



FEL3320 Applied Estimation 7.5 credits

Tillämpad estimering

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

Establishment

Course syllabus for FEL3320 valid from Autumn 2010

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

Language of instruction

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

Intended learning outcomes

The overall goal of the course is to give the participants theoretical as well as practical skills and experience in estimation. The course will start from a number of concrete examples to motivate the need for various filtering techniques such as Kalman filters and particle filters. After completing the course the participants should:

- be able to analyse estimation problems and choose suitable techniques to solve them
- understand the theoretical basis for the estimation techniques
- use different estimation techniques such as Kalman filters and particle filters to solve real world problems

Course contents

The course focuses on giving the participants practical experience in using different estimation techniques on real problems. Examples used in the course are for example from navigation with mobile robots. The following will be covered in the course: Recursive estimation, observability, the Markov assumption, data association, estimation techniques such as Kalman filter, extended Kalman filter, particle filter, Rao-Blackwellized particle filter, Unscented Kalman Filter, Covariance Intersection.

Disposition

There are 12 lectures and two projects in the course.

During the lectures both theory and practice of estimation will be covered. Getting practical skills in anything requires you to get hands-on experience and as such the work between the lectures will be very important.

The project part of the course start with two simpler, more lab like assignments, where the basics of the Extended Kalman Filter and the Particle Filter are dealt with. The student then need to select a theme for further the final project work and conduct a more in depth, research like project to show that he/she is able to apply the knowledge acquired in the course and complement it with information found in additional research literature. Ideally the result of this project course can be submitted for publication.

Course literature

There is no official course book. Letcures notes will be made available and some complementary material will be in the form of reseach publication. The students are assumed able to research for additional material to solve the project assignment.

The recommended reading is "Probabilistic robotics" by Thrun, Burgard and Fox, The MIT Press, ISBN 0-262-20162-3 covers most of the material in the course from a robotics points of view.

Equipment

No special equipment needed, you only need access to a computer

Examination

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.

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

There is an exam in the course which is aimed at testing the theoretical and general knowledge. The examination of the practical skills are tested in the project assignments.

Other requirements for final grade

To pass the course the student need to pass the exam with at least a 80% score (the exam is joint with EL2320) and complete the project assignments.

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.