Jordan University of Science and Technology

Faculty of Science & Arts

Mathematics Department

MATH371 Linear Programming And Applications - JNQF Level: 7

Second Semester 2024-2025

Course Catalog
3 Credit Hours. This course develops the theoretical concepts and computational techniques of linear programming problems and discusses applications of these topics in the social and applied and managerial sciences. Also, presents an introduction to the process of mathematical model building and gives various examples of real-world situations.
Teaching Method: Blended

Text Book	
Title	1. An introduction to linear programming and game theory
Author(s)	Paul R. Thie and G. E. Keough
Edition	3rd Edition
Short Name	Textbook
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref. # 1	Fundamentals of Linear Optimization	Huseyin Topaloglu	1st Edition	
Ref# 2	Linear Programming	S. M. Shahidul Islam	1st Edition	
Ref. # 3	Linear Programming	Alan Sultan	2nd Edition	

Class Schedule & Room
Section 1: Lecture Time: U : - Room:

Prerequisites		
Line Number	**Course Name**	**Prerequisite Type**
903400	MATH340 Linear Algebra (1)	Prerequisite / Pass

Tentative List of Topics Covered		
Weeks	**Topic**	**References**
Weeks 1, 2	Chapters 1, 2: Introduction to Linear Programming: Linear Programming Problem, Graphical Solution, Generating Extreme-Point Solutions, Examples.	From **Textbook**
Weeks 3, 4, 5, 6	Chapter 3: The Simplex Algorithm: Development of a Maximum Feasible Solution, Computational Procedure, The Artificial-Basis Technique, A First Feasible Solution Using Slack Variables, Degeneracy and the Convergence of the Simplex Algorithm, Big M Method, Two Phase Simplex Method, Unrestricted-In-Sign Variables, the LINDO Computer Package, Matrix Generators, LINGO, and Scaling of LPs, Solving LPs with Spreadsheets.	From **Textbook**
Weeks 7, 8	Chapter 5: Sensitivity Analysis : An Applied Approch: A Graphical Introduction to Sensitivity Analysis, The Computer and Sensitivity Analysis, Mangerial Use of Shadow Price, What Happens to the Optimal Z-Value if the Current Basis is no Longer Optimal?	From **Textbook**
Weeks 9, 10, 11, 12	Chapters 4, 5: Sensitivity Analysis and Duality: Some Important Formulas, Sensitivity, Sensitivity Analysis When More Than One Parameter is Changed.: The 100% Rule Finding the dual of an LP, The Dual Theorem and its Consequences, Shadow Price, Duality and Sensitivity Analysis, Complementary Slackness, The Dual Simplex Method.	From **Textbook**
Weeks 13, 14, 15	Chapter 7: Applications: Transportation, Maximal Network Flow , and the assignment Problems.	From **Textbook**, **Chapters 7, 8** From **Ref. # 1**

Mapping of Course Outcomes to Program Outcomes and NQF Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Be able to formulate and model a linear programming problem from a word problem and solve it. [1SLO1(K1S1)] [1L7K1]	40%	
Be able to find the dual, and identify and interpret the solution of the Dual Problem from the final tableau of the primal problem. [1SLO3(C24)] [1L7C4]	20%	
Be able to interpret the dual variables and perform sensitivity analysis. [1SLO2(S23C1)] [1L7S3]	16%	
Be able to explain the concept of complementary slackness and its role in solving the primal and the dual problems. [1SLO1(K1S1)] [1L7S1]	10%	
Be able to implement linear programming problems and solve real life problems such as the transportation, the assignment and the maximal flow problems. [1SLO1(K1S1)] [1L7S2]	14%	

Relationship to Program Student Outcomes (Out of 100%)					
SLO1(K1S1)	SLO2(S23C1)	SLO3(C24)	SLO4(C3)	SLO5(C4)	SLO6(S2C3)
64	16	20			

Relationship to NQF Outcomes (Out of 100%)				
L7K1	L7S1	L7S2	L7S3	L7C4
40	10	14	16	20

Evaluation	
Assessment Tool	**Weight**
First Exam	30%
Second Exam	30%
Final Exam	40%

Policy	
Additional Notes	Exams ? The format for the exams is generally (but NOT always) as follows: Problem formulation and design, Computation, and analysis. ? Grades will not be given out via e-mail. ? The final exam covers all the material in the course. Quizzes ? Quizzes (10-15 minutes) will be given at the end of the lecture. Typically they will involve some questions that are designed to test the understanding of the material discussed in the preceding lectures. Projects and Reports ? Projects and reports will be given to test the ability of students of problem formulation, designing the solution, and analysis the results. Makeup Exams ? Let the instructor know about your makeup exam before 3 days prior to the scheduled exam time. ? Makeup exam should not be given unless there is a valid excuse. Drop Date ? According to the university calendar. Cheating ? Cheating or copying from neighbor on exam, or quiz is an illegal and unethical activity. ? Standard JUST policy will be applied. Attendance ? Excellent attendance is expected. ? JUST policy requires the faculty member to assign ZERO grade (35) if a student misses 20% of the classes that are not excused. ? Sign-in sheets will be circulated. ? If you miss class, it is your responsibility to find out about any announcements or assignments you may have missed. Workload ? Average work-load student should expect to spend is 6 hours/week. Graded Exams ? Instructor should return exam, quiz, Hw's, and project papers graded to students during the week after the due date. Participation ? Participation in, and contribution to class discussions will affect your final grade positively. Raise your hand if you have any question. Finally ? Smoking is prohibited in all in-door places.