HE1011 Control Systems 7.5 credits

Reglersystem

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 HE1011 valid from Spring 2014

Grading scale

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

Education cycle

First cycle

Main field of study

Electrical Engineering,Technology

Specific prerequisites

ML1000 Engineering Mathematics or equivalent

Language of instruction

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

Intended learning outcomes

The course should provide basic understanding how processes and control systems can be interpreted in terms of differential equations. The participants should obtain a feeling for which factors determine the properties of a control system, such as stability, response speed and accuracy. The course also aims to acclimate to control systems simulation software.

After finishing the course, the students should be able to

- Describe processes and control systems using differential equations.
- Create block diagrams based on differential equations describing the system.
- Calculate parameters indicating different properties of the system, such as stability, response speed and accuracy.
- Simulate the behaviour of a control system using available software.
- describethe principles fora variety of practicalcontrollers.
- Give account for various methods of optimising mentioned controllers and, with regards to PID and pole positioning controllers, be able to carry out calculations using the optimisation methods.

Course contents

- Applying linear differential equations on processes involving mechanics, electronics, thermodynamics and hydraulics.
- Laplace transforms and transfer functions.
- P, PI,PD and PID controllers
- Properties of analogue systems.
- Frequency analysis
- Simulation
- Dimensioning of analogue controllers
- Discrete-time controlling systems
- Z-transforms and transfer functions
- Pole placement controller
- Properties of discrete-time systems
- Dimensioning of discrete-time controllers
- Basic fuzzy control

Disposition

Lectures
Practical exercises

Course literature

Thomas, Bertil: Modern Reglerteknik, Liber
Thomas, Bertil: Modern Reglerteknik, Övningsbok, Liber

Examination

- LAB1 - Laboratory Work, 1.5 credits, grading scale: P, F
- TEN1 - Written examination, 6.0 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.

Other requirements for final grade

Passed written exam
Passed practical exercises
The final grade is based on the written examination, grading A-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.