جامعة آل البيت
دائرة ضمان الجودة والتخطيط

بسم الله الرحمن الرحيم

جامعة آل البيت

College of Science
Department of Mathematics
Course syllabus: Linear programming and game theory
First semester 2020/2021

1. Instructor Information:

Instructor Name	Prof. Ali Handam
Office Hours	Sunday ,Tuesday, Thursday
Office Number and Telephone Extension	
Email	alifirstsem@gmail.com

2. Course Description:

Linear programming introduces the student to a specific mathematical model: the linear programming model. This model has a wide range of applications, and is of interest to practitioners in operations research, statistics, economics management and psychology. This, and the fact that good algorithms can solve huge linear programs, is the reason for the success of this model. The theory of the course treats the simplex algorithm, duality theory, and sensitivity analysis. The theory is accompanied by practical examples that illustrate the power of the model, and teach the student the skill of modelling. After completing this course student will have obtained knowledge of the existing algorithms for linear programming. Students will be able to detect when a problem be solved via linear programming, and model it accordingly. Furthermore student will be able to perform sensitivity analysis.

3. Course Information:

Course number: 401384	Course Title: Linear programming	Level : Third year
Course Nature: Applied	Prerequisite: 0401241	Lecture time: Sun. Tue. Thu. 10:00 – 11:00
Academic year: 2020 – 2021	Semester: First	Credit Hours: 3

4. Course Objectives:

1. Able to develop an optimization model from a problem description.
2. Provide a detailed treatment of the theory of linear optimization.
3. Learn the simplex algorithm solving for linear optimization.
4. Develop a fundamental understanding of duality theory.
5. Conduct sensitivity analysis for linear programming problems and interpret the results.
6. Learn optimization algorithms for solving network flow problems.
7. Learn interior-point algorithms for solving linear optimization.

5. Intended Student Learning Outcomes:

Successful completion of the course should lead to the following outcomes:
A. Knowledge and Understanding Skills: Student will be able to
A1) State the theories and concepts used in linear optimization.
A2) Apply the simplex method in linear optimization.
A3) Apply interior point methods in linear optimization.
B. Intellectual Analytical and Cognitive Skills: Student will be able to
B1) Apply appropriate theories, principles and concepts relevant to linear optimization.
B2) Apply appropriate theories, principles and concepts relevant to duaity in linear optimization.
C. Subject- Specific Skills: Student will be able to
C1) Plan and design applications using techniques and procedures appropriate to the simplex method.
C2) Plan and design applications using techniques and procedures appropriate to interior point methods.
D. Creativity /Transferable Key Skills/Evaluation: Student will be able to
D1) Deal with an appropriate effective data relevant to linear optimization.
D2) Solve linear optimization models using ideas and techniques some of which are at the forefront of the discipline.

6. Course Content:

Course Content		
Week	**Topics**	
1+2+3	1,1 Concept Of Linear Programming L.P . 1.2 Building (Formulation) Of Linear Programming Model. 1,3 Forms of Linear Programming Models. 1.4 General Form of Linear Programming Models. 1,5 standard Form of Linear Programming Models.	
4+5+6	2.1 The Graphical Method. 2.2The Simplex Method, 2.3 The (Bis-M) method.	
7+8+9+10	3.1 The Concept Of Duality Problem. 3.2 Dual Problem when Primal Modal in Canonical Form, 3.3 Dual Problem when Primal Modal in Standard Form. 3.4 Find a Solution for Dual Modal.	
11+12+13	4.l lntroduction and Definition of Transportation Modal, 4.2 Balancing of Transportation Modal. 4,3 Solution Technique of Transportation Modal' 4.4 North West - corner Method, 4.5 Least cost Method. 4.6 Vogel s Approximation Method. 4.7 Stepping Stone Method, 4.8 Multipliers Method, 4,9 Assiqnment Problem	
14+15+16	5.1 Levels of tabulations project. 5.2 Network Rules & Construction. 5,3 Network Analysis. 5.4 Critical Path Method. 5.5 Proqram Evaluation and Review Technique	

7. Teaching and learning Strategies and Evaluation Methods:

Learning Outcomes	Teaching Strategies	learning Strategies	Evaluation Methods
A1) State the theories and concepts used in linear optimization. A2) Apply the simplex method in linear optimization. A3) Apply interior point methods in linear optimization.	- Writing on the blackboard - Ask students questions and discuss them - Solve various issues	Give homework assignments	- Classroom presentations - Discussion - First exam
B1) Apply appropriate theories, principles and concepts relevant to linear optimization. B2) Apply appropriate theories, principles and concepts relevant to duaity in linear optimization.	- Writing on the blackboard - Ask students questions and discuss them - Solve various issues	Give homework assignments	- Classroom presentations - Discussion - Second exam
C1) Plan and design applications using techniques and procedures appropriate to the simplex method.	- Writing on the blackboard - Ask students questions and discuss them - Solve various issues	Give homework assignments	

C2) Plan and design applications using techniques and procedures appropriate to interior point methods			
D1) Deal with an appropriate effective data relevant to linear optimization. D2) Solve linear optimization models using ideas and techniques some of which are at the forefront of the discipline.	- Writing on the blackboard - Ask students questions and discuss them - Solve various issues	Give homework assignments	- Classroom presentations - Discussion - Final exam

8. Text Book:

The main reference	Elementary Linear programming with applications
Author(s)	Bernard Kolman and Robert E. Beck
Publisher	Elsevier Science & technology books
Year	1995
The edition	
The reference website	**https://drive.google.com/file/d/1dRL8HchIfiG98d1wI4G18OflIBr-a2UT/view?usp=sharing**

9. References and additional resources:

1)	Ronald L. Rardin, Optimization in Operations Research. Prentice Hall, 1998. W.L. Winston and M. Venkataramanan, Introduction to Mathematical Programming. 4th edition. Thomson Brooks/Cole.
2)	D. Bertsimas and J. Tsitsiklis. Introduction to Linear Optimization. Athena Scientific Series in Optimization and Neural Computation.