Syllabus

ELEC-E5422: Convex Optimization I (5 cr.)

09.09 - 23.10.2019   every Wed. & Thur.

Wed. 9:15am - 11:00am: Zoom   Thur. at 12:15 - 2:00pm: Zoom

ELEC-E5422: Convex Optimization II (5 cr.)

Self-Reading

Textbook and Optional References

- Stephen Boyd; Lieven Vandenberghe, *Convex Optimization* (**Textbook!**)
- Ben-Tal and A. Nemirovski, *Lectures on Modern Convex Optimization: Analysis, Algorithms, and Engineering Applications*
- Y. Nesterov, *Introductory Lectures on Convex Optimization: A Basic Course*
- J. Gallier and J. Quaintance, *Algebra, Topology, Differential Calculus, and Optimization Theory For Computer Science and Engineering*

Course Requirements and Grading

Requirements:

- 4 homework assignments (2+2 by the course portions). Homework will normally be assigned on Wendsday and will be due in 2 weeks.
- Exam. The format will be decided depending on the sitation.

Grading: Homeworks: 60%. Exam: 40%. These weights are approximate. We reserve the right to change them later. Can be also discussed with you.

Catalog Description

Concentrates on recognizing and solving (using standard packages) convex optimization problems that arise in practice!

- Convex sets, functions, and optimization problems.
- Least-squares, linear and quadratic programs.
- Semidefinite programming (SDP).
- Minimax, extremal volume, and other problems with geometric interpretation.
- Optimality conditions, duality theory, theorems of alternative.
- Introduction to unconstrained optimization algorithms.
- Introduction to interior-point methods for constrained optimization.
- Applications.

Course Objectives

- to give the tools and training to recognize convex optimization problems that arise in electrical and computer engineering
- to present the basic theory of such problems, concentrating on results that are useful in computation
- to give a thorough understanding of how such problems are solved, and some experience in solving them
- to give the background required to use the standard methods and software packages in their own research work
- to give a number of examples of successful application of convex optimization techniques for solving problem in applied mathematics, computer science, statistics, electrical engineering, and science in general