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

Offered for the last time
Autumn semester 2024

Replaced by
TNE108

Main field of study
Electrical Engineering

Course level
First cycle

Advancement level
G1N

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://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.