



## Course syllabus

Faculty of Technology

Department of Physics and Electrical Engineering

2ED414 Mikroelektronik, 7,5 högskolepoäng

Microelectronics, 7.5 credits

### **Main field of study**

Electrical Engineering

### **Subject Group**

Electrical Engineering

### **Level of classification**

First Level

### **Progression**

G2F

### **Date of Ratification**

Approved by Faculty of Technology 2016-09-26

The course syllabus is valid from autumn semester 2017

### **Prerequisites**

- 45 credits Electrical engineering including Analogue Electronic Circuits, 7.5 credits (1ED012) or equivalent.
- 15 credits mathematics or equivalent

## Objectives

After completing the course, students are expected to:

- have knowledge of the physical principles behind the MOSFET transistor and apply these in analog integrated circuits and amplifier stages.
- have knowledge of the structure and design of an operational amplifier, including stability and feedback circuits as well as behavior at higher frequencies.
- be able to construct simple integrated operational amplifiers.
- have an understanding of how different blocks affect a system's overall performance
- have an understanding of oscillators and oscillators in feedback systems (PLL)

## Content

The course includes the following elements:

- The MOSFET transistor and semiconductor technology
- Amplifier stages with one or more transistors at high frequencies
- Operational amplifiers and interaction between the different building blocks
- Frequency analysis
- Feedback, stability and compensation (prevention of instability)

- Noise in building blocks and systems
- Oscillators
- PLL - Phase Locked Loops
- Design and simulation of a simple IC

## Type of Instruction

The teaching consists of lectures and tutorials. Participation in the laboratory work is mandatory.

## Examination

The course is assessed with the grades A, B, C, D, E, Fx or F.

The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

Assessment of the student's performance is made through a written exam and a written or oral presentation of laboratory work. Grades used for Laboratory work are Pass (G) and Fail (U).

Students who do not pass the regular examination are given the opportunity to do a resit shortly after the regular examination.

## Course Evaluation

During the course or in close connection to the course, a course evaluation is to be carried out. The result and analysis of the course evaluation are to be communicated to the students who have taken the course and to the students who are to participate in the course the next time it is offered. The course evaluation is carried out anonymously. The compiled report will be filed at the Faculty.

## Other

Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

Part of the course may entail costs defrayed by the student.

## Required Reading and Additional Study Material

### **Required reading**

B. Razavi, Design of Analog CMOS Integrated Circuits. McGrawHill, International edition (2003). Pages 575 (676).

### **Additional Literature**

IFE, Handouts . Pages 30 (30).