

SIE 440/540: Survey of Optimization Methods

Spring 2021

Course Description: (3 units) Survey of methods including network flows, integer programming, nonlinear programming and dynamic programming. Models development and solution algorithms are covered.

Course Goal: Students are able to develop a working knowledge of different types of optimization methods in these directions: learning solution approaches for linear/integer/dynamic/nonlinear programming and some network optimization problems; developing an appropriate optimization model from a verbal description of a problem; choosing an appropriate solution technique; extract relevant information from the model and solutions.

Prerequisites: SIE 340 – Deterministic Operations Research, or equivalent. Knowledge of linear programming.

Time and Location: TuTh 12:30PM-1:45PM (FLEX IN-PERSON modality)

- We will be meeting remotely through Zoom (link in D2L) until the University's further notice; the lectures will be recorded and be available in D2L after each lecture.
- The in-person teaching location is ENGR 301, if the policy allows (further announcement will be made in D2L).

Instructor: Dr. Neng Fan, Associate Professor

Office: Zoom link in D2L / ENGR 312

Office Hours: TuTh 1:45PM-2:30PM

Email: nfan@arizona.edu

Teaching Assistants:

Meysam Cheramin

Office: Zoom link in D2L

Office Hours: MoWe 4:00PM-5:00PM

Email: meysamcheramin@email.arizona.edu

Course Website: We'll be using D2L. All class materials, including homework assignments, lecture notes, supplemental readings, videos, etc, will be distributed from D2L. You must check the announcements in D2L at least twice a week.

Textbook: Title: Introduction to Operations Research; 11th Edition; Published Date: 2021; Authors: F. Hillier and G. Lieberman; ISBN10: 1259872998; ISBN13: 9781259872990; McGraw Hill (Inclusive Access)

References:

Title: Operations Research: Applications and Algorithms; Author: W.L. Winston; 4th Edition; Published Date: 2004; ISBN-13: 978-0534380588; ISBN-10: 0534380581; Publisher: Duxbury Press **or**

Title: Introduction to Mathematical Programming; Author: Winston, W. L. and Venkataraman, M.; 4th Edition; Published Date: 2002; ISBN-13: 978-0534359645; ISBN-10: 0534359647; Publisher: Thomson Learning.

Course Outline:

1. Review of linear programming: modeling, simplex method, interior-point method, sensitivity and duality analysis.
2. Network optimization: modeling, transportation problem, assignment problem, network flows, etc.
3. Integer programming: modeling, branch and bound method, cutting plane method, etc.
4. Nonlinear programming: convexity, duality, optimality conditions.
5. Dynamic programming

Grade Policy:

- SIE 440:
 - Homework: 5 sets (30%)
 - Exams: Midterm exam (30%), Final exam (40%)
- SIE 540:
 - Homework: 5 sets (20%)
 - Exams: Midterm exam (25%), Final exam (35%)
 - Project (20%)

Note on Academic Integrity: I expect you to understand and write your own solutions, but you are allowed to discuss with your classmates. Also, if you have any references, you must cite them.

Late problem sets will not be accepted unless you contact the instructor in advance. Any questions with grades for HW and exam, you should write explanation to teaching assistant within one week of grades posted.

Accessibility and Accommodations: It is the University's goal that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability or pregnancy, please let me know immediately so that we can discuss options. You are also welcome to contact Disability Resource Center (520-621-3268) to establish reasonable accommodations.

You are encouraged to make recommendations to improve the class and my teaching skills. Information contained in the course syllabus, other than the grade policy, may be subject to change with advance notice, as deemed appropriate by the instructor.