



# IL2220 Low Power Analogue and Mixed Signal ICs 7.5 credits

Låg effekts analog och mixed signal IC

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

If the course is discontinued, students may request to be examined during the following two academic years

## Establishment

Course syllabus for IL2220 valid from Spring 2019

## Grading scale

A, B, C, D, E, FX, F

## Education cycle

Second cycle

## Main field of study

## Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

## Intended learning outcomes

The aim of this course is to provide an understanding of, and experience with, the basic design concepts for low power analog and mixed signal VLSI circuits in CMOS technology. After this course the students should be able to:

- Explain the basic design concepts for low power mixed signal VLSI circuits in CMOS technology.
- Apply the knowledge in low-power analog and mixed-signal VLSI circuit analysis and simulation.
- Identify the critical parameters that affect the analog and mixed-signal VLSI circuits' performance.
- Design low-power analog and mixed-signal VLSI circuits by using CMOS processes.

## Course contents

The main course topics are:

- BJT and MOS devices; Noise analyses and models
- Basic current mirrors and single-stage amplifiers: CMOS operational amplifier design; Advanced current mirrors and operational amplifiers
- Voltage comparators; Band-gap voltage references
- Sample & Hold; MOS SC circuit fundamentals; SC filters and gain circuits; Low-voltage SC design techniques
- Continuous-time filters
- Data converters fundamentals: ADCs, DACs.; Nyquist D/A converters Nyquist-rate A/D converters; Oversampling A/D converters; Oversampling D/A converters; Decimation and interpolation filters

## Disposition

Students will be introduced to low voltage low power design techniques for analog and mixed signal CMOS IC's.

## Specific prerequisites

Basic knowledge of transistor operation and models, function of simple analog circuits, Laplace and z-transforms, frequency-domain circuit analysis, familiarity with IC fabrication and circuit simulation tools such as SPICE.

## Examination

- TEN1 - Examination, 7.5 credits, grading scale: A, B, C, D, E, FX, 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.

The examination consists of quizzes, homeworks and final written exam.

## Other requirements for final grade

Quiz and homeworks ( pro1;3.0 hp)

Final exam ( TEN1;4,5 hp)

## 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.