



# 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 Autumn 2008

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

## Specific prerequisites

## 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
- Layout Design

## Course literature

Analog integrated circuit design,  
David A. Johns, Ken Martin  
Upplaga: Förlag: John Wiley & Sons Inc  
År: 1997ISBN: 0471144487

Recommended:

Mohammed Ismail, Terri Fiez, Analog VLSI signal and information processing, McGraw-Hill, 1994.

Philip E. Allen, Douglas R. Hollberg, CMOS analog circuit design, Oxford University Press, 2002.

Behzad Razavi, Design of analog CMOS integrated circuits, McGraw-Hill, 2001

Franco Maloberti, Analog Design for CMOS VLSI Systems, Kluwer, 2001

Mikael Gustavsson, J. Jacob Wikner, Nianxiong Tan, CMOS Data Converters for Communications, Kluwer Academic Publishers.

Behzad Razavi, Principles of data conversion system design, IEEE Press, 1995.

## 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.

## Other requirements for final grade

Examination ( TEN1;4,5 hp)

Projekt ( pro1;3.0 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.