IL2234 Digital Systems Design and Verification using Hardware Description Languages 9.0 credits

Digital systemdesign och verifiering med hårdvarubeskrivande språk

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 IL2234 valid from Autumn 2023

Grading scale

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

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

- Knowledge in basic digital technology, 7,5 credits, corresponding to completed course IE1204.
- Basic knowledge of the structure of microprocessors and instruction execution, 7,5 credits, corresponding to completed course IS1200.
- Basic knowledge of electric circuits, 7,5 credits, corresponding to completed course IE1206 or EI1110.

Language of instruction

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

Intended learning outcomes

After passing the course, the student should be able to

- design digital systems to fulfill given functional requirements
- model and simulate digital systems in hardware description languages (HDL)
- verify digital systems using HDL
- synthesize digital systems and analyze results using EDA tools targetting field programmable gate arrays (FPGAs).

Course contents

The course teaches digital systems design and verificaiton using hardware description language. Additionally, the course includes simulation and synthesis of digital systems designs targeting FPGAs.

- Review of elementary digital design concepts and their modeling and verification in HDL.
- Review of sequential elements, timing concepts, and their applications and modelling and verification in HDL.
- Design of finite state machines (FSMs) and datapaths.
- Modeling and verification of FSM and datapaths in HDL.
- Advanced digital systems concepts.
- Advanced verification concepts: constrained random stimuli generation, assertions, coverage, formal verification.

Examination

- LAB1 - Laboratory work, 3.0 credits, grading scale: P, F
- LAB2 - Laboratory work, 1.0 credits, grading scale: P, F
- TENA - Digital exam, 4.5 credits, grading scale: A, B, C, D, E, FX, F
- TENB - Digital exam, 0.5 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.

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.