هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title	**LINEAR PROGRAMMING** *Enter Course Title.*
Course Code:	**MTHS 232**
Program:	**APPLIED STATISTICS AND DATA MANAGEMENT**
Department:	**MATHEMATICS**
College:	**SCIENCE - ZULFI**
Institution:	**MAJMAAH UNIVERSITY**
Version:	**TP – 153 – 2023**
Last Revision Date:	26/9/2023

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 3(3+0)					
2. Course type					
A.	☐University	☐College	☒Department	☐Track	Others
B.	☒Required		☐Elective		
3. Level/year at which this course is offered: (3rd level)					
4. Course general Description:					
Introduction to operations research-Mathematical model for some real problems - Mathematical formulation of linear programming problem by defining the objective function, the set of linear constraints that determines its feasible solutions - Graphical method for solving linear programming problems - Unique optimal solution and infinite many optimal solutions. Incompatible constraints, unbounded feasible solution set and unbounded variables. Redundant constraints - Analytical method (Simplex method) – Big-M method – Two-phase method - Formulation mistakes - Duality problem - Sensitivity analysis - Application to transportation and network problem.					
5. Pre-requirements for this course (if any)**:**					
Linear Algebra I (MTHS 211)					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					

1	Knowing how to make the mathematical model of some actual problems (the mathematical formulation of the linear programming problem
2	Recognizing the optimality theory and the different methods for solving the linear programming problem
3	Knowing the problem, the solution of the duality problem and sensitivity analysis for each problem
4	Knowing how to apply the linear programming in solving some of the actual problem (transportation and networks problems

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	30	67 %
2	E-learning	15	33 %
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**30**
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	**15**
5.	**Others (specify)**	
Total		**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Recognizing the Operations Research and the mathematical modeless of some actual problems and Knowing how to form the mathematical models of the linear programming problem	K1	Direct teaching: lectures and discussions Aimed teaching: Discovery and oral questions	Homework Quiz Midterms Final Exams E-exam Presentation
1.2				
...				
2.0	**Skills**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	Knowing the convex sets, convex functions and concave functions, polygons, vertex points and the theory of optimization-Knows different methods for solving the linear programming problem	S1	Direct teaching: lectures and discussions Aimed teaching: Discovery and oral questions	Midterms Final Exams E-exam Presentation
2.2	The students should Analyze and realize the codes of ethics and their importance, Be able to write treatise or thesis by Scientific workplace.	S2	Direct teaching: Lectures Aimed teaching: Discovery Oral questions Indirect teaching: Cooperative Learning	Homework Quiz Midterms Final Exams
...				
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				
3.3				
3.4	Concluding the duality problem and its solution	V4	Direct teaching: lectures and discussions Aimed teaching: -Raise the spirit of dialogue and discussion among students.- Ask indirect questions interesting and varied and give incentive to those who based solution. Indirect teaching: Peer Learning	Midterms Final Exams E-exam Presentation

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Operations Research - Mathematical Models of Some Actual Problems - Mathematical formulation of linear programming problem by defining the objective function, the set of linear constraints that determines its feasible solutions	9
2.	Graphical method for solving linear programming problems - Unique optimal solution and infinite many optimal solutions. Incompatible constraints, unbounded feasible solution set and unbounded variables. Redundant constraints	12
3.	Analytical method (Simplex method) – Big-M method – Two-phase method - Formulation mistakes - Duality problem	12
4.	Sensitivity analysis - Application to transportation and network problem.	12
	Total	45

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm Exam	6th or 7th	30%
2.	Electronic Exam	9th	10%
3.	Homework	During semester	5%
4.	Presentation and discussions	During semester	5%
5.	Quizzes	During semester	10%
6.	Final Examination	12th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	(1) Quantitative analysis for management -Barry Render - 9 edition –Prentice Hall -2006 (2) H.A.Taha, Introduction Operations Research 6th edition, London, Macmilla Publishing Company, Inc. (3) V. Chvatal: Linear Programming, San Francisco: McGill University, W.H. Freeman and Company,
Supportive References	1-M.Bazara and Shetly: Linear programming, Theory and Algorithm, New York, John Wiley,1993. 2- B. Gottfried and J. Weisman:Introduction to Optimization Theory, Prentic-Hell,Inc.,Englewood Cliffs,New Jersey.

	3-O.L. Mangasarian: Nonlinear programming, McGraw-Hill,York,1969. 4-Donald M.Simmons: Nonlinear Programming for Operations Research
Electronic Materials	http://people.brunel.ac.uk/~mastjjb/jeb/or/morelp.html
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	- The size of the room should be proportional to the number of students - Provide enough seats for students. - The number of students do not exceed on 30 in the classroom
Technology equipment (projector, smart board, software)	- Mathematics Lab is equipped with a computer. - Provide overhead projectors and related items i.e smart Board, Wi-Fi, AV. - Updated Math Software i. e Mathematica, Matlab, Maple. etc
Other equipment (depending on the nature of the specialty)	-

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students/ internal committee	Direct (Students evaluation electronically organized by Deanship of registration and admission)/ Verification of students' papers
Effectiveness of students assessment	Staff members (Peer Reviewer)	Indirect (Frequent meetings consultation among the teaching staffs)
Quality of learning resources	Staff members (course coordinators)	Direct (Meeting between course coordinators and the tutors)
The extent to which CLOs have been achieved	Students/ internal committee	Direct (Students evaluation electronically organized by Deanship of registration and admission)/ Verification of students' papers

Assessment Areas/Issues	Assessor	Assessment Methods
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	