

# Digital Communication Electronics

Programme course

12 credits

Digital kommunikationselektronik

TNE064

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

Second cycle

## Advancement level

A1X

## Course offered for

- Electronics Design 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

Digital Electronics, Digital Design and Microcomputers

## Intended learning outcomes

This course intends to provide the knowledge and technology in modern digital communication electronics.

- Show how arithmetic circuits are constructed.
- Explain the pipelined design technique.
- Study how the computation of sum of product is implemented with distributed arithmetic.
- Explain how CORDIC algorithm works.
- Study how digital filters and Fast Fourier Transform are implemented in hardware.
- Explain error detection and error correction in digital communication systems.
- Study various types of cryptography algorithms.
- Explain how wireless digital communication systems are constructed.
- Construct various types of algorithms in digital communication systems with VHDL (Hardware Description Language) and FPGA (Field Programmable Gate Arrays).

## Course content

- Digital construction on system and algorithm level.
- VHDL and circuit design
- Arithmetic circuits
- Pipelined design technique
- Distributed arithmetic
- CORDIC algorithm
- Digital filters
- Fast Fourier Transform
- Error detection and error correction
- Cryptography algorithms
- Wireless digital communication systems

## Teaching and working methods

Lectures, labs and project work.

The course runs over the entire autumn semester. The first period: lectures and labs. The second period: project work.

## Examination

UPG2	Project report and presentation	6 credits	U, 3, 4, 5
UPG1	Tests and Laboratory Work	6 credits	U, 3, 4, 5

## Grades

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

## 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: 39 h

Recommended self-study hours: 281 h

## Course literature

### Additional literature

#### Books

U. Meyer-Baese, *Digital Signal Processing with Field Programmable Gate Arrays* Third Edition Springer

## 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).