FEK3230 Electrical Measurement Technology for PhD Students 8.0 credits

Elektrisk mätteknik för forskarstuderande

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

Establishment

Course syllabus for FEK3230 valid from Autumn 2012

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

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 the basics of electrical safety: hazards and safety measures,
- describe the basic concepts of measurement technology and metrology, especially how measurement units are defined and how tractability is achieved,
- understand, model and minimize common types of electrical noise and disturbances in a measurement setup,
- draw a block diagram for a multimeter and describe how it handles other quantities than DC voltage and how this influences the performance,
- draw a block diagram for the oscilloscope and describe the effects of bandwidth, sampling frequency, input impedance and uncertainty in the instrument,
- understand and use all working modes of a standard lab oscilloscope,
- describe how several different types of AD-converters work and how this influences their performance,
- describe the basic principles for spectrum analyzers and how the features of the analyzed signal show up in the time domain frequency domain results,
- describe the basics of modern sensor technology and how sensors based on resistivity piezoelectricity, capacitance and inductance are used,
- select and use appropriate sensor for a given measurement tasks,
- design computerized measurement systems using AD-cards and bus systems,
- be able to compute the standard uncertainty and confidence interval for a combined quantity based on uncertainty information of different kinds for the quantities that contribute to the combined quantity,
- apply the above knowledge and abilities in problem solving and measurement technology development projects.

Course contents

The course consists of self studies of the course literature (cf. below) and a supervised development project.

Disposition

Multimeters, oscilloscopes, AD-conversion, instrument control, LabView, EMC, sensors, frequency domain measurements, project work.

Course literature

Course literature for EK1190 but with a more full content coverage. Two alternatives are currently recommended

- Course compendiums for the course – lab theory booklets (in Swedish)
- Buchla, McLachlan, Applied Electronic Instrumentation and Measurement, Macmillan, ISBN 0675-21162-X, 1992. (in English)

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Equipment

None

Examination

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

Pass oral examination. Development project demonstrated.

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.