



Course syllabus

Faculty of Technology

Department of Physics and Electrical Engineering

4ED424 Avancerad mikroelektronik, 7,5 högskolepoäng

Advanced Microelectronics, 7.5 credits

Main field of study

Electrical Engineering

Subject Group

Electrical Engineering

Level of classification

Second Level

Progression

A1N

Date of Ratification

Approved by Faculty of Technology 2016-09-26

The course syllabus is valid from autumn semester 2017

Prerequisites

General requirements for studies at advanced level and specific entry requirements:

- Bachelors degree 180 credits in electrical engineering, or the equivalent
- Analog Electronics, 15 credits or equivalent
- English course B/English 6 or equivalent

Objectives

After completing the course, students are expected to:

- be able to mathematically analyze analog integrated circuits and amplifier stages.
- have a deeper understanding of stability, and how different blocks affect a system's overall performance.
- be able to evaluate different solutions for the design of integrated circuits such as operational amplifiers and PLL, phase locked loop.
- be able to critically assess scientific papers on the development and application of FET transistors on nanometer scale.

Content

The course includes the following elements:

- The MOSFET transistor, semiconductor technology and modeling
- New transistor technologies at nanometer scale
- 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 an IC

Type of Instruction

The teaching consists of lectures, laboratory work, project work and independent study. Participation in 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 is Pass (G) or 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 596 (676).

Additional literature

IFE, Handouts. Pages 30 (30). Scientific papers (2).