Switching Theory and Logical Design

Programme course

6 credits

Digitalteknik

TSEA52

Valid from: 2017 Autumn semester

Determined by
Board of Studies for Industrial Engineering and Logistics

Date determined

Main field of study
Electrical Engineering

Course level
First cycle

Advancement level
G1X

Course offered for
- Industrial Engineering and Management, M Sc in Engineering
- Industrial Engineering and Management - International, M Sc in Engineering

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 amd error detection of digital systems. 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.
- Boolean Algebra. Modulo-2 Algebra
- Simplification, Karnaugh Maps, 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, Asynchronous Input Signals, Initialisation
- Synthesis using Counters, Shiftregisters, Sequencers.
- Modelling in VHDL, simulation using ModelSim and synthesizing with Xilinx.

Teaching and working methods

Lectures, lessons and laborations.

Examination

LAB2	Laboratory work	2 credits	U, G
LAB1	Laboratory work	4 credits	U, G

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 Krysander

Course website and other links

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

Education components

Preliminary scheduled hours: 56 h
Recommended self-study hours: 104 h

Course literature

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