

Math 430: Mathematics of Optimization

Prerequisite: Math 325 with C or better.

Bulletin Description: Modeling and solution of optimization problems as linear, semidefinite, nonlinear, or integer programming problems. Analysis and interpretations of solutions to these problems.

Course Objectives: The main objective of Mathematics of Optimization is to introduce linear optimization models, their solution techniques, and interpretation of their solutions. Specifically, students will be able to

- model an optimization problem as a linear program and solve using simplex method,
- interpret the solution of simplex algorithm in order to perform sensitivity analysis,
- model various convex optimization problems as semidefinite programs and solve them using an appropriate interior point method,
- and model discrete optimization problems as integer programs and solve them using cutting plane and branch-and-bound methods.

Evaluation of Students: Student will demonstrate their mastery of the course objectives on frequent graded homework assignments, midterm and final examinations.

Course Outline: The course is broken into three parts: Linear programming and simplex algorithm (7 weeks), semidefinite programming and interior point algorithms (4 weeks), and integer programming and cutting plane/branch-and-bound algorithms (4 weeks).

Textbook: *Introduction to Linear Optimization* by Dimitris Bertsimas and John N. Tsitsiklis.