

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

TinCS:Convex Optimization (CSED700H)

Lee Namhoon Assistant

Course Home / 컴퓨터공학특론:컨벡스 최적화

Course Info

- Participants list
- Syllabus

Grade/Attendance

- Statistics
- Completion status
- Online-Attendance
- Attendance
- Grades
- Assignment grade statist...

Course Self-Assessment

- Course Self-Assessment

Students Notifications

Others

Student screen

Course Summary

공지사항 Q&A

All week course

1Week [4 September - 10 September]

2Week [11 September - 17 September]

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 disciplines. This includes first-order methods for both unconstrained and constrained optimization problems, duality theory and dual-based methods, and possibly some modern methods for large-scale optimization problems. The course also includes assignments on theory and exercises.

### General

**Code** CSED700H or AIGS700H

**Term** Fall 2023

**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](mailto:namhoonlee@postech.ac.kr))

**TA** Jinhwan Nam ([njh18@postech.ac.kr](mailto:njh18@postech.ac.kr))

### Lectures

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

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

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

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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 😊, 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)

- ▶ It 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 😊