

2102732 Convex Optimization and Engineering Applications

Semester: 2/2014

Schedule: Mon Wed 11 am-12:30 pm

Classroom: EE 404

Exams: Midterm: Feb 27, 9 am - 12 pm (tentatively)

Instructors: Jitkomut Songsiri

jitkomut.s@chula.ac.th

Office: EE410

Course web: <http://jitkomut.eng.chula.ac.th/ee732.html>

Course Description: Convex sets, functions, and optimization problems; basics of convex analysis; optimality conditions, duality theory; linear and quadratic programs, semidefinite programming, geometric problems; unconstrained minimization, equality constrained minimization; interior-point methods; applications to control systems and other engineering topics.

Course Objectives:

1. To explain convex sets, convex functions, and formulate convex problems.
2. To derive the dual and optimality (KKT) conditions for a convex problem.
3. To determine the type of convex problems; linear, quadratic, semidefinite, geometric programs.
4. To determine and explain unconstrained and equality constrained minimization problems.
5. To analyze convex optimization problems in engineering.
6. To numerically solve convex programs using interior-point methods.

Assessment: Weekly Homework 40 % Midterm 35 % Final 15 % Term paper 10 %

Textbooks:

1. S. Boyd and L. Vandenberghe, *Convex Optimization*, Oxford, 2004.

Course Calendar:

Weeks	Dates	Contents
1	Jan 4	Introduction
2	Jan 9,11	Convex sets
3	Jan 16-20	No class
4	Jan 23,25	Convex functions
5	Jan 30, Feb 1	Duality theory
6	Feb 6,8	Duality theory
7	Feb 13, 15	Approximation and fitting
8	Feb 20,22	Statistical estimation
9	Feb 27	Midterm 9 am -12 pm
10	Mar 6, 8	Geometric problems
11	Mar 13 Mar 15	Geometric problems no class (Chula exhibition)
12	Mar 20, 22	Numerical linear algebra background
13	Mar 27, 29	Unconstrained minimization
14	Apr 3,5	Unconstrained minimization
15	Apr 10,12	Equality minimization
16	Apr 17,19	Equality minimization Interior-point methods
17	Apr 24,26	Interior-point methods
18	May 1,3	Term-project presentation
19	May 8-12	Final exam (9 AM - 12 PM)

Class policies:

1. Any student who is late more than 20 minutes will NOT be permitted to the classroom and will be considered absent from the class unless he/she can provide a reasonable explanation. Remember that when any student comes to class late, it can interrupt the flow of the lecture or distract other students.
2. Please refrain from using cellphones (include texting) and talking in class. These activities obviously are distractions to the classroom. Cellphones should be switched to the vibration mode.
3. Students must hand in homework during the first 15 minutes of the class (11-11:15 AM) on the due date, unless it is stated otherwise. Late homework is NOT accepted in any case.
4. By default homework is an individual activity. Certainly you can form a study group and share ideas with classmates but you MUST write up the solution yourself independently. If a set of copied homework is detected, all parties will be given ZERO for that homework without any investigation. You can declare a collaboration with classmates by writing all the collaborator names on the work sheet.
5. Students must keep all graded homework and exam papers until the letter grades are announced.
6. As a general rule, your grade is NOT negotiable, especially once the final exam is over. Do NOT attempt to negotiate with the instructors because you will definitely get NO for answer. Instead, if you feel you are behind the class, you should come to office hours during the entire semester.