Zarqa University
Faculty: Information Technology
Department: Computer Information System
Course Title: Operation Research (1502323)

Instructor:
Lecture's time:
Semester:
Office Hours:
Office No.:
E-mail:

Course description:

This course aims to provide students in obtaining those skills in optimizing (Maximizing or Minimizing) an Objective Function according to a set of constraints. Besides that, it provides information about the origins of OR problems, fields of OR Applications, and Modeling of such problems. Several special problems will be presented. Several solution methods will be discussed, and some of them will be programmed and implemented.

Aims of the course:

The main goal of this course is that students obtain those skills in optimizing an Objective Function and its constraints and how to implement and program this function.

Intended Learning Outcomes: (ILOs)

A. Knowledge and Understanding

A1. Concepts and Theories:

Overview of the basic operation research concepts.
List the basic terminologies and discuss the origin of OR.

A2. Contemporary Trends, Problems and Research:

Know about areas of applications of OR.

A3. Professional Responsibility:

Learn how to solve LP models graphically.

B. Subject-specific skills

B1. Problem solving skills:

Understanding to solve the LP models using:
a. Simplex Method.
b. M-Technique.
c. Two- phase Method.

B2. Modeling and Design:

Know the meaning of Duality and Dual problems, sensitivity analysis technique and be able to apply the Dual Simplex method when applicable.

B3. Application of Methods and Tools:.

Understand and solve the operations research applications and models.

C. Critical-Thinking Skills

C1. Analytical skills: Assess

Understand and solve some networks Problems and models:
a. Shortest-Path.
b. Minimum Spanning Tree
c- Maximum-Flow Problem.

C2. Strategic Thinking:

Understanding the OR options and how to pursue them.

C3. Creative thinking and innovation:

Analyze and investigate some OR models and design.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1. Communication:

D2. Teamwork and Leadership:

Discuss several case studies and solving real-world problems through simple projects.

Course structures:

Week	Credit Hours	ILOs	Topics	Teaching Procedure	Assessment methods
1,2	6	A1, A2	**Introduction:** • Operations Research definition. • Applications, Formulations and Graphical Solutions.	• Lecturing with active participations. • Problem solving. • Cooperative learning and discussion.	
3,4	3	A3	• Introduction To Graphical LP Maximization and minimization solutions	• Lecturing with active participations. • Problem solving. • Cooperative learning and discussion.	
5,6	3	B1	**The Simplex Method:** • Primal Simplex Method. • Simple examples. • Big-M method.	• Lecturing with active participations. • Problem solving. • Cooperative learning and discussion.	
7,8	3	B1	• The 2-Phase technique. • Sensitivity Analysis.	• Lecturing with active participations. • Problem solving. • Cooperative learning and discussion.	
9,10	3	B2, B3	**Duality:** • Duality Theory. • Dual Simplex Method. • Max. & Min. Cases. • Some Special Cases and Applications. • M-technique • Slackness Theorem	• Lecturing with active participations. • Problem solving. • Cooperative learning and discussion.	
11,12	3	C1	**Sensitivity:** • More Sensitivity Analysis. • Adding New Variables or Constraints	• Lecturing with active participations. • Problem solving. • Cooperative learning and discussion.	
13,14	3	C2, C3	**Applications:** • Transportation & Assignment Problems • Some Networks Problems. • Project Scheduling by -CPM.	• Lecturing with active participations. • Problem solving. • Cooperative learning and discussion.	
15	6	D1, D2	**Projects (Research paper)**	• Real-World Problem solving. • Research topics and discussion.	

References:

A. Main Textbook:

Hamdy Taha, "Operations Research: An Introduction" ,Macmillan, 8th ed.,2006

B. Supplementary Textbook(s):

1- Ferris, Michael C., Mangasarian, Olvi L., and Wright, Stephen J., Linear Programming with MATLAB, MPS-SIAM series on optimization, 2007.

2- Frederick S.Hillier, and Gerald J.Lieberman, "Introduction to Operations Research" , 6thed., McGraw-Hill, 1995.

3- Prem Kumar Gupta, and D.S. Hira; "Problems in Operations Research (Principles and Solutions)" , S.Chand & Compaang Ltd, 1991.

Assessment Methods:

Methods	Grade	Date
First Exam	20%	
Second Exam	20%	
Assignments (Reports /Quizzes/ Participations, ….)	10%	
Final Examination	50%	