EL1020 Automatic Control, general course 6.0 credits

Reglerteknik, allmän kurs

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

Establishment

The official course syllabus is valid from the autumn semester 2022 in accordance with head of school decision: J-2021-1442.Decision date: 15/10/2021

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Knowledge in differential equations and transform methods, 6 higher education credits, equivalent completed course EQ1110 or SF1633.

Active participation in a course offering where the final examination is not yet reported in LADOK is considered equivalent to completion of the course. Registering for a course is counted as active participation. The term 'final examination' encompasses both the regular examination and the first re-examination.

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 shall be able to

- formulate basic theory and definitions of important concepts in general automatic control
- apply analysis and design methods in general automatic control.

Course contents

The course covers how feedback influences properties of dynamic system such as stability, speed of response, sensitivity and robustness. The course contains analysis and design of feedback systems with regard to these properties. In particular, the following is studied

- basic concepts and problems: application examples of automatic control, representation of dynamic systems, input and output signals, differential equation models, transforms, transfer functions, block diagrams, impulse response, step response, poles, zeros and linearisation
- analysis of feedback systems: stability, root locus, the Nyquist criterion, Nyquist and Bode diagrams, precision, speed of response, sensitivity and robustness
- design of control systems with one input signal and one output signal: specifications, PID-controllers, compensation in the frequency domain, feed-forward control, time delays, state feedback, observers and pole placement
- implementation: choice of sampling time, anti alias filters and discretisation of controllers
- control terminology in Swedish and English.

Examination

- LAB1 - Laboratory work, 0.5 credits, grading scale: P, F
- LAB2 - Laboratory work, 1.5 credits, grading scale: P, F
- LAB3 - Laboratory work, 2.0 credits, grading scale: P, F
- TEN1 - Written exam, 2.0 credits, grading scale: A, B, C, D, E, FX, 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.

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.