KH1251 Electrical Measurements, Control Theory and Practice 6.0 credits

El-, mät- och reglerteknik

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 KH1251 valid from Autumn 2011

Grading scale

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

Education cycle

First cycle

Main field of study

Chemistry and Chemical Engineering,Technology

Specific prerequisites

Completed upper secondary education including documented proficiency in Swedish corresponding to Swedish B, and English corresponding to English A. For students who received/will receive their final school grades after 31 December 2009, there is an additional entry for mathematics as follows:

documented proficiency in mathematics corresponding to Mathematics A.
And the specific requirements of mathematics, physics and chemistry corresponding to Mathematics D, Physics B and Chemistry A.

Language of instruction

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

Intended learning outcomes

After this course the student should be able to

- make a DC or a AC analysis of a simple electric circuit.
- choose the size of an electrical machine with a timevarying load (torque).
- calculate the speed, torque, power, current and voltage in different parts of an electrical motordrive (consisting of mechanical load, electric machine and drive), at constant speed.
- estimate deviations in measurements due to the the influence of the instrument on the measurement object and due to the accuracy of the instrument..
- connect an electric circuit from a description or a diagram.
- connect common measurement instruments to a electric circuit and to make measurements with the instruments.
- experimentally determine the current-voltage charcteristic of an apparatus or component.
- view if electrical apparatus or components could be wired toghether.
- account for different elementary process models.
- experimentally tune the parameters of a PID controller.
- connect a sensor to a measurement card and write a LabWIEV program that presents the results in a time graph.

Course contents

Electrical circuits: DC, AC.

Electrical measurements: Measureing with multimeter (analog and digital) and oscilloscope. Use of LabVIEW

Analog cirquits for signalcondition of sensorsignals before ADC (analog to digital conversion). Examples of sensors for mussuaring of temperature, force and strain.

Electrical motordrives: Single- and three- phase systems. Theory and properties of DC machines and AC machines. Principles for speedcontrol of electrical machines.

Design of control circuits. On-Off control. PID regulator. Sensors, detectors and other measurement & control components. How computers are used to aid instrumentation, control and regulation.

Course literature

Elektroteknik, Inst för maskinkonstruktion, KTH

For control engineering section is recommended lecture notes or Hägglund T: Praktisk processreglering, Studentlitterarur, 2:a uppl. 1997.

Examination

- INL1 - Assignment, 1.5 credits, grading scale: P, F
- LAB1 - Laboratory Work, 1.5 credits, grading scale: P, F
- TEN1 - Written examination, 3.0 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 (TEN1; 3 cr.).
Passed lab sessions (LAB2; 1,5 cr.)
Passed assignments (INL1; 1,5 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.