# IL2223 Embedded Hardware Design 7.5 credits

## Konstruktion av inbyggd hårdvara

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 IL2223 valid from Autumn 2011

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Information and Communication Technology

## Specific prerequisites

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

**IL2217 Digital Design, IL2206 Embedded Systems or equivalent knowledge.**

## Language of instruction

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

## Intended learning outcomes

After completing the course students shall be able to design hardware accelerators; know how to integrate these into an embedded system consisting of both hardware and software; estimate performance, circuit complexity and power consumption of the components; and be able to determine which solution is the best from the system perspective.

## Course contents

Implementation of algorithms in hardware. From C to VHDL. Design Space Exploration. High-level synthesis: Signal-Flow/Control and Data Flow Graphs, Scheduling, Allocation, and Binding of operations. Records and Mux-minimization. Optimizing transformations. Pipelining. Fixed Point vs Floating Point.

Integration of hardware in an embedded system. Memory mapped designs. Interrupt-driven designs. User-defined processor instructions. Design of Device Drivers. Hardware Abstraction Layer. Testing/debugging of embedded hardware.

Review of the latest FPGA technologies from market leaders (Altera, Xilinx ,...), as well as how to integrate accelerators in their environments. Nios II processor. Microblaze processor. Leon3.

## Disposition

Laboratory work part LAB1 - 4.5 ECTS

Written exam TEN1 - 3 ECTS

## Course literature

Lecture notes and distributed articles

## Equipment

Own laptop.

## Examination

- LAB1 - Laboration, 4.5 credits, grading scale: P, F
- TEN1 - Examination, 3.0 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.

Grade scale A/B/C/D/E/Fx/ F

## Other requirements for final grade

Approved exam TEN1

Approved lab work LAB1

The final grade is the grade on the examination

## 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.