IL2227 VLSI Design Fundamentals 7.5 credits

Grundläggande VLSI konstruktion

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 IL2227 valid from Autumn 2012

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

120 university credits (hp) in engineering or natural sciences and documented proficiency in English corresponding to English A.

Language of instruction

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

Intended learning outcomes

This course focuses on the circuit level fundamental knowledge necessary to deal with VLSI Design and the important VLSI design aspects that are interconnect, signalling and timing.

After the course the students should be able to:

- Explain basic operation principles of diodes and MOS transistors and their circuits level models.
- Design the fundamental blocks of a VLSI circuits, both by circuit schematic and physical layout.
- Analyze the influence of wires/interconnects on VLSI circuit performance.
- Describe signalling conventions and analyze signalling circuits.
- Describe timing conventions and analyze timing circuits.

Course contents

1. Basic operation principles and circuit level models of semiconductor devices and wires
2. The manufacturing process and scaling trends of VLSI
3. Elementary building blocks - gates, flops, multiplexers, pass transistor, tri-state buffers, memory cells
   a. Layout
   b. Timing and Power characterization
   c. Dimensioning
4. Logical Effort - Sutherland and Sproull
5. Interconnect: Capacitive, Inductive and Resistive Parasitic
6. Signalling conventions & circuits
7. Timing conventions & circuits

Course literature

Lecture notes.

Examination

- LAB1 - Laboratory Work, 2.5 credits, grading scale: P, F
- TEN1 - Examination, 5.0 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

- Written examination, TEN1 (5,0 credits, A-F)
- Laboratory work, LAB1 (2,5 credits, P/F)

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.