



# FEK3230 Elektrisk mätteknik för forskarstuderande 8,0 hp

Electrical Measurement Technology for PhD Students

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

## Fastställande

Kursplan för FEK3230 gäller från och med HT12

## Betygsskala

## 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.

## 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.