

**ISyE 6661**  
**Linear Optimization**  
**Fall 2020**  
**Syllabus**

## 1 Class Meetings:

- Lectures: Due to the pandemic, this course is going to be remote asynchronous, which means most of the lectures will be recorded by me and posted on canvas; with the exception of the first class which is going to be synchronous (will be recorded and posted). Here is the bluejeans link for the first class: <https://bluejeans.com/951205759>.

Each video will have a due date. Each student is required to watch all the lecture videos in full before the due date.

- Synchronous discussion sessions I: I will have one synchronous discussion session every week on Thursdays at 12:30pm-1:30pm EST (unless otherwise announced). These will also be recorded and posted on canvas. You are not required to attend these sessions although if you can, this is highly recommended.
- Synchronous discussion sessions II: If we need to have more synchronous discussion sessions (due to, for example, time zone of some students or any other reason) we will make arrangements for that as the semester goes on during a mutually agreeable time.

## 2 Instructors:

Santanu S. Dey

- email: [santanu.dey@isye.gatech.edu](mailto:santanu.dey@isye.gatech.edu) (Email is the best way to reach me. Please include “ISyE 6661” in the subject line)
- Office hours (on bluejeans): By appointment.

## 3 Teaching Assistant:

TBD.

## 4 Textbook:

- D. Bertsimas and J. N. Tsitsiklis, Introduction to Linear Optimization, Athena Scientific, 1997.
- A. Nemirovski, Lecture notes on Linear Optimization (<http://www2.isye.gatech.edu/nemirovs/>)

Additional references will be provided.

## 5 Learning Goals:

- Mastery of the theory of linear programming including polyhedral theory, theorems of alternatives, simplex algorithm, duality etc.
- Exposure to large-scale linear programming algorithms and network models.
- Exposure to Ellipsoid method, interior point methods.

## 6 Prerequisites:

Linear algebra (at the level of Math 2406). This is a PhD level class, you are expected to be thoroughly comfortable with undergraduate calculus and analysis, and basic proof techniques.

## 7 Topics:

- Introduction + Modeling LPs (Ch. 1): No. of Lectures 1-2
- Polyhedral Theory (Ch. 2): No. of Lectures 5-6
- Simplex Algorithm (Ch. 3): No. of Lectures 3-4
- Duality (Ch. 4): No. of Lectures 4-5
- Sensitivity Analysis (Ch. 5): No. of Lectures 1-2
- Large Scale Optimization (Ch. 6): No. of Lectures 3-4
- Complexity and Ellipsoid Method (Ch. 8): No. of Lectures 1-2
- Polarity, Equivalence of Optimization and Separation. No. of Lectures 1-2
- Interior Point Methods. (Ch. 9): No. of Lectures 1-2
- Networks (Ch. 7): No. of Lectures 1-2

Chapter numbers refer to those of the textbook: D. Bertsimas and J. N. Tsitsiklis, Introduction to Linear Optimization, Athena Scientific, 1997. The coverage of the last 3-4 topics will depend on the available time.

Note that a lecture may be divided into a number of small asynchronous videos.

## 8 Grading:

- Final course grade will be based on homework assignments (30%), one mid-term exam (30%), and a final exam (40%).
- Midterm Exam (30%): The mid-term exam will be take home.
- Final Exam (40%): The final exam will be take home. The exam will be comprehensive.
- Homework (30%): There will be 5-8 homework assignments - each assignment will be composed of several problems (including possibly computational exercises). A subset of the problems will be graded.

## 9 ACADEMIC HONOR CODE:

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. Please see Student-Faculty Expectations developed jointly by the SGA and faculty:

<http://www.catalog.gatech.edu/rules/22/>

All course participants (myself, the teaching assistant, and students) are expected and required to abide by the letter and the spirit of the Georgia Tech honor code (<http://policylibrary.gatech.edu/student-affairs/academic-honor-code>). It is your responsibility to familiarize yourself with the Georgia Tech Honor Code. Any case of academic dishonesty will be reported to the Dean of Students. If there is any way in which I can help you in complying with the honor code, please do not hesitate to ask.