

# Computer Hardware and Architecture

Programme course

4 credits

Datorteknik

TSEA77

Valid from: 2019 Spring semester

**Determined by**

Board of Studies for Computer Science  
and Media Technology

**Date determined**

2018-08-31

## Main field of study

Electrical Engineering

## Course level

First cycle

## Advancement level

G1X

## Course offered for

- Master of Science in Information Technology

## Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

## Prerequisites

To fully appreciate the course you should have previous knowledge of any high level language.

## Intended learning outcomes

The course provides an introduction on how simple processors work and are programmed at the lowest level. The laboratory work is the experimental implementation in the lab to provide practice in applying the abstract models and troubleshooting methodology. The laboratory work shall also include, practicing the ability to work in groups. Structured programming. Data sheets and manuals in English practice to communicate in foreign languages.

After the course you should be able to:

- (i) Program a processor at the lowest level.
- (ii) Use addressing modes and interrupt handling.
- (iii) Make calculations using binary arithmetic.
- (iv) Understand how a simple computer system is built.
- (v) Describe the processor's unifying role in a computer system.
- (vi) Troubleshoot software and hardware.
- (vii) Read and understand data sheets.
- (viii) Using a processor's input and output devices.
- (ix) Contribute to the discussion and results in the lab group.

These goals are reached using assembler.  
(Numeral refers to the corresponding comment field in IUAE matrix.)

## Course content

Binary arithmetic:

Number representations, fix- and floating point. Arithmetic-logical functions, addition, subtraction, multiplication, shifts.

Computer architecture:

Internal dataflow in a simple computer model. Instructions, instruction formats, addressing modes, input and output, exceptions.

Input- and output peripherals.

Ports, A/D-conversions.

Mikrocontroller:

Purpose and features. Built-in peripherals, timers, clocking alternatives, blackout och brownout.

## Teaching and working methods

The course consists of lectures and laboratory exercises.

## Examination

LAB1      Laboratory work      4 credits      U, G

The laboratory exercises test the student's ability to write and verify assembler programs in close connexion with hardware. All laboratory exercises, including final individual exercise (LAX), must be fulfilled to pass the lab assignment examination.

Grades are given as 'Fail' or 'Pass'.

## Grades

Two grade scale, older version, U, G

## Other information

Supplementary courses: Project with Microcontroller, Microcomputer Project Laboratory

## Department

Institutionen för systemteknik

## Director of Studies or equivalent

Anders Nilsson

## Examiner

Michael Josefsson

## Course website and other links

<http://www.isy.liu.se/edu/kurs/TSEA77/>

## Education components

Preliminary scheduled hours: 34 h

Recommended self-study hours: 73 h

## Course literature

Föreläsningsunderlag. Laborationshandledningar.