وەزارەتی خوێندنی بالآ و تویژینەوەی زانستی

Department of Mathematics

College of Basic Education

Salahaddin University- Erbil

Subject: Linear Programming

Course Book –4ᵗʰ Stage – First Semester

Lecturer's name: Dr. Dler Mustafa KHIDHR

Academic Year: 2022-2023

Course Book

1. Course name	**Statistics**
2. Lecturer in charge	**Dr DLER MUSTAFA KHIDHR**
3. Department/ College	**MATHEMATICS/ Basic Education**
4. Contact	**e-mail: dler.khidhr@su.edu.krd**
5. Time (in hours) per week	**Theory: 4**
6. Office hours	**1 hours in week**
7. Course code	
8. Teacher's academic profile	I graduated from Salahaddin university – Hawler in 2002 college of administration & Economic \ Statistics Department. From 2003, I am working in Salahaddin Uni. In 2007 I achieved a master's degree in the Department of Statistics college of Science of computer and mathematics, University of Mosul. I have got PhD in Applied Statistics in February 2020. I studied the first stage students Principles of Statistics at the Department of Mathematics department and through these years supervised Research on the graduation for students of the fourth stage in the Department of Statistics, and, so far, I am working as an assistant teacher in the Department of Mathematics.
9. Keywords	Operations: The activities carried out in an organization. Research: The process of observation and testing characterized by the scientific method. Situation, problem statement, model construction, validation, experimentation, candidate solutions. Model: An abstract representation of reality. Mathematical, physical, narrative, set of rules in computer program..

10. Course overview:
The general purpose of this course is to study the basic concepts of Operations Research
This course is divided into two parts. The first part deals with linear programming problem, method of this and solved it by one of the methods,, and the second part deals with Transportation Problem

11. Course objective:

1-This module aims to introduce students to use quantities methods and techniques for effective decisions- making; model formulation and applications that are used in solving business decision problems.

2-To provide students with techniques for formulating operation research problems they may encounter in industry.

3-To provide students with solution for solving operation research problems.

4-To teach student how to analyze and interpret the solutions obtained from s

12. Student's obligation

➢ **Student readiness is very important to learn and get a note about the lesson because you are amenable to the lesson.**

➢ **Is not allowed to use a mobile phone in the classroom during the time of lecture until the teacher goes out of the classroom, If you use it, therefore you face legal punishment.**

13. Forms of teaching

White board and Data show to view the headlines, definitions and tables

14. Assessment scheme

Test 1 = 35+ Quiz

the total = 40

and final exam =60

May be student have some activities and quizzes 5% as part of second exam.

15. Student learning outcome:

At the end of this course, students are expected to be able to understand and find reasonable date in the company , provide a method for using sample data to find the objective function and the subject function and how to take profit in the product

16. Course Reading List and References:

➢ **Main References:**

. Course Reading List and References:

1-فتحي خليل حمدان- رشيد رفيق مرعي "مقدمه في بحوث العمليات"2008

2-د.دلال صادق الجواد"بحوث العمليات "2008

3- عبدالكريم هادي شعبان "تطبيقات في الاساليب الميه وبحوث العمليات "2008

4-كاسر نصر المنصور "الاساليب الكميه في اتخاذ القرارات الاداريه" 2006

5-"Operation Research,Application and Algorithms",Wayn L.Winston,2004.

6-"Operation Research an introduction ,8 edition",Hamdy A.Taha,2007.

7--"Operation Research an introduction ,2 edition",Hamdy A.Taha,1987.

8. Don T .Phillips "Operation Research Principles and Practice" 1976.

17. Subject

Week	Subject
1	**Chapter 1 :** 1 Chapter one
2	1.1 Introduction to operation research: -
3	1.2 Linear programming:
	1.3 The standard maximum problem:
4	1.4 The standard minimum problem
5-6	1.5 Steps of Constructions Linear Programing
	2 Chapter two
7-8	2.1 Graphical solution of linear programming Problems:
	2.2 Graphical method: -
9	2.2.1 Steps of solving linear programming by using graphical methods:
	2.2.2 Example:
10	2.3 Types of graphical method:
	2.3.1 1. Alternative or Multiple optimal solutions:
11	2.3.2 Unbounded
	2.3.3 Infeasible:
12	2.3.4 Degenerate solution:
	3 Chapter three5The Simplex method.
	3.1 Solving linear programming problems: the simplex method
	3.2 The Simplex method:-
	3.3 Artificial variable
	3.3.1 -Minimization case of simplex method
	3.4 Dual problem:
	.
13-15	**Chapter 4: Transportation Problems:** **4.1- Finding the starting feasible solution North-West corner Method.** **4.2- Least cost Method.** **4.3- Vogel's approximate Method.** **4.4 Improving the Initial solution by Multipliers Modified Method .**

18. Practical Topics (If there is any)

19. Examinations:

Reddy Mikks produces both interior and exterior paints from two raw materials M1 and M2.   Tons of raw material per ton of

	Exterior paint	Interior paint	Maximum daily availability (tons)
Raw material M1	6	4	24

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2 // Find the optimal Solution for the following (L.P) problem by using Graphical Method.

$$MaxZ = 3X1 + 5X2$$
$$s.to$$
$$2X1 + X2 \geq 7$$
$$X1 + X2 \geq 10$$
$$X1 + 3X2 \geq 9$$
$$X_1, X2 \geq 0$$

3)Use the Simplex method to solve the Linear Programming Problem.

$$MaxZ = X1 + X2$$
$$s:to$$
$$X1 + 2X2 \leq 10$$
$$2X1 + X2 \leq 10$$
$$X_1, X2 \geq 0$$

4) Write the Dual model for the fallowing primal Linear Programming problem.

$$MinZ = 3X1 + 4X2 + 6X3$$
$$s.to$$
$$3X1 + 2X2 = 16$$
$$X1 + 4X3 \geq 12$$
$$X1 + 2X2 + X3 \leq 20$$
$$X_1, X2, X3 \geq 0,$$

5)For the transportation problem
   a- Find the feasible Solution by using The North-West Cornet Method & The Least –Cost Method then compare them .

b-Find the optimal Solution by using the Modified Distribution Method .

	D1	D2	Supply
S1	4	2	60
S2	7	5	40
S3	3	10	70
Demand	105	65	

2.True or false type of exams:

3. Multiple choices:

20. Extra notes:

21. Peer review پێداچوونەوەی هاوەڵ