

# Switching Circuits and Logical Design

Programme course

4 credits

Digitalteknik M

TMEL53

Valid from: 2017 Spring semester

**Determined by**

Board of Studies for Mechanical  
Engineering and Design

**Date determined**

2017-01-25

## Main field of study

Electrical Engineering

## Course level

First cycle

## Advancement level

G1X

## Course offered for

- Mechanical Engineering, 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

Ability to handle simple mathematical functions and solve basic electricity problems, for example by using Ohms law.

## Intended learning outcomes

To learn the use of digital circuitry in control systems for processes and machines.  
In the end of the course the student should know about how to:

- analyze digital networks and describe their functionality
- realize digital networks according to a description of its functionality
- realize the construction into hardware
- describe how an analogue signal can be processed into a digital signal and vice versa.

As sub elements the student should know how to:

- perform calculations using boolean algebra
- conclude if a problem description is related to a combinatorial circuit or a sequential network
- make a function table for a combinatorial network on the basis of a problem description
- make a state graph for a sequential network on the basis of a problem description
- minimize a state graph
- realize a state graph into a sequential network with different kinds of flip-flops
- use Karnaugh diagram to find minimal solutions for combinatorial networks
- use special circuits and memory circuits to realize logic functions and systems
- apply fault tracing in a digital network

## Course content

The lectures/tutorials and laboratory work deal with:

- Number systems and codes.
- Boolean algebra.
- Combinatorial networks.
- Iterative networks
- Specialized circuits, for example multiplexer, and memory circuits etc.
- State maps and sequential circuits.
- A/D and D/A converters.

## Teaching and working methods

Seminars and laboratory work.

## Examination

UPG3	Assignment	0 credits	U, G
UPG2	Assignment	0 credits	U, G
UPG1	Assignment	0 credits	U, G
LAB1	Laboratory work	1.5 credits	U, G
TEN1	Written examination	2.5 credits	U, 3, 4, 5

Bonus from written tests may be included in the final exam result during the academic year the test results are achieved.

## Grades

Four-grade scale, LiU, U, 3, 4, 5

## Other information

Supplementary courses: Courses in the area of computer hardware and architecture, control engineering and electrotechnical project courses.

## Department

Institutionen för systemteknik

## Director of Studies or equivalent

Tomas Svensson

## Examiner

Oscar Gustafsson

## Course website and other links

<http://www.isy.liu.se/edu/kurs/TMEL53/>

## Education components

Preliminary scheduled hours: 36 h

Recommended self-study hours: 71 h

## Course literature

Gralén: Kompendium, Björkman/Ekdahl/Gralén: Exempelsamling, Laborationshandledning.

## 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).