2.2	Solve LP problems by Simplex method.	S1
2.3	Solve a linear or integer program using appropriate software.	S1
2.4	Formulate and solve the transportation and assignment problems.	S1
2.5	Use Markov chains for classification.	S1
<b>3</b>	<b>Values:</b>	
3.1	Interpret the optimal solution and perform sensitivity analysis	C1

### C. Course Content

No	List of Topics	Contact Hours
1	Understand the characteristics of different types of decision making problems and the appropriate approaches and tools to be used in each type	2
2	Solve LP problems by Simplex method.	3
3	Interpret the optimal solution and perform sensitivity analysis.	5
4	Interpret the optimal solution and perform sensitivity analysis.	5
5	Formulate and solve the transportation and assignment problems.	5
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.	5
11	Use Markov chains for classification.	5
<b>Total</b>		<b>50</b>

### 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	<b>Knowledge and Understanding</b>		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.1	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
1.2	Describe and solve the minimal spanning tree the shortest path problem and the maximal flow problems.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.3	Explain the basic definitions in the field of graphs and network planning.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
1.4	Explain queue models and the role of Poisson and the Exponential distributions in such models.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
<b>2.0</b>	<b>Skills</b>		
2.1	Formulate a certain class of problems as a linear or a mixed integer program.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
2.2	Solve LP problems by Simplex method.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
2.3	Solve a linear or integer program using appropriate software.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
2.4	Formulate and solve the transportation and assignment problems.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
2.5	Use Markov chains for classification.	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments
<b>3.0</b>	<b>Values</b>		
3.1	Interpret the optimal solution and perform sensitivity analysis	Lecture Discussion Problem Solving	Written Exams Quizzes Assignments

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments, Quizzes	Continues	20%
2	Midterm Exam	6	20%
3	Final Exam	12	60%

\*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 :

Academic advising and counseling of students is an important component of teaching; student academic advising is a mandatory requirement of College of Computers and Information Technology (CCIT). Appropriate student advising provides support needed for the student during times of difficulty. In addition, it helps the student to build a close relationship with his/her advisor and to provide student motivation and involvement with the institution.

In addition, since faculty are usually the first to recognize that a student is having difficulty, faculty members play a key role in developing solutions for the students or referring them to appropriate services. Faculty members also participate in the formal student-mentoring program.

Additional counseling is provided by course directors, who provide students with academic reinforcement and assistance and refer “at risk” students to the Vice Dean for Academic Affairs and the Vice Dean for female section.

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	Abdul Hamid `Introduction to Operations` Edition1, Taif University 2002
<b>Essential References Materials</b>	Abdul Hamid `Introduction to Operations` Edition1, Taif University 2002
<b>Electronic Materials</b>	NON
<b>Other Learning Materials</b>	NON

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>• A Lecture room appropriate for maximum 25 students with a personal computer, a data show and a smart board.</li> <li>• A Lab room appropriate for maximum 15 students with a personal computer, a data show and a smart board.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	<ul style="list-style-type: none"> <li>• NON</li> </ul>

Item	Resources
<b>Other Resources</b> (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
Effectiveness of Teaching	Students	Students' surveys and Students course evaluation
Improvement of Teaching	Course Coordinator	deficiencies based on the student Evaluation, faculty input, course file, and program assessment
Verifying Standards of Student Achievement	Curriculum Committee	<ul style="list-style-type: none"> <li>Review CAF (Course assessment file)</li> <li>Alumni surveys.</li> </ul> Periodic exchange and remarking of tests or a sample of assignments with staff at another

**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	CS council
Reference No.	Meeting #12
Date	23-10-1443

