UNIVERSITY OF GOTHENBURG

PHYSICS

FYD101 Electronics 1: Electricity, 7.5 higher education credits

Elektronik 1: Ellära, 7,5 högskolepoäng

First Cycle

Confirmation

This course syllabus was confirmed by Department of Physics on 2014-10-14 to be valid from 2014-10-14, spring semester of 2015.

Field of education: Science 100%
Department: Physics

Position in the educational system

The course is given at first cycle level in the programme Computer-aided Physical Measurements and as a freestanding course at University of Gothenburg.

The course can be part of the following programme: 1) Computer Aided Measurements in Physics (N1DAF)

Main field of studies	*Specialization*
Physics	G1N, First Cycle, has only upper-secondary level entry requirements

Entry requirements

General entrance requirements for university studies and the Swedish upper secondary courses Physics B, Mathematics D or Physics 2, Mathematics 3c or equivalent.

Learning outcomes

Knowledge and understanding
On completion of the course, the student should be able to

solve DC and AC networks
calculate and use complex impedances
calculate the precision in a measured value
account for the strain gauge principle
explain and account for the two pole theorem
describe qualitatively what is meant with the rms value of an alternating current
explain the relationship between resistance, reactance and impedance
explain how an OP amp functions and analyse the most common OP amp circuits
dimension first order's low- and high-pass filters
explain the concepts "signal" and "system"
describe what be meant with a the Q-value, poles and zeros of filters
Record the impedance spectrum for a given circuit

Skills and abilities
On completion of the course, the student should be able to

use a multimeter to measure direct current, DC-voltage, alternating current, alternating current and resistance
retrieve the data that are required to calculate the precision in the measured value from the manual of the instrument
use the most common electric measuring instruments such as handheld multimeter, desktop multimeter, function generator and oscilloscope
handle a breadboard and a DC power supply
handle electronic components as resistance and OP amps
simulate simple electric circuits in Multisim

Judgement and approach
On completion of the course, the student should

be able to make a judgement concerning the reasonableness of the achieved results both when it comes to simulations, and calculations and measurement results
have a conception of typical sizes on currents, voltages and resistance

Course content
The course treats electric circuits, components and measuring instruments. True current and true voltage connection. Direct and alternating current, current and current sources. Ohm and Kirchoff's laws. Nodes, loops, meshes. Net solving, 2-poles and two pole theorem, superposition. Capacitors, capacitance, spools, inductance, mutual inductance, reactance and transformers. Sinusoidal current and voltage, phasor diagrams, jw-

method and complex impedance. Electrical Measurement Techniques, the strain gauge principle, Wheatstone bridge. Introduction to operational amplifier. Filters. Linear systems complex frequency, poles and zeros. Introduction to impedance spectroscopy. Introduction to Multisim. Production and distribution of electric energy.

The course consists of a number of lectures, calculation exercises and laboratory sessions and is divided into two paragraphs components:

FYD101 0101 Theory, 5 credits

FYD101 0102 Laboratory session, 2.5 credits

Sub-courses

1. **Theory** *(Teori),* 5 higher education credits
   Grading scale: Pass with Distinction (VG), Pass (G) and Fail (U)
   Includes the theoretical components of the course.

2. **Laboration** *(Laboration),* 2.5 higher education credits
   Grading scale: Pass (G) and Fail (U)
   Includes the laboratory components of the course.

Form of teaching

The teaching consists of lectures, exercises, simulations and laboratory sessions. The laboratory element in the course, both simulation and laboratory sessions, be emphasised strongly. Participation in laboratory sessions is compulsory.

Language of instruction: Swedish

Assessment

The first part (FYD101 0101) is examined through written examination at the end of the course. For students who have failed the regular examination, an additional examination sessions are offered.

The other part (FYD101 0102) is examined through passed laboratory part. This part consists of a number of laboratory sessions and to pass on this component must all laboratory sessions is managed during one and the same semester (? components of components? can in be saved).

A student who has failed a test twice has the right to change examiner, unless weighty argument can be adduced. The application shall be sent to the board of the department and has to be in writing.

In case the course has cease or go through major changes be guaranteed student of access to at least three examination sessions (including regular examination session) during a period of at least one year after the course has been discontinued.

Grades

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

Course evaluation

At the end of the course, a course questionnaire is opened in on the GUL web page of the course. The result of the questionnaire is published on the course homepage and a compilation of course evaluation and any changes in the set-up of the course be communicated the students who start the course next time it be given.

Additional information

The course is given in Swedish.