

# Digital Electronics and Design

Programme course

12 credits

Digitalteknik och konstruktion

TNE094

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

Electrical Engineering

## Course level

First cycle

## Advancement level

G1X

## Course offered for

- Electronics Design Engineering, M Sc in Engineering

## Specific information

The course is not available for exchange students

## 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.

## Intended learning outcomes

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

- implement calculations on simple DC- and AC-circuits
- handle multimeters, functiongenerators and oscilloscope
- conversions between binary- decimal- and hexadecimal number systems
- simplify Boolean expressions
- analyse combinational- and sequential circuits
- design combinational circuits with Boolean algebra and Karnaugh maps
- design synchronous sequential circuits with state diagram
- design asynchronous sequential circuits with state diagram
- design combinational- and synchronous sequential circuits with VHDL
- describe the function of FPGA circuits
- describe the function of semiconductor memories
- describe the function of DA- and AD- converters
- write a technical report in Swedish and present the result orally.

## Course content

Calculations on simple DC- and AC-circuits. Measuring instruments for electrical quantities. Boolean algebra Combinational circuits Boolean functions. Karnaugh maps. Analysis and design of combinational circuits. Analysis and design of sequential circuits. Arithmetic. Computer based development-tools: Program for description and simulation of designs made in VHDL, the designs are realized in Programmable Logic Devices (FPGAs). Semiconductor memories. D/A- and A/D-converters. Oral and written communication in Swedish.

## Teaching and working methods

Education in form of lectures and exercises with practical laboratory works in combination with a project.

## Examination

LAB2	Laboratory Work	2 credits	U, G
PRA1	Oral and Written Report	2 credits	U, 3, 4, 5
LAB1	Laboratory Work	4 credits	U, G
TEN1	Written examination	4 credits	U, 3, 4, 5

Support during report writing will be given by the technical teacher. The written report and oral presentation will be assessed by a language teacher. Feedback will be given on both report and oral presentation.

## Grades

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

## Other information

Supplementary courses: Analog/Digital System Design, Digital Communication Electronics

## Department

Institutionen för teknik och naturvetenskap

## Director of Studies or equivalent

Adriana Serban

## Examiner

Qin-Zhong Ye

## Course website and other links

<http://www2.itn.liu.se/utbildning/kurs/>

## Education components

Preliminary scheduled hours: 83 h

Recommended self-study hours: 237 h

## Course literature

### Additional literature

#### Books

Hemert Lars-Hugo, *Digitala kretsar*  
Studentlitteratur

#### Compendia

Complementary papers.

## 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).