



PHYSICS

FYD102 Electronics 2: Analogue electronics, 7.5 higher education credits

Elektronik 2: Analog elektronik, 7,5 högskolepoäng

First Cycle

Confirmation

This course syllabus was confirmed by Department of Physics on 2014-10-14 and was last revised on 2015-10-09 to be valid from 2015-10-09, autumn semester of 2015.

Field of education: Science 100%

Department: Physics

Position in the educational system

Advanced course at the basic level in the main field of study physics.

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

Main field of studies

Physics

Specialization

G1F, First Cycle, has less than 60 credits in first-cycle course/s as entry requirements

Entry requirements

FYD101 Electronics 1: Electromagnetism (or the equivalent)

Learning outcomes

Knowledge and understanding

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On completion of the course, the student should be able to

describe how semiconductors are created
 explain how a pn-junction is used in diodes and bipolar transistors
 describe various types of diodes
 account for the structure of bipolar transistors and field effect transistors
 draw the small signal diagram of transistors and account for the small signal parameters
 dimension amplifier of transistors both for small signals and power applications
 describe the properties of a differential amplifier
 explain what the resting point of an amplifier is
 account for the OP amp's properties
 explain what is meant with a "schmitt-trigger"
 reproduce the most common pulse and oscillation circuits
 explain how the timer circuit 555 functions
 interpret the Bode diagram of an amplifier
 dimension an amplifier based on given parameters

Skills and abilities

On completion of the course, the student should be able to

use semiconductors such as diodes and transistors in simple connections on bread board
 design amplifiers of transistors (on bread board)
 design pulse circuits and oscillators
 simulate simple electric circuits in Multisim

Judgement and approach

On completion of the course, the student should

have ability independently to be able to choose necessary semiconductor components
 for design of simple amplifiers
 be able to assess which amplifier or oscillator that is best suited for a given problem

Course content

The course treats passive components, semiconductors, doping of silicon, p and n doping, pn-junctions, diodes, bipolar transistors, field effect transistors, resting point. The transistor as switch and transistor as amplifier. JFET and CMOS transistors. Small signal parameters, amplifier, single-ended, differential-ended, power amplifier,

operational amplifier, schmitt-trigger, pulse circuits, oscillators. Frequency functions and Bode diagrams. Phase detectors and phase locked loops. Introduction to high frequency electronics. Multisim simulations.

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

FYD102 0101 Theory, 5 credits

FYD102 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 part of the course.
2. **Laboration** (*Laboration*), 2.5 higher education credits
Grading scale: Pass (G) and Fail (U)
Include the laboratory components in the course.

Form of teaching

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

Language of instruction: Swedish

Assessment

Tests are organised on completion of the course components. The tests are in writing and to pass test be informed the grades Passed or Passed with distinction. For students who have failed the regular examination, 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.

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U). For Pass with distinction, Pass with distinction in written examination and Pass in the laboratory part is required.

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 partly replaces FYD100 why both FYD100 and FYD102 cannot be counted in in degree from Computer-aided Physical Measurements.