EE 588 Course Syllabus – Fall 2024
Optimization for the Information and Data Sciences

Basic information

- EE 550, Spring 2024
- Lecture: Mon/Wed 3:30-5:20pm (THH 102)
- Units: 4
- Pre-req: EE 510
- Recommended preparation: EE 503

Blackboard website

Course materials and zoom links for lectures and discussions are available on the Blackboard website for the class. Homeworks will also be turned in on the Blackboard website. Find Blackboard at the following link:

https://blackboard.usc.edu/

Instructor

Michael J. Neely (EEB 520)
mikejneely@gmail.com (please put "EE 588" in subject)
Office hours: Mon/Wed 2-3pm

Teaching assistant

Kamiar Asgari
kamiaras@usc.edu (please put "EE 588" in subject)
Office hours: TBA

Piazza

Please sign up for the Piazza discussion page here:
https://piazza.com/usc/fall2024/ee588

Rather than sending questions by email, you are highly encouraged to post them on Piazza. The post can even be anonymous. Response time will be much better.

Textbook

Convex Optimization by Boyd and Vendenberghe.
Available for free download on:
https://stanford.edu/~boyd/cvxbook/

Supplemental notes

- "Optimization over $\mathbb{R}$" (for week 1)
  https://ee.usc.edu/stochastic-nets/docs/optimization-over-R.pdf

Grading:

Homework 30%, Midterm 35%, Final 35%. Class participation may factor into the homework score. Thresholds:

- $[85, 100]$: A
- $[70, 85)$: B, B+, A-
- $[50, 70)$: C, C+, B-

The above thresholds may be adjusted at the end of the semester at the discretion of the instructor. Any such adjustments will be in favor of a higher letter grade.

Important dates (locations to be announced later):

- First day of classes: Monday Aug. 26, 2024
- Labor day (no class): Monday Sept. 2, 2024
- Fall recess (no class): Thursday-Friday, Oct. 10-11, 2024
- Veterans day (no class): Monday Nov. 11
- Thanksgiving (no class): Wednesday-Friday Nov 27-Dec 1
- Last day of class: Friday Dec. 6
- **Midterm exam:** Wednesday Oct. 9, 2024 (3:30-5:30pm, location TBA)
- **Final exam:** Monday Dec. 16, 2-4pm (3:30-5:30, location TBA)

I. Tentative course outline

- Intervals; open and closed subsets of $\mathbb{R}$; $\inf A$; $\sup A$ (week 1 notes)
- Minimizing Lipschitz continuous functions $f : \mathbb{R} \to \mathbb{R}$ (week 1 notes)
- Minimizing convex functions $f : \mathbb{R} \to \mathbb{R}$; bisection for $f'(x) = 0$ (week 1 notes)
- Preview of gradient descent and Newton's method (week 1 notes)
- Convex sets; cones; separating hyperplanes (Ch. 2)
- Operations that preserve convexity (Ch. 2)
- Convex functions; operations that preserve convexity; log-concave and log-convex; quasiconvex (Ch. 3)
- Convex programs; linear programs; applications (Ch. 4 and 6)
- Least squares (Ch. 6)
- Statistical estimation (Ch. 7)
- Geometric programming (Ch. 4)
- Gradients and subgradient algorithms for unconstrained minimization (Ch. 9)
- Smooth, nonsmooth, strongly convex
- Interior point methods (Ch. 11)
- Lagrange multipliers, constrained minimizaiton (Ch. 5)
- Using CVX to solve convex optimization problems

A. Assignment submission policy

- Scan and upload your work into the blackboard system by 9pm of the due date.

B. Academic Conduct

Plagiarism (presenting someone else's ideas as your own, either verbatim or recast in your own words) is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, "Behavior Violating University Standards" https://policy.usc.edu/scampus-part-b/. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

C. Support Systems

- Student Counseling Services (SCS) – (213) 740-7711 ? 24/7 on call Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. https://engemannshc.usc.edu/counseling/
- National Suicide Prevention Lifeline – 1-800-273-8255 Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. http://www.suicidepreventionlifeline.org
- Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 - 24/7 on call Free and confidential therapy services, workshops, and training for situations related to gender-based harm. https://engemannshc.usc.edu/rsvp/
- Sexual Assault Resource Center For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: http://sarc.usc.edu/
- Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086 Works with faculty, staff, visitors, applicants, and students around issues of protected class. https://equity.usc.edu/
- Bias Assessment Response and Support Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response.

https://studentaffairs.usc.edu/bias-assessment-response-support/

- The Office of Disability Services and Programs Provides certification for students with disabilities and helps arrange relevant accommodations.
  http://dsp.usc.edu
- Student Support and Advocacy – (213) 821-4710 Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic.
  https://studentaffairs.usc.edu/ssa/
- Diversity at USC Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students.
  https://diversity.usc.edu/
- USC Emergency Information Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible,
  http://emergency.usc.edu
- USC Department of Public Safety – 213-740-4321 (UPC) and 323-442-1000 (HSC) for 24-hour emergency assistance or to report a crime. Provides overall safety to USC community.
  http://dps.usc.edu