

Filters

Programme course

6 credits

Filter

TSEI10

Valid from: 2017 Spring semester

Determined by

Board of Studies for Electrical
Engineering, Physics and Mathematics

Date determined

2017-01-25

Replaced by

TSEI68

Main field of study

Electrical Engineering

Course level

First cycle

Advancement level

G2X

Course offered for

- 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

Circuit Theory

Intended learning outcomes

The aim of the course is to provide insight into principles and methods for design of analog filters. After the course, the student will be able to understand:

- basic concepts and principles for design of analog filters
- realization of filters using standard approximations and frequency transformations
- realization of passive LC filters with optimal element sensitivity
- sensitivity properties of second-order sections
- realization of higher-order filters using coupled forms, immittance and topological simulation.

Course content

The lectures, exercises, and laboratory work cover:

- basic concepts and properties of analog filters
- approximation theory and synthesis of transfer functions using MATLAB and Tables
- equalization of the group delay
- realization of passive filters with optimal element sensitivity
- realization of doubly resistively terminated LC filters
- realization of passive filters with distributed circuit elements
- n-ports, immittance converters and inverters, gyrators, transformers, op-amps, transconductors, and current conveyors
- realization of second-order sections using op-amps, transconductors, and current conveyors
- sensitivity properties of active filters
- realization of a transfer function using coupled forms, immittance simulation, and topological simulation.
- scaling of signal levels

Teaching and working methods

Lectures, lessons, and laboratory work.

Examination

| | | | |
|------|---------------------|-----------|------------|
| LAB1 | Laboratory Work | 2 credits | U, G |
| TEN1 | Written Examination | 4 credits | U, 3, 4, 5 |

Grades

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

Other information

Supplementary courses: Analog Electronic Circuits, Analog and Discrete-Time Integrated Circuits

Department

Institutionen för systemteknik

Director of Studies or equivalent

Klas Nordberg

Examiner

Håkan Johansson

Course website and other links

<http://www.commsys.isy.liu.se/en/student/kurser/TSEI10>

Education components

Preliminary scheduled hours: 52 h

Recommended self-study hours: 108 h

Course literature

L. Wanhammar: Analog Filters Using MATLAB, 2009, 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.