IS1200 Computer Hardware Engineering 7.5 credits

Datorteknik, grundkurs

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

Establishment

Course syllabus for IS1200 valid from Autumn 2008

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Completed upper secondary education including documented proficiency in Swedish corresponding to Swedish B and English corresponding to English A. For students who received/will receive their final school grades after 31 December 2009, there is an additional entry requirement for mathematics as follows: documented proficiency in mathematics corresponding to Mathematics A. And the specific requirements of mathematics, physics and chemistry corresponding to Mathematics D, Physics B and Chemistry A.

Language of instruction

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

Intended learning outcomes

After this course, the student will be able to

Describe and explain the micro-architecture of a pipelined processor

Describe and explain priority interrupt handling and direct memory access

Write assembler-language programs for simple calculations and input/output

Describe, explain and use hardware and software priority used by operating systems

Describe and explain cache memory and piplining in order to discuss qualitative aspects of computers

Describe, explain and write low-level C-code

Describe and explain the relationship between C-code and assembler code

Describe and explain time-sharing the processor and how programs use semaphores to cooperate

Course contents

Computer engineering fundamentals: What is a program, and how is it executed inside a pipelined processor.

Addressing methods in assembly language.

The C language for Java programmers.

Subroutines - the C language level, the assembler language level and hardware support.

Computer Arithmetic: Binary representation of integers and floating pointnumbers - how computers perform calculations.

Low-level programming: combining C code and assembler code.

Static and dynamic variables on the C level and on the assembler language level.

Argument passing: pointers, call by reference and call by value.

Communication between the central processing unit, the memory system, and the input/output subsystem, using a simple processor bus.

Communication, priority interrupt handling and direct memory access.

RISC architecture fundamentals including the cache memory concept.

There are six laboratory sessions treating:

* Assembler language programming

* Input/output

* Interrupt handling

* Combining C and assembler code

* Processor architecture and cache memories

* Time-sharing the processor

Course literature

Litteratur

Datorsystem - Program- och maskinvara, Mats Brorsson

Upplaga: Förlag: Studentlitteratur År: 1999

ISBN: 91-44-01137-7

Övrig litteratur

Nios II Processor Handbook Chapter 3 and 8

Föreläsnings-anteckningar (PowerPoint)

Exempelsamling med lösningar

Lab-PM

Examination

- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 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.

Other requirements for final grade

Passed written examination (TEN1; 3 hp) grading A-E
passed laborative sessions (LAB1; 4,5 hp).

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.