



EL2700 Model Predictive Control 7.5 credits

Modell-prediktiv reglering

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

Establishment

On 04/21/2020, the Head of the EECS School has decided to establish this official course syllabus to apply from autumn semester 2020, registration number: J-2020-0537.

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

Automatic Control, general course or permission from the examiner

Language of instruction

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

Intended learning outcomes

After passing the course, the student should be able to

- formulate theory and definitions of important concepts in model predictive control.
- apply theory and methods in model predictive control.

Course contents

The course gives a thorough treatment of theory and application of model predictive control. In particular, the following is treated

- analysis of properties of linear systems in discrete time
- use of linear and quadratic programming to determine open loop control of linear systems in discrete time
- use of dynamic programming to determine optimal observers and linear control systems that minimise quadratic objective functions in the control input and the system states (LQG control)
- the idea behind receding-horizon control and how model predictive control (MPC) expands on LQG to handle hard limitations on control inputs and system states
- design of MPC controllers for technical systems and how different design parameters should be chosen to satisfy the performance requirements that are set on the closed system
- stability properties of MPC controllers
- implementation of MPC controllers either as an explicit non-linear control system (that is determined off-line) or through real time optimization in each sample.

Examination

- TEN1 - Exam, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB3 - Lab 3, 1.5 credits, grading scale: P, F
- LAB2 - Lab 2, 1.5 credits, grading scale: P, F
- LAB1 - Lab 1, 1.5 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.

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

Other requirements for final grade

LAB1 1.5p Lab 1 Grading scale P/F

LAB2 1.5p Lab 2 Grading scale P/F

LAB3 1.5p Lab 3 Grading scale P/F

TEN1 3p Written examination. Grading scale A-B-C-D-E-Fx-F

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.