IS1500 Computer Organization and Components 9.0 credits

Datorteknik och komponenter

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

Establishment

On 04/21/2020, the Head of the EECS School has decided to establish this official course syllabus to apply from autumn semester 2020, registration number J-2020-0871.

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Completed course in programming corresponding to DD1310/DD1311/DD1312/DD1314/DD1315/DD1316/DD1318/DD1331/DD1337/DD100N/ID1018..

Active participation in a course offering where the final examination is not yet reported in LADOK is considered equivalent to completion of the course. This applies only to students who are first-time registered for the prerequisite course offering or have both that and the applied-for course offering in their individual study plan.

Language of instruction

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

Intended learning outcomes

Having passed the course, the student should be able to:

- Implement low-level programs in the C programming language and in an assembly language
- Implement low-level programs with input-output, timers, and interrupts
- Analyse how logical gates, blocks, combinatorial circuits and sequential circuits work.
- Analyse processor microarchitectures, with and without a pipeline,
- Analyse memory hierarchies, including cache-structures.
- Compare fundamental concepts about multiprocessor computers.
- Explain and describe technical solutions both orally and in writing.

For higher grades, the student shall also construct more complex programs and/or discuss and analyze concepts within the course. The details are specified in the course memo.

Course contents

The course gives basic knowledge of how a computer functions and is built-up both from a hardware and a software perspective The course is divided into six different modules, which for example include the following basic concepts:

1. C-programming and assembler language: pointers, functions, stack, assembly language, machine language, instruction encoding and processor registers.
2. I/O system: timers, interrupts and memory mapped I/O.
3. Digital design: truth tables, gates, boolean algebra, multiplexers, decoders, adders, combinatorial nets, sequential networks and registers.
4. Processor construction: arithmetic-logic unit, data path, control unit and pipeline.
5. Memory architectures: instruction cache, data cache and virtual memory.
6. Parallel processors and programs: Amdahl's law, different specialisations of parallelism as well as multicore.

Examination

- ANN1 - Component Demostration, 1.5 credits, grading scale: P, F
- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Works, 4.5 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.

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.