

Math 346-002 Introduction to Optimization Theory, Fall 2019

Meeting time and location: MW 11:30a-12:45p in MSC W201

Instructor: Hao Huang
Office: MSC E432
Office hours: MW 10:30-11:30a, or by appointment.
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Textbook

P. Thie and G. Keough, *An Introduction to Linear Programming and Game Theory*, 3/e (ISBN 978-0-470-23286-6).

We will cover Chapters 1-7 and 9 of the textbook. Some of these chapters will be covered partially and some will be expanded.

Course Goal

The purpose of this one-semester-long course is to provide a fairly complete and rigorous treatment of the fundamental theory and the applications of linear optimization (programming) and various network problems, and hence it serves as a good first course in linear optimization for higher level undergraduates as well as for masters students in engineering, computer science or mathematics. The prerequisites for this course is Math 221 (Linear Algebra) or 321, and CS 150 or 170. This means good understanding of basic linear algebra notions like matrix, vector, linear independence, rank, inverse of matrix, solution of system of linear equations. For some of the applications mentioned in this class, backgrounds in graph theory, algorithms and basic calculus will be very helpful. But I will assume no knowledge of these.

Upon completion of this course, the students can expect to be able to formulate mathematical models as linear programming or network optimization problems, and apply these modeling techniques to solve problems in engineering, finance, operation research and economics. The course will cover the following contents: basic notions of linear programming, convex sets, the simplex method, duality theory, sensitivity analysis, integer programming, transportation problems and zero-sum games.

Grading Scheme

Grades will be assigned on the following basis: **20% homework, 20% for each midterm (40% in total), and 40% for the final exam.**

Curves will be applied if needed. Attendance has no direct effect on your grade. However from past experience, most students find regular attendance essential to performing well in the class.

Exams

- There will be three exams: two midterms and one final. The two midterms will be on Oct 9 and Nov 13 (tentative). Both of them are in the usual classroom for the class. The materials covered in the

midterms will be announced during the semester. The final exam will be on Tuesday, Dec 17 from 3:00pm to 5:30pm. **Both midterms and the final exam will be cumulative.** The final exam will cover all the topics from this course.

- The exams dates listed above are tentative and are subject to change. Students will be notified at least a week prior to any changes made.
- The in-class exams during the term are “required midterm examinations” so are subject to the rule described there. If you know that you will have to miss an exam in advance, due to illness or a university-sanctioned off-campus commitment, **you must contact the course instructor before the exam**, with a legitimately documented reason. In that case your grades will be re-weighted appropriately. Excuses such as travel for other personal reasons, non-Emory exams, etc., are not valid reasons for missing exams. Unexcused absences will be treated as 0’s.

Homeworks

There will be weekly homework assignments (except for the two weeks when you have midterms, so there are about 10 assignments in total), which counts towards 20% of your total score. The homework assignments and their due dates (**you may turn them in before or in the class on that day, but not after the class**) will be announced on the class webpage and by group emails. The graded homework will be returned to you about one week after they are turned in.

The homework assignments will be posted and updated on the class webpage, and announced in the classes or sent by emails. These assignments can be worked on in groups, however every student must write their own solution independently. ****Please note that no late homework will be accepted or credited.**** But the lowest homework score will be dropped.

Disruptions

Disruptions that interfere with other students’ ability to learn will not be tolerated. A student may be asked to leave the class or exam for disruptive behavior. **Please make sure that you turn off all cell phones and pagers before each class.**

Honor Code

All students must adhere to the provisions of the Honor Code. See the following:

<http://catalog.college.emory.edu/academic/policies-regulations/honor-code.html>

Accessibility

The Department of Mathematics at Emory supports equal access for students with disabilities. Any students needing special accommodations due to a disability should speak with someone in the Office of Disability Services and arrangements will be made.