The University of Jordan
School of Engineering
Industrial Engineering Department
First Semester 2019/2020

Course name:	Operations Research -1		
Course code:	IE 0906353		
Credits hours	3		
Contact hours/room:	10:00-11:00 Sun, Tue & Thu/Workshop 102; 11:00-12:30 Mon & Wed/ Workshop 102		
Course instructor's name, E-mail, and phone:	Wafa' AlAlaween, Ph.D., AFHEA		
	w.alaween@ju.edu.jo		
	22941		
Office hours	12:00-13:00 Sun, Tue & Thu; 10:00-11:00 Mon & Wed		
Course Coordinator:	-		
Text book:	Frederick Hillier and Gerald Lieberman, Introduction to Operations Research, Mc-Graw Hill, 10th Edition.		
Other reference(s):	Hamdy Taha, Operations Research, Pearson Prentice Hall, 10th Edition.		
Course Description:	Mathematical modeling and operations research. Linear programming. Simplex algorithm. Duality. Transportation and assignment problems. Network models.		
Providing Department:	Industrial Engineering		
Prerequisite Course:	Engineering Analysis (IE 0906303)		
Course type	Mandatory		
Assessment Methods:	**Method**	**Weight %**	**Date**
	Midterm Exam	30	TBDL
	Project	10	Deadline (20/12/2019)
	Short Exam (Matlab & Excel)	10	TBDL
	Final Exam	50	TBDL

	#	After successful completion of this course, the student will be able to	SO
Course Learning Outcomes:	**CLO1**	Understand the applications of, basic methods for, and challenges in linear programming.	**1**
	CLO2	Design mathematical linear models for complex real world problems and present it in the class.	**2, 3, 6**
	CLO3	Understand the theoretical workings of the Simplex method and used to solve linear programming models.	**1**
	CLO4	Utilize various computer packages in Excel and Matlab to solve different programming models.	**2, 6**
	CLO5	Understand the relationship between a linear program and its dual, including strong duality and complementary slackness.	**1**
	CLO6	Perform sensitivity analysis (i.e. post optimality) to determine the direction and magnitude of a change of a model's optimal solution as the data change.	**1**
	CLO7	Model and solve specialized linear programming problems like the transportation and assignment problems.	**1, 2**
	CLO8	Design and solve integer systems and compute important	**1, 2**

		performance measures.	
Brief list of topics	**Credit hours**	**Reading materials**	**Topics**
	2	Ch. 1, 2	Introduction to operations research 1. History of operations research 2. Applications 3. Modeling the linear programming
	10	Ch. 3, 4, 5	Linear programming 1. Geometry 2. Solving the linear programming: the Simplex method 3. Shadow price 4. Theory of the simplex method
	5	Ch. 6	Duality 1. Dual theory 2. Sensitivity analysis
	8	Ch. 7	Other algorithms for linear programming 1. The dual simplex method 2. Big-M method 3. The two phase method
	7	Ch. 8	The transportation and assignment problems 1. The transportation problem 2. A streamlined simplex method for the transportation problem 3. The assignment problem 4. A special algorithm for the assignment problem
	10	Ch. 10	Network Optimization Models 1. The Terminology of Networks 2. The Shortest-Path Problem 3. The Minimum Spanning Tree Problem 4. The Maximum Flow Problem 5. The Minimum Cost Flow Problem 6. The Network Simplex Method

Important Notes:	• Do not hesitate to ask questions • You are required to bring a notebook and take notes in classes. • Students are expected to attend every class session and they are responsible for all material, announcements, schedule changes, etc., discussed in class. • Discuss the assignments among yourselves • Don't Cheat; direct copying of others work will NOT be allowed or tolerated and will result in a reduction of grade. If you are found to be cheating in any way, on an exam or assignment, even signing the roll sheet for another student, you will be given an "F" for the course. There will be no exceptions. • All cases of academic dishonesty will be handled in accordance with university policies and regulations. JU policy requires the faculty member to assign ZERO grade (F) if a student misses

	15% of the classes that are not excused, and 20% of the classes that are excused • Students are expected to be ready to take a quiz any time they have a class. There will be no make-up quizzes or home works. • Any students with disabilities who need accommodations in this course are encouraged to speak with the instructor as soon as possible to make appropriate arrangements for these accommodations.

The B.Sc. in industrial Engineering program enables students to achieve, by the time of graduation the following program learning outcome (SOs)			
1	*An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.*	**5**	*An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.*
2	*An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.*	**6**	*An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.*
3	*An ability to communicate effectively with a range of audiences.*	**7**	*An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.*
4	*An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.*		