IE 312 - Operations Research II

Spring 2024

Instructor: Gizem Özbaygın
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Office: FENS 1030
Weekly schedule: T 09:40 – 10:30, R 14:40 – 16:30 (FENS L045)
TAs: Arghavan Sharafi, Neman Karimi
Office hours: TBD

Course Content: Develop a broad perspective on the relationships between various types of optimization problems; acquire modeling and solution skills for various methodologies: integer programming, network flows, dynamic programming, heuristics; apply these skills to problems from domains such as service, production, transportation, and energy systems.
Objectives: To teach basic ingredients of deterministic optimization including integer programming modeling and solution methods, network models, dynamic programming and heuristics.

Prerequisite(s): IE 311.

Tentative Course Outline:

- Integer programming modeling
- Branch and bound method
- Introduction to networks
- Shortest path, maximum flow and minimum cost network flow problems
- Characteristics of dynamic programming
- Dynamic programming examples
- Local search and metaheuristic algorithms
- Overview and classification of optimization problems

Textbook: *Operations Research, Applications and Algorithms*, Wayne L. Winston

Required software: We will use Python and the Gurobi Python interface from time to time. Some quizzes and exams will include computer-based questions. We will use the first class meeting to make sure that you have Python and Gurobi installed on your computer, and that you have a valid Gurobi license. Afterwards, it is your responsibility to maintain the working condition of the required software throughout the semester.

Learning Outcomes:

1. Have a basic understanding of integer programming modeling and branch and bound algorithm as a solution method.
2. Have an understanding of basic concepts related to networks, network models including shortest path, maximum flow and minimum cost network flow problems.
3. Have an understanding of dynamic programming.
4. Have an understanding of heuristic approaches.

5. Be able to implement developed models and/or solution methods using appropriate software.

Grading Policy: Quizzes (30%), Midterm (30%), Final (35%), Participation (5%).

Quizzes: There will be six in-class quizzes in total (roughly once in every two weeks), and your worst quiz grade will be dropped at the end of the semester. Note that there will be no make-up for missed quizzes. The quiz dates are tentatively set as follows:
Quiz 1 - Feb 29
Quiz 2 - Mar 14
Quiz 3 - Mar 28
Quiz 4 - April 25
Quiz 5 - May 9
Quiz 6 - May 23

Make-up Policy: A single comprehensive make-up exam will be offered after the final exam to those who have missed the midterm or the final exam. A medical report must be e-mailed to me from the Health Center in order to be eligible for the make-up exam.

Academic Integrity: Each student in this course is expected to abide by the Sabanci University Academic Integrity Statement (available at http://www.sabanciuniv.edu/en/academic-integrity-statement).

Disclaimer: The instructor reserves the right, when necessary, to alter the grading policy, change examination dates, and modify the syllabus and course content. Modifications will be announced in class and via SUCourse. Students are responsible for the announced changes.