

# Computer Hardware and Architecture

Programme course

4 credits

Datorteknik

TSEA48

Valid from:

**Determined by**

Board of Studies for Computer Science  
and Media Technology

**Date determined**

2017-01-25

**Replaced by**

TSEA77

## Main field of study

Electrical Engineering

## Course level

First cycle

## Advancement level

G1X

## Course offered for

- Information Technology, M Sc in Engineering

## 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, in addition to the traditional basgruppsarbetet, practicing the ability to work in groups. 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 and base 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.

A/D- and D/A-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

BAS1	Tutorial work	1 credits	U, G
LAB1	Laboratory work	3 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, U, G

## Other information

Supplementary courses: Project with Microcontroller, Microcomputer Project Laboratory

## Department

Institutionen för systemteknik

## Director of Studies or equivalent

Tomas Svensson

## Examiner

Michael Josefsson

## Course website and other links

<http://www.isy.liu.se/edu/kurs/TSEA48/>

## Education components

Preliminary scheduled hours: 34 h

Recommended self-study hours: 73 h

## Course literature

Föreläsningsunderlag. Laborationshandledningar.

## Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at [http://stydokument.liu.se/Regelsamling/Innehall/Utbildning\\_pa\\_grund-\\_och\\_avancerad\\_niva](http://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva).