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IE 501 - Linear Programming and Extensions

Fall 2020

Instructor

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Course Logistics

	Time - Location
Online Lecture	M 15.40 - 17.30 (via Zoom) T 16.40 - 17.30 (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. The Network Simplex Algorithm (if time permits)
7. Complexity of Linear Optimization and the Ellipsoid Method
8. Introduction to Conic Optimization and Interior Point Methods

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).

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

Course Assessment Measures

- ▶ **Homework Assignments (55%):** 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 submit their individual and unique copy, and clearly list the names of their collaborators.
- ▶ **Exams (20% each):** 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.
- ▶ **Participation and Attendance (5%):** Participation and attendance to online lectures will be evaluated.

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.

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.