SIE 440/540: Survey of Optimization Methods

Spring 2018

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 9:30AM-10:45AM, ENGR 301

Instructor: Dr. Neng Fan, Assistant Professor
Office: ENGR 312
Office Hours: TuTh 10:45AM-12:00PM
Email: nfan@email.arizona.edu

Teaching Assistants:
Ms. Shanshan Hou
Office: ENGR 323
Office Hours: MoWe 1:00PM-2:00PM
Email: shanshanh@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.
Online students: All lecture videos will be available in Panopto (D2L–UA Tools–Panopto); You will take exams through Examity (D2L–UA Tools–Examity) and submit homework assignments and project reports through Assignments (D2L–Assignments).

Textbook: F. S. Hillier, and G. J. Lieberman, Introduction to Operations Research, 10th Edition, McGraw-Hill, New York, 2014.

References:
Wayne L. Winston, Operations Research: Applications and Algorithms, ISBN-10: 0534380581, Cengage Learning; 4 edition, 2003. **or**

Winston, W. L. and Venkataramanan, M., Introduction to Mathematical Programming, ISBN: 0-534-35964-7, Edition: 4, Publisher: ITP EDUC/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

Course Policies:

- 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. Any questions with grades for HW and exam, you should write explanation to TAs 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 Resources (520-621-3268) to establish reasonable accommodations.

You are encouraged to make recommendations to improve the class and my teaching skills.