EL1820 Modelling of Dynamical Systems 6.0 credits

Modellering av dynamiska system

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 EL1820 valid from Spring 2009

Grading scale

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

Education cycle

First cycle

Main field of study

Electrical Engineering,Technology

Specific prerequisites

Language of instruction

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

Intended learning outcomes

After completed course the student should be able to derive mathematical models for technical systems based on fundamental physical relations and based on measurement data.

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

- Derive mathematical models of technical systems based on fundamental physical relations.
- Employ bond graph and object- oriented based modelling tools to develop models of systems with subparts from different physical domains.
- Describe how differential-algebraic equations (DAEs) arise in modelling of technical systems, and determine the index of a given DAE model.
- Choose a proper numerical solver and its parameters for effective simulation of a given problem.
- Estimate impulse and frequency responses as well as transfer- functions for linear systems based on measured input and output data.
- Analyze the statistical properties of basic estimation methods, and explain the practical consequences of these results.
- Choose appropriate experimental conditions to collect data for system identification.
- Use the most common methods for model validation agains experimental data.

Course contents

Types of models, physics/ mechanics/ electronics- overview, model somplifications, bond graphs, object oriented modelling, disturbance and disturbance models, non- parametric identification, parameter estimation, system identification for modelling.

Simulation: numerical errors, computer simulation tools.

Course literature

Ljung, L. och Glad T. Modellbygge och simulering, Studentlitteratur, 1991.

Lindskog, Glad; Ljung, " Modellbygge och simulering övningsbok", Studentlitteratur, 1997.

Examination

- LAB1 - Laboratory Work, 0.5 credits, grading scale: P, F
- LAB2 - Laboratory Work, 0.5 credits, grading scale: P, F
- LAB3 - Laboratory Work, 0.5 credits, grading scale: P, F
- TEN1 - Examination, 4.5 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

TEN 4.5 hp, LAB1 0.5 hp, LAB2 0.5 hp, LAB3 0.5 hp

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.