

# Switching Theory and Logical Design

Programme course

6 credits

Digitalteknik

TSEA22

Valid from:

**Determined by**

Board of Studies for Computer Science  
and Media Technology

**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 Science and 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 functional expressions. Ability to solve simple problems in basic electronics, e.g. Ohm's law and Kirchhoff's laws.

## Intended learning outcomes

To give a theoretical and practical base for construction of digital system. After the course the student should be able to:

- transform a problem to a theoretical model
- use structured methods for analysis and synthesis
- transform a theoretical model to a physical realisation
- verify physical realisation against problem formulation

## Course content

- Number systems. Conversions. Error detecting and Error correcting Codes.
- Boolean Algebra. Modulo-2 Algebra
- Simplification. Karnaugh Maps. Map-Entered Variables. NAND- and NOR-Networks. Wired Gates, Three-state. Bus System. Incompletely Specified Networks. Multiple-Output Networks. Adders. Comparators. Decoders. Multiplexers.
- Programmable Logic. Memories.
- Sequential Networks. State Graphs. Mealy-, Moore- Networks. Reduction of State Tables.
- Flip-Flops. D-, T-, SR-, JK-, Asynchronous Input Signals, Initialisation
- Counters. Shiftregisters. Sequencers.
- Iterative Combinatorial Networks

## Teaching and working methods

Lectures, lessons and laborations.

## Examination

LAB1	Laboratory work	2 credits	U, G
TEN1	Written examination	4 credits	U, 3, 4, 5

The examination tests the student's ability to transform a problem formulation to a digital network.

The lab course is passed when all the compulsory tasks are fulfilled. The laborations test the students ability to transform a theoretical model to working hardware and to verify the fysical network against the problem formulation.

## Grades

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

## Other information

Supplementary courses: Computer Hardware and Architecture, introductory course, Computer Hardware and Architecture, Electronics project

## Department

Institutionen för systemteknik

## Director of Studies or equivalent

Tomas Svensson

## Examiner

Mattias Krysander

## Course website and other links

<http://www.da.isy.liu.se/undergrad/>

## Education components

Preliminary scheduled hours: 60 h

Recommended self-study hours: 100 h

## Course literature

Lars-Hugo Hemert: Digitala kretsar, ISBN 978-91-44-01918-5, 3 uppl.,  
Studentlitteratur AB, Lund 2001.

## 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).