

# Switching Theory and Logical Design

Programme course

4 credits

Digitalteknik

TSEA51

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

- Applied Physics and Electrical Engineering - International, M Sc in Engineering
- Applied Physics and Electrical 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, i.e. 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. Three-state. Bus System. Incompletely Specified Networks. Multiple-Output Networks. Adders. Comparators. Decoders. Multiplexers.
- Programmable Logic. Memories.
- Sequential Networks. State Graphs. Mealy-, Moore- Networks.
- Synthesis using flip-Flops(D-, T-, SR-, JK-), Asynchronous Input Signals, Initialisation
- Synthesis using Counters, Shiftregisters, Sequencers.

## Teaching and working methods

Lectures, lessons and laborations.

## Examination

LAB1	Laboratory work	4 credits	U, G
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The examination tests the student's ability to transform a problem formulation to a digital network. 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 are given as 'Fail' or 'Pass'.

## Grades

Two-grade scale, U, G

## 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 Krysanter

## Course website and other links

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

## Education components

Preliminary scheduled hours: 48 h

Recommended self-study hours: 59 h

## Course literature

### Additional literature

#### Books

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

## 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).