

# Project with Microcontroller

Programme course

8 credits

Mikrodatorprojekt

TSIU51

Valid from: 2017 Spring semester

**Determined by**

Board of Studies for Electrical  
Engineering, Physics and Mathematics

**Date determined**

2017-01-25

## Main field of study

Computer Science and Engineering, Electrical Engineering

## Course level

First cycle

## Advancement level

G1X

## Course offered for

- Computer Engineering, B Sc in Engineering
- Mechanical Engineering, M Sc in Engineering
- Engineering Electronics, B 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

Switching Theory and Logical Design, Computer Hardware and Architecture

## Intended learning outcomes

This project will provide practical knowledge and skills in the use of a microcontroller in digital systems. The projects are carried out in small project groups.

After the course you should be able to:

- (i) Design with microprocessor-based hardware
- (ii) Program a computer system with assembly language
- (iii) Make calculations using binary arithmetic and digital logic
- (iv) Use analog components in the digital environment
- (v) Construct a small computer with a microcontroller and peripherals
- (vi) Troubleshoot software and hardware
- (vii) Read, understand and use data sheets
- (viii) Use the processor's input and output devices
- (ix) Contribute to the discussion and problem solving in a project
- (x) Write a simple specification for the final product
- (xi) Give substantial input into the final report
- (xii) Project documentation, reporting and presentation to larger group
- (xiii) Use Swedish language in a technical documentary context
- (xiv) Work in a team
- (xv) Economise with available resources.

(Numeral refer to the corresponding comment field in IUAE matrix.)

## Course content

### Design methodology:

- Modern development and simulation environment.
- Microcontrollers.
- Digital electronics.
- Analog Electronics.
- Input and output devices.
- Assembly programming.
- Troubleshooting.
- Data sheets.

### Project report:

- Documentation of the design.
- Linguistic aspects of speech and writing.
- Rhetoric.
- Intercultural communication.
- Layout.
- Genres and linguistic correctness.
- Body language.
- Argumentative or informative presentation.
- Impromptu exercises.
- Writing exercises.
- Presentation of the report.

## Teaching and working methods

The course includes 5 lectures, 2 laborations and a project. The lectures contain the hardware to be used and some basic analogue electronics. The project is performed in a team of students. Each team will choose a design task from a list. The project then entails the construction of a microcontrollerbased unit including both hardware and software, from a given specification to the finished product. The programming language is assembler. The project shall be documented in a report. In connexion with the project scientific articles concerning projects and/or programming shall be studied. One supervisor is allotted to each group. Necessary components, computers and instruments will be available to the participants. The course finishes with a number of compulsory seminars where all project groups presents the resulting units. Parallell to the project there will be a number of lectures. The technical aspects of the report is allowed to be completed during the following period. A concluding reflexion document shall be written.

## Examination

UPG1	Assignment - Communication	2 credits	U, G
PRA2	Project work	6 credits	U, G

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

## Grades

Two-grade scale, U, G

## Other information

Supplementary courses: 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/TSIU51/>

## Education components

Preliminary scheduled hours: 24 h

Recommended self-study hours: 189 h

## Course literature

Kompendium utgivet av institutionen. Per Foyer, Mikroprocessorteknik, Studentlitteratur. Merzell, Magnus (2002): Rapportskrivning - En lathund för studenter. Artiklar om projekt- och/eller programmeringsmetodik.

## 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).