

**Department of …Mathematics**

**College of …Education**

**University of …Salahaddin**

**Subject: …Operation Research**

**Course Outline– *Fourth year (1st and 2nd) semester***

**Lecturer's name Prof. Dr. Nejmaddin A. Sulaiman**

**Academic Year: 2022/2023**

**Course Book**

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| **1. Course name** | Operation Research | |
| **2. Lecturer in charge** | Prof. Dr. Nejmaddin A. Sulaiman | |
| **3. Department/ College** | Mathematics/ Education | |
| **4. Contact** | **e-mail: nejmaddin.sulaiman@su.edu.krd**  **Tel: (optional)** | |
| **5. Time (in hours) per week** | **Theory: 3**  **Practice : 0** | |
| **6. Office hours** | **Availability of the lecturer to the student during the week** 6 | |
| **7. Course code** |  | |
| **8. Teacher's academic profile** | **PROFESSIONAL EXPERIENCES**  **\*** 1- B. Sc. In Mathematicsscience/Education college – Univer.of Mosul in 1983  2- M. Sc. In Mathematicsscience/science college – Univer. of Salahhadin in 1989  **Thesis title***(*Extreme point quadratic programming techniques*)*  3- Ph.D. In Mathematics(Numerical Analysis) science /scientific educational college– Univer. of Salahadin in 1999  **Thesis title***(*New Techniques in the Numerical Solutions of Fredholm and Volterra integral Equations*)*  **Undergraduate Students**  1- Calculus 2- Computer Programming  3- Geometric and Axiomatic Systems  4- Numerical Analysis  5- Finite Mathematics 6- Discrete Mathematics  7- Applied Mathematics 8- Operation Research  9- Linear Programming  **Postgraduate Students**  1- Advanced Numerical Analysis  2- Advanced Integral Equations  3- Topics in Optimization  4- Advanced Operation Research  5- Nonlinear programming problem  **Sciential degrees**  1- Scientific Researcher 1986-1989  2- Assistant Lecturer 1989-1992  3- Lecturer 1992-1998  4- Assistant Professor 1998-2010  5-Professor 2010 till now  **Scientific and Office works**  1- Chairman of computer branch/ College of education /Univer. of Salahadin 1991-1998.  2- Manager of computer center/Univer. of Salahadin 1995-1998.  3- Manager of central Admission office Kurdistan region1996-1999  **4-** Head of mathematical department / College of Education-scientific departs. /Univer. of salahaddin-Hawler 2008- 2012  5. Head of mathematical department / College of Education/Univer. of salahaddin-Hawler 2012- till now  **Supervised and Researches**  \* Published more than 40 scientific researches in several scientific Journals  \* Supervised on 13 master thesis and 3 Ph.D.Thesis in mathematics.  \*Contributed as chairman or member or supervisor and member for more than 55examination committee for discussion master and Ph.D. thesis.  \* Supervised on more than 35 projects research at the end stage of undergraduate student.  **Book published :**   1. “On Neural Network Algorithms for Solving Non-Linear Problems”, LAMBERT academic Published (L.A.P.),Copyright 2012,   ISBN: 978-3-8465-8080-6, printed in the U.S.A.  Email: [info@lap-publishing.com](mailto:info@lap-publishing.com) , Phone: +49 6813720-310.  **The Conferences Contrib**  1. Mathematical factual conference Erbil/Massif Salahadin in 1985  2. Third scientific conference of Salahadin Un. in Erbil in 1997  3. Scientific conference of Salahadin Univer. in Erbil in 2002  4. The first Iraqi-French mathematics conference in cooperation with college of Science Salahaddin university-Erbil 14 to 18 November2009.  5. Revitalizing Research in Kurdistan International scientific conference ministry of higher education and scientific research in Erbil 2010 .  6. 1stScientific Conference of Research Project of 4thClass students, College of Education –Scientific Departments,University of Salahaddin-Hawler 28-29/5/2011.  7. The fourth International Scientific Conference of Salahaddin University –Erbil October 18-20, 2011.  8. 2ndScientific Conference of Research Project of 4thClass students, College of Education –Scientific Departments,University of Salahaddin-Hawler 21-22/5/2012.  9. International conference IRAQ:10 YEARS on –stocktaking and perspectives December 9-12, 2013 Erbil, Kurdistan Region of Iraq PROGRAM Organized by: Salahaddin Un.-Hawler –Kirkuk Un.  University of Erlangen-Nurnberg – Center for Iraq Studies Felsberg institute for Education and Academic Research.  10.3rdScientific Conference of Research Project of 4thClass students, College of Education –Scientific Departments,University of Salahaddin-Hawler 22-23/5/2013.  11. Cimpa-Unesco-Kurdistan Iraq School inverse Problems: Theory and Applications Erbil, May, 5, 2014 , to 14, 2014.  12. The first international scientific conference of Cihan University – Erbil, May, 20-21, 2014.  13. The5th International scientific conference of Eshik university –Erbil April13-14, 2014  14.الدورة السادسة والاربعين (دورة صلاحالدين) للمؤتمر العام لاتحاد الجامعات العربية و  جامعةصلاحالدين – اربيل واقليم كردستان – العراق 19-20اذار2013.  15. 4thScientific Conference of Research Project of 4thClass students and 1stScientific Academic Posters of 1st Class students, 12/5/2015.  16.The2th International Ecology, Environment and Energy Conference(ICEEE2015)Collaboration between Faculty of Education of Eshik University andCollege of Education of Salahaddin University-Hawler Erbil April12-13, 2015  17. The 6th International Visible Conference on Educational Studies and Linguistic in Erbil-Iraq organized by Faculty of Education of Eshik University and College of Education of Salahaddin University-Hawler . Erbil April26,-27, 2015  18. 