FIL3113 Analog Integrated Circuits 7.5 credits

Analoga Integrerade Kretsar

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

The official course syllabus is valid from the autumn semester 2026 as decided by the Faculty Board: dnr PA-2026-0008. Decision date: 2026-06-16.

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Knowledge in analog electronics covering 4,5 higher education credits, equivalent to a completed course IE1202/IE1207.

Knowledge of integrated circuits covering 3 higher education credits, corresponding to a completed course IL2241 or a completed module LAB1 in IL2241.

Intended learning outcomes

After passing the course, the student should be able to:

- explain how noise, signal power and bandwidth relate to amplifier performance

- synthesize negative feedback amplifiers by using the asymptotic model
- evaluate noise and linearity performance and apply different circuit techniques to design analog circuits that meet a requirement.
- apply bandwidth optimization and frequency compensation based on phantom zeros
- design current and voltage sources to bias the amplifiers
- apply analog layout techniques for physical implementation
- design, verify, evaluate, and characterize simple integrated circuits by using Electronic Design Automation (EDA) tools
- write design documentation

Course contents

The course is an introduction to analog integrated circuits. The course focuses on negative feedback
amplifiers, which are central building blocks in analog, digital, and radio frequency circuits. Synthesis
of amplifiers based on the asymptotic model is introduced. In detail, component modelling, low
noise and low distortion design, bandwidth and frequency compensation, operting point and analog
layout are studied. The course includes practical amplifier design from specification to physical
verification, using the latest EDA tools.

Examination

- LAB1 - LAB1 - Laboratory work, 3.0 credits, grading scale: P, F
- PRO1 - PRO1 - Project Work, 4.5 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability. The examiner may apply another examination format when re-examining individual students. If the course is discontinued, students may request to be examined during the following two academic years.

- LAB1 - Laboratory work, 3.0 credits, grading scale: P, F
- PRO1 - Project Work, 4,5 credits, grading scale: P, F

LAB1 consists of 4 laboratories. Each laboratory is related to a module in the course. Completion of all 4 laboratories is required to get a pass (P).

PRO1 consists of designing an analog integrated circuit, preferably related to the student's research, using the techniques taught in the course. The design needs to be documented and presented orally in a seminar. To get a pass (P), the design should accomplish design specifications over process corners and Monte Carlo simulations.

A student needs to pass both LAB1 and PRO1 in order to get a pass the course.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.