EK1191 Measurement Technology 6.0 credits

Mätteknik

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 EK1191 valid from Autumn 2015

Grading scale

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

Education cycle

First cycle

Main field of study

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 requirement for mathematics as follows: documented proficiency in mathematics corresponding to Mathematics A.

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 basic concepts of measurement technology and metrology, especially how measurement units are defined and how traceability is achieved,
- describe how electrical nose and disturbances are generated, propagated into the circuits, how this can be modelled and how the effects can be minimized,
- describe the design of oscilloskopes and multimeters, and understand their performance influences the result and applicability.
- describe how several different types of AD-converters work and how this influences their performance
- use oscilloscopes and multimeters to measure voltage, current and resistance both in the static and time-varying case,
- use resistive sensors for measurement of temperature and strain,
- describe the basics of modern sensor technology and how sensors based on piezoelectricity, capacitance and inductance are used,
- describe the most basic strategies for computerized measurement systems, like AD-cards and different bus systems,
- describe the basic principles for spectrum analyzers and how the features of the analyzed signal show up in the time domain results and the frequency desman results,
- 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,
- document and orally and in writing report experimental results,
- apply the above knowledge and abilities in problem solving and experimental work, both independently and when working in a group.

Course contents

- Basic concepts of measurements: units and standards, traceability, uncertainty calculations, documentation.
- Measurement of static and dynamic electrical quantities: introduction to digitalisation,aliasing, spectrum analysis. Applications with mulimeter and oscilloscope.
- Electromagnetic compatibility (EMC).
- The computer in the measurement system: hardware configurations, software, virtual instruments.
- Sensors: physical principles, common types, fabrication technologies, applications.

Disposition

Lectures 20 h

Lessons 10 h

Lab work 4 x 4 h = 16 h

Course literature

Kompendier som säljs på studerandeexpeditionen.

Compendia

Equipment

None

Examination

- LAB1 - Lab, 1.0 credits, grading scale: P, F
- LAB2 - Lab, 1.0 credits, grading scale: P, F
- LAB3 - Lab, 1.0 credits, grading scale: P, F
- LAB4 - Lab, 1.0 credits, grading scale: P, F
- TEN1 - Written Examination, 2.0 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.

- Several smaller tests during the course. The theoretical teaching in each subsection will be concluded with a web-based test or a short written test.
- Laboratory assignments.
- The written exam at the end of the course is strongly related to the labs and includes lab reporting based on notes from the Lab exercises.

Other requirements for final grade

Lab 1 including web-based test or short written test, P/F, 1 ECTS credit.

Lab 2 including web-based test or short written test, P/F, 1 ECTS credit.

Lab 3 including web-based test or short written test, P/F, 1 ECTS credit.

Lab 4 including web-based test or short written test, P/F, 1 ECTS credit.

Written exam, A, B, C, D, E, Fx, F, 2 ECTS credits.

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.