System Design

Programme course

8 credits

Systemkonstruktion

TSIU03

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

G2X

Course offered for

- Computer Engineering, B Sc in Engineering
- Engineering Electronics

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

Switching Theory and Logical Design, Computer Hardware and Architecture

Intended learning outcomes

The course includes methods and tools for design and implementation of electronic systems using VLSI technologies. The design methods aim at reducing the design time and guarantee correct designs as well as ensuring that performance requirements are met. After the course the student shall be able to to:

- Design a digital circuit (RTL) that calculates a mathematical function.
- Analyze the mathematical function calculated by a digital circuit (RTL).
- Generate VHDL code that describes a digital circuit (RTL).
- Analyze the digital circuit (RTL) described by a VHDL code.
- Formulate the requirements for a digital system.
- Identify the phases and tasks involved in the development of a digital system.
- Generate, analyze and compare alternative approaches to implement a digital system.
- Create an implementation of a digital system on an FPGA that fulfills a set of requirements.
- Apply simulation tools to test, verify and validate a digital system.
- Describe a digital system and justify that it meets a set of requirements.

Course content

Design of complex systems, project organisation, planning and documentation. Problem capture, specification, system design, complexity, partitioning and validation. Use of CAD-CAE tools. Behavioral description using VHDL. System architectures. Automatic synthesis of logic and implementation using FPGA technologies.

Teaching and working methods

The course consist of a series of lectures, laboratory work and a large design project that includes assignments and implementation of a system.

Examination

| LAB1 | Laboratory work | 3 credits | U, G |
| PRA1 | Oral and Written Presentation of Project Work | 5 credits | U, G |

Grades are given as 'Fail' or 'Pass'

Grades

Two-grade scale, U, G

Department

Institutionen för systemteknik

Director of Studies or equivalent

Tomas Svensson

Examiner

Mario Garrido

Course website and other links

http://photon.isy.liu.se/edu/courses/course.html?TSIU03

Education components

Preliminary scheduled hours: 52 h
Recommended self-study hours: 161 h

li.U
LINKÖPINGS UNIVERSITET

Course literature

Additional literature

Books

Andrew Rushton, (2011) *VHDL for Logic Synthesis* 3rd edition John Wiley & Sons
ISBN: ISBN-13: 978-0470688472
Peter J. Ashenden, (2007) *Digital Design: An Embedded Systems Approach Using VHDL* Morgan Kaufmann
ISBN: ISBN-13: 978-0123695284

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.