CSED700H: Convex Optimization

Logistics

Namhoon Lee

POSTECH

Fall 2023

Registration

Current

▶ 32 students registered so far (as of Sep 1)

Update

- register/drop by 13 September
- withdraw between Sep 25 and Nov 3

Other note

- ▶ I can't take more than the current capacity.
- You can audit the course.

Team

Instructor:

- ► Namhoon Lee (namhoonlee@postech.ac.kr)
 - Assistant Professor in CSE and AI
 - ► PI of the Lee Optimization Group
 - Faculty member in the ML Lab
 - Visiting Researcher at Google

Teaching assistant (TA):

► Jinhwan Nam (njh18@postech.ac.kr)

Class assistant (CA):

- vacant and needs to be filled
- send me an email to volunteer

Contents

first half

- 1. Introduction
- 2. Convex sets
- 3. Convex functions
- 4. Convex optimization problems
- 5. Duality
- 6. Gradient methods
- 7. Proximal gradient methods

second half

- 8. Accelerated gradient methods
- 9. Second-order methods
- 10. Stochastic optimization
- 11. Dual-based optimization
- 12. Constrained optimization
- 13. Large-scale optimization
- 14. Nonconvex optimization

Important dates

No class on holidays

- ► Sep 28, Oct 3
- ► Supplementary study materials will be provided as backup.

Exams

Oct 24 (midterm), Dec 19 (final)

No class on exam weeks

▶ Oct 26. Dec 21

The schedule is subject to change.

Course websites

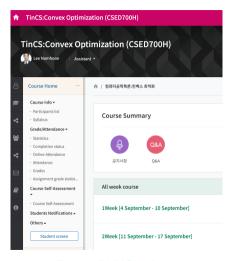


Figure: PLMS website

Convex Optimization

The primary goal of this course is to provide ideas and analysis for convex optimization problems that arise frequently in many scientific and engineering discipline. This includes first-order methods for both unconstrained and constrained optimization problems, duality theory and dual-based methods, and possibly some modern methods for juncy-scale notimization problems. The cruses also includes assistenances on a thorough our methods for juncy-scale notimization problems. The cruses also includes assistenances on a thorough our contractions.

General

Code CSED700H or AIGS700H

Audience PG and UG students at POSTECH

Meet

Lectures Tuesdays and Thursdays 9:30-10:45am (Room 102 in Eng bldg II)
Office hours Wednesdays 5-6pm (by appointment)
Online PLMS

Staff

Instructor Namhoon Lee (namhoonlee@postech.ac.kr)

TA Jinhwan Nam (njh18@postech.ac.kr)

Lectures

- 1 Introduction 2 Convex sets
- 3 Convex functions
 4 Convex ontimization problems
- 4 Convex op 5 Duality
- Gradient methods
- Proximal gradient methods Accelerated gradient methods
- 9 Second-order methods 10 Stochastic optimization
- 11 Dual-based optimization 12 Constrained optimization
- 13 Large-scale optimization
- Large-scale optimization
 Nonconvex optimization

Figure: CVXOPT website

Lectures

- ► Tuesdays and Thursdays from 9:30am to 10:45am
 - ▶ You're required to attend at least 75% of lectures to receive credits by the University.
 - ► Make sure your attendance is recorded well on the online student attendance management system.
 - Also, we will have pop quizzes; no show will mean no marks.

Office hours

when

► Wednesdays between 5-6pm (by appointment)

where

▶ in my office or via online

what

▶ course materials, research problems, general advising

Communication

Method	For
Lecture PLMS Office hours Email CVXOPT	course delivery, live discussion announcement, peer-discussion, assignments general Q&A, advising other inquiries reference

We will be speaking in English at all time.

Grading

(NEW) Grading scheme:

Quizzes	Assignments	Midterm exam	Final exam	Total
10	30	30	30	100

- ▶ Letter grading only (A, B, C, with +/0/-, or F)
 - ▶ Relative evaluation; percentages to be decided based on the final distribution
 - ► No S/U grading available for this course; talk to the department admin to switch to letter grading
- ► Grading will be generous ②, but
 - ▶ no soliciting please (e.g., "This is my last semester", "I need to graduate", ...).

Grading – Quizzes

Total scores: 10 (out of 100)

- ▶ It will take place during lecture without notice.
- ▶ If you miss it by any chance (as you are late or absent), you will receive 0 score.

Grading – Assignments

Total scores: 30 (out of 100)

- lt will include theory exercises, programming algorithms, reading papers, etc.
- ► Late submissions will not be received.
 - Exception can be made only for legitimate reasons; still your score will be deducted 20% delay penalty for each day.

Grading – Midterm exam

Total scores: 30 (out of 100)

- Date: Tuesday 24 October
- ► Location: Room 102 in Eng Bldg2.
 - ▶ If you don't turn up, expect to receive 0 score.
- ▶ Based on all the stuff delivered during classes till then.

Grading – Final exam

Total scores: 30 (out of 100)

- Date: Tuesday 19 December
- ► Location: Room 102 in Eng Bldg2.
 - ▶ If you don't turn up, expect to receive 0 score.
- ▶ Based on all the stuff delivered during classes till then.

Academic integrity

If you get caught cheating, you will

- have to leave the course effective immediately, and
- be reported to the department for further regulations.

You must follow rules by

- ► POSTECH regulations (S01-6-2)
- ► Any standard rules from other places (e.g., Oxford, CMU)

Please don't cheat.

Remarks

This course assume you have some basic knowledge in math.

▶ Brush up your rusty math if you haven't used them for long!

This course may be moving quite quickly.

▶ Make sure you review course materials on due course!

You may learn a lot by interacting with classmates.

Engage in the peer discussion on PLMS!

Hope you enjoy taking this course ©