



Jordan University of Science and Technology
Faculty of Science & Arts
Mathematics Department

MATH771 Linear Programming

Second Semester 2023-2024

Course Catalog

3 Credit Hours. Topics in this course include formulation of linear programming (LP) models, Geometric solution for LP problems. Solving LP using Excel solver. Solving LP using simplex method and duality simplex method. Discuss sensitivity analysis and applications of LP including network models, transportation, and assignment problems.

Teaching Method: On Campus

Text Book

Title	Linear Programming & Network Flows
Author(s)	Mokhtar Bazzaraa, John Jarvis and Hanif Sherali, Fourth Edition
Edition	4th Edition
Short Name	Text book
Other Information	Wiley, 2010.

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref 1	Introduction to mathematical programming and algorithms	W. L. Winston	2nd Edition	International Thomson, (1995).
Ref 2	Linear Programming	Katta Murty	2nd Edition	1990
Ref 3	Nonlinear Programming: Theory and Algorithms	Mokhtar Bazzaraa , Hanif Sherali , C. M. Shetty	3rd Edition	2006

Instructor

Name	Prof. Mahmoud Alrefaei
Office Location	D1 Level 0

Office Hours	
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Class Schedule & Room
Section 1: Lecture Time: Mon, Wed : 13:00 - 14:30 Room: NG55

Tentative List of Topics Covered		
Weeks	Topic	References
Weeks 1, 2	Linear Programming Modeling and Examples, computer solutions, Geometric Solution, Requirement space.	Chapter 1 From Text book
Week 3	Convex analysis and polyhedral sets: convex sets and convex functions, extreme points	Chapter 2 From Text book
Weeks 4, 5, 6	Extreme directions and optimality. Characterization of extreme points and directions. Representation Theorem. Basic feasible solution. Algebra of the simplex method, termination: optimality and unboundedness, alternative solutions and degeneracy The simplex method in tableau form	Chapter 3 From Text book
Weeks 7, 8	The initial BFS, the two phase method, The Big-M method, comparisons, degeneracy, cycling and stalling	Chapter 4 From Text book
Weeks 9, 10	Duality, relationship between primal dual problems. The dual simplex method, sensitivity analysis	Chapter 6 From Text book
Week 11	Applications of LP: The minimal cost network flow problem.	Chapter 9 From Text book
Week 12	The transportation problem. The transshipment. The assignment problem	Chapter 10 From Text book
Week 13	Maximal flow problem, The shortest path problem	Chapter 12 From Text book

Mapping of Course Outcomes to Program Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Formulate real life problem as a linear programming problem [2SLO2(S23C1), 1SLO3(C24), 1SLO4(C3)]	20%	
Identify significant limitations of a model and explain why such limitations occur [1SLO2(S23C1), 1SLO3(C24)]	15%	

Solve model based on linear programming using different versions of Simplex method [2SLO1(K1S1), 1SLO5(C4), 1SLO6(S2C3)]	40%	
Interpret solutions of models in terms of the original problem [1SLO3(C24), 1SLO5(C4)]	10%	
Manipulate around the solution [1SLO1(K1S1), 1SLO2(S23C1), 1SLO3(C24), 1SLO4(C3), 1SLO5(C4)]	15%	

Relationship to Program Student Outcomes (Out of 100%)					
SLO1(K1S1)	SLO2(S23C1)	SLO3(C24)	SLO4(C3)	SLO5(C4)	SLO6(S2C3)
23	20.5	20.5	8	18	10

Evaluation	
Assessment Tool	Weight
Midterm	30%
Course Work	20%
Final Exam	50%

Date Printed: 2024-02-27