



# IS1391 Programming of Embedded Systems 6.0 credits

## Maskinnära programmering

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 IS1391 valid from Autumn 2008

## Grading scale

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

## Education cycle

First cycle

## Main field of study

Technology

## Specific prerequisites

Some basic first programming course.

The short C-program examples in the course can be understood without knowledge about the C programming language, but to be able to use the examples as buildingblocks in the project course, it could be necessary with skills in C-programming .

## Language of instruction

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

## Intended learning outcomes

The course should provide the students with a fundamental understanding of how microcontrollers are used to control and supervise mechanical systems.

The focus is on the processor type that later on is to be used in their project course.

The course will supply details of how typical sensors and actuators can be connected to the processor and how it should be setup and programmed.

The programming language is C (or some C-dialect) and variables and datatypes will be used in a way that mirrors registers and units in the processor. The course will provide detailed knowledge of the processor in use, and give a insight in the assembly language so the C-compiled code can be understood and reviewed.

Most microcontrollers use the same working principles. Knowledge from this course could be useful if the student later on is to learn a different processor.

## Course contents

The study of:

The processor instructions. Assembler language. C-syntax.

Processor specific extensions.

The study of the function of:

AD-converter. Connection of analog sensors. Timers. Measuring of pulses, frequency. Connection of a Pulse/rotation sensor. Generation of pulses and PWM-signals.

Connection of actuators. Interrupt.

Programming of a tick-clock. Serial communication.

## Examination

- ANN1 - Assignment, 1.5 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 1.5 credits, grading scale: A, B, C, D, E, FX, F
- PRO1 - Assignment, 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.

## Other requirements for final grade

**Grading scale:** A/B/C/D/E/Fx/F

Passed laboratory course 1.5hp (LAB1).

Passed individual programming task 3.0hp (PRO1) .

Individualised questions to solve during the course 1.5hp (ANN1).

## 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.