# FSH3217 Convex Optimization within Medical Imaging 7.5 credits

## Konvex optimering inom medicinsk avbildning

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 FSH3217 valid from Spring 2019

## Grading scale

P, F

## Education cycle

Third cycle

## Specific prerequisites

Enrolled as PhD student.

## Language of instruction

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

# Intended learning outcomes

After completing the course, the PhD students should:

- have tools and training to recognize convex optimization problems that rise in applications
- be able to present the basic theory of such problems, concentrating on results that are useful in computation
- have a thorough understanding of how such problems are solved, and some experience in solving them
- have the background required to use the methods in their own research work or applications.

# Course contents

Grundläggande teori för konvex optimering och praktisk träning hur man löser problem relaterade till konvex optimering så att man kan tillämpa på problem inom den egna forskningen.

# Disposition

Web-based, supplemented by oral and written presentation in which the course is applied to problems in their own research.

- Weekly course videos. Every week we will asign a number of videos you are expected to watch at your own pace throughout the week. Video topics are correlated  with the textbook.
- Weekly readings. The material presented in the videos you will watch is also covered in the textbook. Each week we will assign the corresponding chapter or sections.
- Video quizzes. After each video you will be asked a number of quiz questions on the topics you have just covered. Most of these questions are there to help you understand the basics. Some will be very straightforward while others may be a little more involved. Each answer is worth one point, and you can attempt each of them twice. Quizzes contribute 10% of the final score.
- Homework assignments. You will be given a total of eight homework assignments, each consisting of about six problems. Just as quiz questions, many of the problems will be multiple choice. Beware, as they require much deeper analysis and better understanding of the material. To solve other problem types you will need to write short MATLAB scripts and use the CVX toolbox. Mathworks has kindly agreed to distribute a free licence for all students enrolled in this class. Each homework answer is worth 10 points, and you can attempt every problem twice. Homeworks contribute 90% of the final score.
- Oral and written presentation of the solution of a relevant optimization problem related to your own research.

# Course literature

Convex Optimization by Stephen Boyd and Lieven Vandenberghe, Cambridge University Press

Video lectures:
https://class.stanford.edu/courses/Engineering/CVX101/Winter2014/f0e5ca452f9a437c83af75626d196df0/

# Examination

- PRO1 - Project, 4.5 credits, grading scale: P, F

- SEM1 - Seminars, 3.0 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.

Oral and written presentation of the solution of a relevant optimization problem related to your own research, 7,5 hp, Grading: P/F

# Other requirements for final grade

Approval of oral and written presentation of problem assignment.

# 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.