EEOR E4650: Convex Optimization for Electrical Engineering

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Logistics & organization

• Basics

• Online format

• Meet the TAs

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• Responsible learning

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Basics

instructor: James Anderson

class: Tuesday & Thursday, 10:10-11:25am, live on Zoom

recitations: every 2 weeks (approximately)

website: http://www.columbia.edu/~ja3451/courses/e4650.html

contact

- james.anderson@columbia.edu (subject line: E4650 [help!])
- TAs – details later
- Piazza – access through Courseworks

virtual office hours

- James – TBD
- TAs – Han: TBD
Online format

classes
- streamed live via Zoom
- recorded and posted to Courseworks – usually with an $x$-hour delay
- where possible you should watch the live stream

recitations
- typically led by a TA
- we’ll aim for one every two weeks or as needed
- first recitation will be an intro to \LaTeX

online discussion
- email is one-to-one and incredibly inefficient
- please post questions to Piazza before emailing an instructor
Meet the TAs

Han Wang

contact: hw2786@columbia.edu

office hours: Friday 2-4pm (to be confirmed)

about: likes going to the gym and shopping

research: optimization, learning, and control
Assessment

grading: homework 35%, midterm exam 15%, final exam 50%

midterm exam
  • 75-minute closed-book, “in-class” exam
  • scheduled for Oct 22

final exam
  • 24-hour take-home, “open-notes” exam
  • mixture of coding and written problems
  • scheduled for Dec 17 (to be confirmed)

students not in the New York time zone should let the instructors know as soon as possible
Assessment: Homework

35% of total grade, questions graded on the scale \{0, 1, 2, 3\}

- on average, 1 homework per week, to be submitted via Courseworks
- posted before class on Tuesday, due in by 6pm the following Friday
- late homework is **not accepted**, however...
  - you have 5 “late days” to use at your discretion
  - you do not need to inform us you are using a late day
- lowest-scoring homework will be dropped
- some problems require basic coding
  - more than 30 lines of code \(\Rightarrow\) you’ve gone wrong somewhere!
- graduate students **must** typeset homework solutions with \LaTeX
  - template the Courseworks Files folder
- collaboration with other students is encouraged, but submitted solutions must be your own
Software

all software is freely available

CVX* is a modeling system for convex optimization problems
  • MATLAB (CVX), Python (CVXpy), R (CVXR), Julia (convex.jl)
  • Python, R, and Julia are all free
  • MATLAB with a student license is also free from https://www.ee.columbia.edu/ee-matlab
  • MATLAB with CVX can be accessed remotely on cadpc42.ee.columbia.edu
  • won’t be needed until homework 3

Typesetting with \LaTeX
  • available for installation on Windows, Mac OS, and Linux
  • online \LaTeX editor, free with a .edu email address https://www.overleaf.com
Take responsibility for your learning

just “attending” classes **unprepared** will make this a **very difficult** course

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**reading**

- each topic covered is based on a chapter of Boyd & Vandenberghe
- one topic \( \approx \) one week = two classes + \( \frac{1}{2} \) recitation + one homework
- aim to read a chapter a week
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homework

- questions from Boyd & Vandenberghe and coding exercises
- may cover material we skimmed in class
- start early, read before class
Take responsibility for your learning

just “attending” classes unprepared will make this a very difficult course

resources

- instructor/ta, office hours, recitations
- Piazza discussions (including non-work related)
- each other
Things to do

immediately
  • download Boyd & Vandenberghe
  • read chapter 1
  • make sure you’re enrolled on Courseworks and Piazza

by the end of this week
  • install a \LaTeX{} distribution or create an Overleaf account
  • read the short style guide in Files/Style\_guide on Courseworks

by the end of next week
  • install CVX* on the platform of your choice

more detailed instructions and additional sources of information available
http://www.columbia.edu/~ja3451/courses/software.pdf
Course overview

theory
- convex sets & functions
- convex optimization problems
- duality

applications I
- approximation & fitting
- statistical estimation

algorithms
- constrained & unconstrained optimization
- interior point methods

applications II
- optimal control