IE 6661 Linear Optimization Fall 2026

Instructor information

Dr. Craig Tovey

Course information

IE 6661 provides a rigorous introduction to linear optimization, focusing on linear programming and elementary combinatorial algorithms and supporting data structures for optimal paths, spanning trees, and flow.

Prerequisites Familiarity with elementary linear algebra (matrices,bases, dimension, orthogonalization); ability to read and write mathematical proofs.

Course Outcomes Upon successful completion of this course, students should have:

- Mastery of fundamental theory of LP, including polyhedral representation, projection, extreme points, simplex method, separating hyperplane theorem, Farkas's Lemma, weak and strong duality theorems, dual simplex method, sensitivity analysis.
- Knowledge of elementary combinatorial algorithms and elementary supporting data structures for shortest paths, min spanning tree, and max flow.
- Mastery of the theory of the simplex method for min cost flows.
- Familiarity with duality in many of its guises, including LP formulations, shadow prices, reduced costs, Lagrangean functions, game theory, theorems of the alternative, representation, and separation.
- High level of ability to model problems with networks or as LPs, when possible, and to recognize when it is not possible.
- Mastery of fundamental modeling principles such as data/model separation, auxiliary variables, penalties, weights, convexity, and documentation.

Required Course Materials

Required textbook The *required* textbook for the class is *Linear Optimization and Duality, Craig A. Tovey, CRC Press 2021, ISBN 978-1-4398-874602 (hbk), ISBN 978-1-315-11721-8 (ebk)* The *recommended* supplementary textbook for the class is *Introduction to Linear Optimization, Arkadi Nemirovski, ISBN 978-9811278730, WSBC, 2024*

Grading Policy

Your course grade will be based upon two tests and a written report. The weights will be

Assignment type	Weight
Midterm:	$\frac{1}{3}$
Final Exam:	$\frac{1}{2}$
Written report	$\frac{1}{6}$

Thresholds for letter grade assignment are as follows.

Letter grade	Percentage range
A:	90% ≤ total grade ≤ 100%
B:	70%≤ total grade <90%
C	50%≤ total grade <70%
D	35%≤ total grade <50%
F	0%≤ total grade <35%

Homework There will be a homework assignment approximately every 1-2 weeks. Solutions will be posted approximately one week later. Homework is not to be turned in because grading homework ineluctably entails an excessive level of temptation in the current era of generative AI. You are responsible for checking your solutions for correctness. If you are not sure that your answer is correct, send me a snapshot or pdf of your answer, and show me what part of your answer you are not sure of. Warning: if you don't work on the problems before reading the solutions, you will sabotage yourself.

Tests/Exams In general, answers to test questions earn full marks if they are correct, earn half marks if they are incorrect but could be corrected in a straightforward way, and earn zero marks if they cannot so be corrected. A mark of $-\epsilon$ indicates an error you should be aware of, but not important enought to decrease your score.

Course policies

Academic Integrity Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct. The core idea of the honor code is that you may not represent work that is not your own as being yours, nor may you enable someone else to do so. If you cheat on a test, you will receive a score of zero.

Accommodations for Students with Disabilities If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter.

Student-Faculty Expectations Agreement At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations by faculty of students and vice-versa.

Collaboration, Group Work You are encouraged to study with fellow students. You may also discuss the project with other students. However, you must write your own report, and to be consistent with the honor code, you must acknowledge any contribution that is not your own work. In-class tests and exams are to be your own work. All in-class tests and exams will be closed book and notes.

Generative AI As stated previously, in accordance with the honor code you must acknowledge any contribution to your report that is not your own. Neither content nor writing produced by AI is your own work.