5thScientific Conference of Research Project of 4thClass students and 2ndScientific Academic Posters of 1st Class students, 12/5/2015.  19. 2nd Scientific conference in Garmian University ,May 6,7 / 2015  20. 6thScientific Conference of Research Project of 4thClass students 17/5/2016..  21. 1st International Conference on Engineering and innovative Technolgy (SU-ICEIT 2016)held by salahaddin University–Erbil, College of Engineering at Erbil Kurdistan-Iraq during April12-14, 2016  22. 7thScientific Conference of Research Project of 4thClass students 16/5/2017.  23.1st AICWSSLS 2017 college of Education ,Salahaddin University –Erbil, September 9th-11th2017.  23.National Conference on pure and applied Mathematics and mathematics Education (NCPAME-2018) which held on February 11,12,2018,in Erbil,KRG-Iraq by Faculty of Education of Eshik University.  24. 5th International V Conference on applied science , Energy and Environment (ICASEE\_2018) which held on February 7,8,2018,in Erbil,KRG-Iraq by Faculty of Education of Eshik University.  25. 8thScientific Conference of Research Project of 4thClass students ands cientific Academic Posters of 1st Class students 14/5/2018.  **Periods**  1-Preperatation period for Salahadin Univer. Staffs 1/1/1991  2-Computer period in Bilkent Un., Ankara-Turkey 17-10-1995  **Committees**  1- Contributed as a member of scientific central committee of Univer. of Salahadin- Hawler to determine scientific grade.  2- Contributed in many committees as a member or chairman in college of Education-scientific departs./Univer.of Salahadin- Hawler.  3-Head of elevation scientific degree committee in college ofEducation-scientific departs./Univer. of Salahadin-Hawler  4-Member of scientific committee depart. of computer science /college of Education-scientific departs./Univer. of Salahadin-Hawler.  5.Head and member of examination committee in college of Education for 11 years.  **6.** Member of scientific committee depart. of Mathematics /college of Science ./Univer. of Salahadin- Hawler .  7 ..Head of scientific committee depart. of Mathematics /college of Education ./Univer. of Salahadin- Hawler since 2008…  8..Head ofHigher Education committee depart. of Mathematics /college of Education ./Univer. of Salahadin- Hawler since 2008… | |
| **9. Keywords** | This course is a natural continuation of a course in operation Research. The basic goal is to establish a connection between different . | |
| **10.**  The more general objective of this course is to continue providing a deeper understanding and working knowledge of Operation Research, while in the process strengthening analytical skills increasing student’s ability to communicate optimization, making them comfortable with reading and understanding different subjects on their own and continuing to develop their appreciation for abstract OR. | | |
| **11. Course objective:**  The topics listed in the syllabi will be covered in the lectures. The students will be asked to study all topics in the lectures at home. To get the best of the course it is suggested that the students attend classes as much as possible. Lectures note, are for supporting not for submitting the reading material try as much as possible to participate in classroom preparing the assignments given in the course. | | |
| **12. Student's obligation:**  Student’s role is very crucial in this course. They need to spend some time in solving and understanding the main concepts. | | |
| **13. Forms of teaching**  We will use datashow &the board in this course. The board is a good tool for Mathematics | | |
| **14. Assessment scheme**  1. 40% of the term mark the annualstriving in25% theory.  2. Final examination 60%. **.**  ‌ | | |
| **15. Student learning outcome:**  The students will learn some concepts in this new field of OR. It will be useful once the pursue a postgraduate degree | | |
| **16. Course Reading List and References‌:**   1. S. D. Sharma.Operation Research ,Kedar Nath RamNath BCo 2. Winston,W.L.”Operation Research Applications and Algorithms ”Brooks/Cole Printed in Canada   3-[Hilier and Liebermann, Introduction to Operations Research,McGraw-Hill](http://www.mhhe.com/engcs/industrial/hillier/)Wayne Winston, Operations Research: Applications and Algorithms, Duxbury Press | | |
| **17. The Topics:** | | **Lecturer's name** |
| In this section the lecturer shall write titles of all topics he/she is going to give during the term. This also includes a brief description of the objectives of each topic, date and time of the lecture  Each term should include not less than 16 weeks | | Lecturer's name  3 hrs. |
| **18. Practical Topics (If there is any)** | |  |
| In this section The lecturer shall write titles of all practical topics he/she is going to give during the term. This also includes a brief description of the objectives of each topic, date and time of the lecture | | Lecturer's name |
| **19. Examinations:**  The exams will be a combination of solving problems and explaining certain ideas of the course   1. Quizzes 5%. 2. Examinations will be given, 20%. 3. Final exam 60%. | | |
| **20. Extra notes:**None | | |
| **21. Peer review پێداچوونه و هه ول ‌**.‌‌ | | |

