FEK3230 Elektrisk mätteknik för forskarstuderande 8,0 hp

Electrical Measurement Technology for PhD Students

Fastställande

Kursplan för FEK3230 gäller från och med HT12

Betygsskala

G

Utbildningsnivå

Forskarnivå

Särskild behörighet

Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

Lärandemål

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.

Kursinnehåll

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

Kursupplägg

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

Kurslitteratur

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)

Utrustning

Inga

Examination

Examinator beslutar, baserat på rekommendation från KTH:s handläggare av stöd till studenter med funktionsnedsättning, om eventuell anpassad examination för studenter med dokumenterad, varaktig funktionsnedsättning.

Examinator får medge annan examinationsform vid omexamination av enstaka studenter.

När kurs inte längre ges har student möjlighet att examineras under ytterligare två läsår.

Övriga krav för slutbetyg

Pass oral examination. Development project demonstrated.

Etiskt förhållningssätt

- Vid grupparbete har alla i gruppen ansvar för gruppens arbete.
- Vid examination ska varje student ärligt redovisa hjälp som erhållits och källor som använts.
- Vid muntlig examination ska varje student kunna redogöra för hela uppgiften och hela lösningen.