EEOR E4650: Convex Optimization for Electrical Engineering

James Anderson

Columbia University

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Logistics & organization

- Basics
- Online format
- Meet the TAs
- Assessment
- Software
- Responsible learning
- Things to do

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

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

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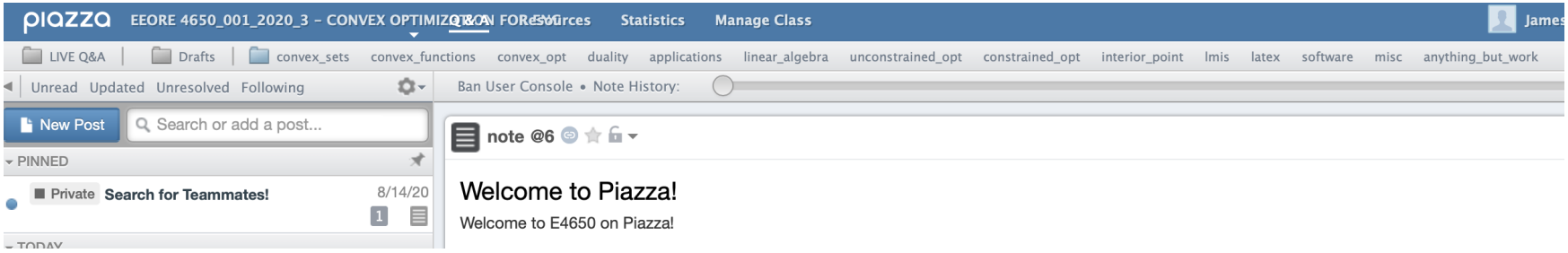

resources

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

Things to do

immediately

- download Boyd & Vandenberghe
  https://web.stanford.edu/~boyd/cvxbook/bv_cvxbook.pdf
- 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