**Syllabus**

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| **First semester from 4/9---12/1 20 weeks :(16 lectures + 4 Exam & revision)** | |
| **No.** | **Title of the Subject** |
| **Week 1** | Some Basic Knowledge about OR, and History of OR, |
| **Week 2** | Definition of Liner Programming problem, Graphical method to solve it. |
| **Week 3** | Formulation Problems in Linear Programming Model |
| **Week 4** | Describe the logic underlining the steps in the Simplex method. |
| **Week 5** | Solve Linear Programming problems by Simplex method. |
| **Week** 6 | Formulate the dual problem and describe its economic interpretation and interpret the LP solution. |
| **Week** 7 | Duality in linear Programming |
| **Week** 8 | Examination and discussion |
| **Week** 9 | Use primal-dual computational formulas to find a solution of an LP |
| **Week** 10 | Two phase method and B.M. methods for solving LP |
| **Week** 11 | Integer programming. |
| Week 12 | Integer programming. |
| Week13 | Gomory constraint method |
| Week14 | Gomory constraint method |
| Week15 | Distribution Models/Assignment Technique |
| Week16 | development of assignment problems |
| Week 17 | **Exam & revision** |
| Week 18 | **Exam & revision** |
| Week19 | **Exam & revision** |
| Week 20 | **Exam & revision** |
| **Second semester from 22/1---30/6 20 weeks** | |
| Week1 | Travelling salesman problem. |
| Week 2 | Transportation problems |
| Week4 | game theory |
| Week 5 | game theory |
| Week 6 | game theory |
| Week7 | game theory |
| Week8 | Graphical method to solve 2xn ,mx2 and 3xm games |
| Week9 | Graphical method to solve 2xn ,mx2 and 3xm games |
| Week10 | Graphical method to solve 2xn ,mx2 and 3xm games |
| Week11 | Transportation |
| Week12 | Transportation |
| Week 13 | Transportation |
| Week 14 | Job Sequencing |
| Week 15 | Job Sequencing |
| Week 16 | Job Sequencing |
| Week17 | Examination |
| Week 18 | Examination |
| Week 19 | Examination |
| Week20 | Examination |