IE 501 - Linear Programming and Extensions
Fall 2021

Instructor

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Office hours: TBA (in person and via Zoom)

Course Logistics

	Time - Location
Lecture	T 14:40 - 16:30 *(FENS 2019 and via Zoom)* W 10:40 - 11:30 *(FENS L035 and via Zoom)*

Catalogue Description

Theory of linear programming; convexity; simplex and algorithmic aspects; duality and sensitivity; computational issues; decomposition and column generation; introduction to integer and nonlinear programming

Tentative Outline

1. Introduction to Linear Optimization
2. Background on Polyhedral Sets and their Geometry
3. Duality
4. The Simplex Method
5. Sensitivity Analysis
6. Decomposition Methods
7. Complexity of Linear Optimization and the Ellipsoid Method
8. Introduction to Interior Point Methods (if time permits)

Textbooks

Introduction to Linear Optimization, A. Nemirovski (Lecture Notes) http://www.isye.gatech.edu/~nemirovs/

Linear Programming and Network Flows, M. S. Bazaraa, J. J. Jarvis and H. D. Sherali (John Wiley).

Recommended Readings:

Introduction to Linear Optimization, D. Bertsimas and J. N. Tsitsiklis (Athena Scientific).

Linear Programming 2: Theory and Extensions, G.B. Dantzig and M. N. Thapa (Springer).

Large Scale Linear and Integer Optimization, R.K. Martin (Kluwer Academic Publishers).

A Gentle Introduction to Optimization, B. Guenin, J. Könemann and L. Tunçel (Cambridge University Press).

Course Assessment Measures

▸ <u>Homework Assignments (50%):</u> Approximately at the end of each chapter, the students will be given an extensive homework assignment to be completed within 1-2 weeks. These assignments are aimed for facilitating continuous learning. The students are allowed to work in groups, as long as each student submits their individual and unique copy, and clearly lists the names of their collaborators. A total of 5-8 homework assignments should be expected.

▸ <u>Exams (20% each):</u> There will be two exams in total, each will cover the previous 6-8 weeks approximately. The format and the dates of the exam will be announced later. The tentative dates for Exam 1 are Nov 9 or Nov 16. Exam 2 will be held during the finals week.

▸ <u>Participation and Attendance (5%):</u> Participation and in-class/online attendance to lectures or office hours will be evaluated.

<u>The letter grades will be adjusted based on the performance of the class. Tentative cut-off points for the letter grades will be announced after the exams.</u>

Software

The students will need to use a commercial solver to solve optimization problems. Although there are no restrictions on which programming language and solver to use, the students are encouraged to use Gurobi solver and Python programming language.

Academic Integrity

By taking this course, each student agrees to abide by the academic integrity policy at Sabanci University. Violators of academic integrity will be subject to disciplinary action.