FSF3847 Convex Optimization with Engineering Applications 6.0 credits

Konvex optimering med ingenjörstillämpningar

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for FSF3847 valid from Spring 2019

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

The course requires basic knowledge of calculus and linear algebra.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After completed course, the student should be able to

- characterize fundamental aspects of convex optimization (convex functions, convex sets, convex optimization and duality);
- characterize and formulate linear, quadratic, geometric and semidefinite programming problems;
- implement, in a high level language such as Matlab, crude versions of modern methods for solving convex optimization problems, e.g., interior methods;
- solve large-scale structured problems by decomposition techniques;
- give examples of applications of convex optimization within statistics, communications, signal processing and control.

Course contents

- Convex sets
- Convex functions
- Convex optimization
- Linear and quadratic programming
- Geometric and semidefinite programming
- Duality
- Smooth unconstrained minimization
- Sequential unconstrained minimization
- Interior-point methods
- Decomposition and large-scale optimization
- Applications in estimation, data fitting, control and communications

Course literature

S. Boyd och L. Vandenberghe, Convex Optimization, Cambridge University Press, 2004, ISBN: 0521833787

Examination

- INL1 - Assignment, 6.0 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Other requirements for final grade

Successful completion of homework assignments and the presentation of a short lecture on a special topic.

There will be a total of four sets of homework assignments distributed during the course. Late homework solutions are not accepted.

The short lecture should sum up the key ideas, techniques and results of a (course-related) research paper in a clear and understandable way to the other attendees.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.