EL1000 Automatic Control, General Course 6.0 credits

Reglerteknik, allmän kurs

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

Establishment

Course syllabus for EL1000 valid from Autumn 2007

Grading scale

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

Education cycle

First cycle

Main field of study

Electrical Engineering, Technology

Specific prerequisites

Basic eligibility

Language of instruction

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

Intended learning outcomes

After the course the student should be able to describe and explain how feedback mechanisms affect system properties such as stability, speed of response, precision, sensitivity and robustness. Furthermore, the student should be able to analyze and design feedback systems with respect to these properties.

In particular, after the course the student should be able to:

- Describe and explain basic concepts and problems within control theory, such as block diagrams, inputs and outputs, transfer functions, poles, zeros, impulse response, step response, frequency response, stability feedback control, and feed forward control.
- Based on a model in terms of nonlinear differential equations, derive linear system descriptions in the form of transfer functions, frequency responses and state space models.
- Analyze a linear system description with respect to dynamic properties, such as stability, damping, speed of response, precision, disturbance sensitivity, robustness.
- Analyze how a given feedback control law affects the above mentioned properties.
- Design a feedback control law that provides desired dynamic properties based on compensation in the frequency domain, pole placement and feedback from observed states.
- Give examples on applications of control systems in different technical areas.
- Use control terminology in Swedish and English.

Course contents

Fundamental concepts and problem areas. Representation of dynamic systems: Differential equation models. Transfer functions. Analysis of feedback control systems: Stability. Root-locus. Nyquist and Bode diagrams. Accuracy. Speed of response. Robustness and sensitivity. Synthesis of simple control systems: Specifications. PID-controllers. Lead-lag compensation. State space models. State feedback. Pole placement. Observers. Digitally implemented controllers.

Examination

- TEN1 - Examination, 4.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB3 - Computer Lesson, 1.0 credits, grading scale: P, F
- LAB2 - Laboratory Work 2, 0.5 credits, grading scale: P, F
- LAB1 - Laboratory Work 1, 0.5 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

TEN 4 cr, LAB1 0.5 cr, LAB2 0.5 cr, LAB3 1 cr

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.