



PHYSICS

FYD111 Electronics 3: Digital electronics, 7.5 higher education credits

Elektronik 3: Digitalteknik, 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

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

FYD102 Electronics 2: Analogous Electronics

Learning outcomes

Knowledge and understanding

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

convert number between different number systems
 account for the truth tables of the logical operators
 account for the difference between combinatorial circuits and sequential circuits
 explain the difference between various types of rockers (D, THE CHANCELLOR OF JUSTICE, T, SR)
 account for the most common AD techniques
 explain the difference between a Mealy and a Moore machine
 account for the difference between various types of memories
 explain TTL and CMOS technology

Skills and abilities

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

minimise a combinatorial circuit by means of Karnaugh diagrams and the Morgans laws
 design a DA converter according to the R-2R method
 draw a state diagram for a given state machine
 handle digital circuits on a breadboard (for prototypes)
 be able to read a circuit diagram with digital circuits
 simulate a digital circuit in e.g. Multisim

Judgement and approach

On completion of the course, the student should

be able to decide when a digital design is to prefer in front of other solutions
 account for the limitations of digital circuits

Course content

The course treats number system, logical algebra, logic circuits and combinatorial circuits, flip flops, latches and sequential circuits, AD and DA converters. Integrated circuits. State diagrams and state machines, Mealy's and Moore's models. State minimizing, shift register. Karnaugh diagram. The Morgan's laws. Decoders and multiplexer. TTL versus CMOS technology, CPLD, FPGA and ASICs. Semiconductor memories, RAM, ROM, EEPROM, SRAM, DRAM and flash. Simulations i Multisim.

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, 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

The first part (FYD111 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 (FYD111 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 not 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). The grading scale for examination includes the grades Fail (U), Pass (G) and Pass with distinction (VG). For grade Pass, at least 50% of the maximum score is required and for

Pass with distinction is required at least 75% of the maximum score.

The grading scale for the laboratory part includes only grades Fail (U) and Pass (G). For the grade Pass, all must laboratory part is managed during one and the same semester.

The course final grade becomes it the same as the examination grade (provided that the laboratory part is passed).

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 FYD110, why both can not be counted with in a degree from the programme Computer-aided Physical Measurements.