UNIVERSITY OF GOTHENBURG

PHYSICS

FYD130 Electrical Measurement Techniques, part 1, 7.5 higher education credits

Elektrisk Mätteknik del 1, 7,5 högskolepoäng

First Cycle

Confirmation

This course syllabus was confirmed by Department of Physics on 2010-04-27 to be valid from 2010-07-01.

Field of education: Science 100%
Department: Physics

Position in the educational system

Advanced course in the main subject physics.

Entry requirements

Prior knowledge the equivalent course FYD120 Electronics 2 and digital technology.

Learning outcomes

After having gone through the course Electric Measurements, part 1 the student should:

- know how disturbances connect to the system and how they be decoupled
- be familiar with simple signal and noise models
- be familiar with the concepts normal/common mode voltages and the concept of CMRR
- have knowledge of basic sensor technique and how one builds sensors for the most common physical units
- know how and why one use instrumentation amplifier and charge amplifier
- know how signal wires influence the signal and how and where to use probes
- be able to define concepts as bandwidth and sampling rate
- be familiar with different methods for AD conversion and how to dimension AD converters' parameters

Course content
The course consists of lectures and laboratory sessions.

The lectures include the following: How signals and noise are modelled in electric measurement systems, how disturbances are coupled to the system and how they can be decoupled, concepts as normal mode and common mode voltages, sensors and sensor technique (strain gauges, Wheatstone bridges, piezo crystals), how to measure physical units as acceleration pressure, flow, torque, viscosity, humidity temperature, light intensity etc. We go through instruments and charge amplifiers, cables' effect on measurement system, bandwidth, rise times and probes as well as AD converters.

The following seven laboratory sessions include:

1. Digital oscilloscopes, part 1
2. Digital oscilloscopes, part 2
3. Digital waveform generators
4. Digital desktop multimeters
5. Instrumentation amplifiers
6. AD converters
7. Data loggers

Form of teaching
To pass is required passed on laboratory part as well as approved written examination.

For students who have not passed at regular test and presentation session, an additional examination sessions are offered. Student who has failed two times in test for course, or part of course, has the right to request another examiner. The application is sent to the relevant department.

Language of instruction: Swedish

Assessment
Final course grade is received then all compulsory components passed.

Grades

The grading scale comprises: Fail (U), Pass (G), Pass with Distinction (VG).

Course evaluation

Course evaluation is carried out by students and teachers during the course as well as at the end of the course.