

Detailed Course Description - Course Plan Development and Updating Procedures/ Computer Science Department	QF01/0408-3.0E
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Faculty	Faculty of Science and Information Technology	Department	Computer Science
Course number	0112434	Course title	Operation Research
Number of credit hours	3	Pre-requisite/co-requisite	Linear Algebra 1

Brief course description:

The Operations Research (OR) refers to the science of decision making. The course is intended to provide the key aspects of operations research methodology. This course covers the linear programming models; graphical LP solution; simplex method and sensitivity analysis; duality; transportation and assignment model; network model and CPM.

Course goals and learning outcomes	
Goal 1	The ability to use computer principles to understand, apply, and analyze mathematical problems and find appropriate solutions to them
Learning outcomes	1.1 Use and analyze texts to design linear mathematical models 1.2 To use mathematical concepts to find solutions for linear mathematical models graphically
Goal 2	The ability to analyze, design, and build effective and reliable software
Learning outcomes	2.1 The student should use different programming languages and employ them to create various computer applications
Goal 3	The ability to solve different types of mathematical models (algorithms) to assist management in the decision making process
Learning outcomes	3.1 To use mathematical concepts to find solutions to linear mathematical models using the Simplex method, the Big-M method, and the Two-phase method 3.2 The student should analyze the future variables that have not been included and the implications of these changes (Sensitivity Analysis) 3.3 The student should convert the Primal model to its equivalent Dual model and solve it 3.4 The student should understand some applications of linear programming such as Transportation models and Assignment model and be able to solve them 3.5 The student should solve the network models and use the critical path method
Textbook	1. Operations Research: An Introduction , 10 th edition, 2016, Pearson Prentice Hall, by Hamdy Taha. ISBN-13: 978-0134444017, ISBN-10: 0134444019
Supplementary references	1. Operations Research: Applications and Algorithms , 4 th edition, 2004, Brooks/Cole Thomson Learning, by Wayne L. Winston. ISBN-13: 978-0534380588, ISBN-10: 0534380581 2. Operations Research: A Model-Based Approach , 2 nd Edition, 2013, Springer Inc. by H. A. Eiselt, Carl-Louis Sandblom, ISBN-10: 3642310532, ISBN-10: 3642310532 3. Operations Research Problems: Statements and Solutions , 2014 Edition, 2014, by Raul Poler, Josefa Mula and Manuel Diaz-Madronero. ISBN-10: 1447155769, ISBN-13: 978-1447155768

Course timeline				
Week	Number of hours	Course topics	Pages (textbook)	Notes
01	1	What is Operations Research? – Operation Research Models – Solving the OR Model – Art of Modeling – More Than Just Mathematics – Phases of an OR Study	Ch1: 35-44	Text
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02	1	Modeling with Linear Programming – Two-Variable LP Model – Graphical LP Solution	Ch2: 47-60	Text
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	1			
03	1	The Simplex Method and Sensitivity Analysis – The Simplex Method	Ch3: 110-122	Text
	1			
	1			
04	1	The Simplex Method and Sensitivity Analysis (Cont.) – Artificial Starting Solution (M-Method)	Ch3: 123-127	Text
	1			
	1			
05	1	The Simplex Method and Sensitivity Analysis (Cont.) – Artificial Starting Solution (Two-Phase Method)	Ch3: 128-132	Text
	1			
	1			
06	1	The Simplex Method and Sensitivity Analysis (Cont.) – Special Cases in the Simplex Method	Ch3: 133-141	Text
	1			
	1			
07	1	The Simplex Method and Sensitivity Analysis (Cont.) – Sensitivity Analysis Revision First Exam 20%	Ch3: 142-162	Text
	1			
	1			
08	1	Duality and Post-Optimal Analysis – Definition of the Dual Problem – Primal-Dual Relationships	Ch4: 171-183	Text
	1			
	1			
09	1	Transportation Model and Its Variant – Definition of the Transportation Model – The Transportation Algorithm	Ch5: 209-215	Text
	1		Ch5: 221-233	
	1			
10	1	Transportation Model and Its Variant (Cont.) – The Transportation Algorithm (Cont.)	Ch5: 221-233	Text
	1			
	1			
11	1	Transportation Model and Its Variant (Cont.) – The Transportation Algorithm (Cont.)	Ch5: 221-233	Text
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12	1	Transportation Model and Its Variant (Cont.)	Ch5: 234-241	Text

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	1 1	- The Assignment Model		
13	1 1 1	Revision Second Exam 20%		
14	1 1 1	Network Models - Scope and Definition of Network Models - CPM	Ch6: 243-245 Ch6: 281-298	Text
15	1 1 1	Network Models (<u>Cont.</u>) - CPM (<u>Cont.</u>)	Ch6: 281-298	Text
16	1 1 1	Revision Final Exam 50%		

Theoretical course evaluation methods and weight	Participation = 10% First exam 20% Second exam 20% Final exam 50%	Practical (clinical) course evaluation methods	Semester students' work = 50% (Reports, research, quizzes, etc.) Final exam = 50%
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Approved by head of department		Date of approval	
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Extra information (to be updated every semester by corresponding faculty member)

Name of teacher	Fadel "Moh'd Kamel" Altamimi	Office Number	
Phone number (extension)		Email	dr.fadel@zuj.edu.jo
Office hours			