



# IL2221 Advanced Topics in Mixed Mode Design 7.5 credits

Avancerad konstruktion av blandad analog och digital teknik

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

## Establishment

Course syllabus for IL2221 valid from Autumn 2008

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

## Specific prerequisites

The course requires good knowledge on analog and mixed-signal ICs design, comparable to 2B1611- Low Power Analog and Mixed-Signal ICs.

## 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 design of mixed-signal integrated circuits (ICs), from system concept to fabrication level.

After this course the students should be able to:

- Describe the top-down design methodology and the steps involved in the design based on a typical mixed-signal IC design flow.
- Apply their knowledge in circuit modeling and simulation techniques (architectural, behavioral, circuit or device level) to analyze and evaluate the mixed-signal circuit blocks.
- Implement the top-down methodology and the design reuse (IPs).
- Design a mixed-signal IC from system specifications to the final layout using different EDA tools.

## Course contents

During this course students will apply the design techniques for advanced mixed-mode circuits. The focus is on applying the top-down and design reuse methodologies to complex mixed-signal ICs. The physical design issues and layout techniques will be addressed.

The following is a tentative list of topics to be covered:

Mixed-mode design flow; Top-down and bottom-up, constraint-driven design methodologies;

Design reuse (IPs); High-level design and optimization, Behavioral modeling and simulation;

Macromodeling algorithms; Multilevel and mixed-domain simulation; AHDL macro models; Computer-aided design considerations for mixed-signal coupling; Functional verification; Floor planning and physical implementation; Layout tools for analog ICs and mixed-signal SoCs; Simulation methods for RF integrated circuits; Examples of mixed-mode circuits for SoC platforms.

## Course literature

Rob A. Rutenbar, Georges G. E. Gielen, Brian A. Antao (Editor), "Computer-Aided Design of Analog Integrated Circuits and Systems", Wiley-IEEE Press, May 2002.

Recommended:

- R. Jacob Baker, "CMOS: Mixed-Signal Circuit Design", Wiley-IEEE, 2002.
- Chieh Lin, Arthur H.M. van Roermund, and Domine M.W. Leenaerts, "Mixed-signal layout generation concepts", Springer-Verlag, 2003.

## Examination

- PRO1 - Project, 4.5 credits, grading scale: A, B, C, D, E, FX, F
- ANN1 - Assignments, 3.0 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.

## Other requirements for final grade

Assignments - 3hp (ANN1)  
Project - 4,5hp (PRO1)

## 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.