Analog Filters

Programme course

6 credits

Analoga filter

TSTE14

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
Electrical Engineering

Course level
Second cycle

Advancement level
A1X

Course offered for
- Computer Science and Engineering, M Sc in Engineering
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Electronics Engineering, Master's programme
- Information Technology, M Sc in Engineering
- Applied Physics and Electrical Engineering - International, 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
Circuit Theory

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

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

Course content

The lectures, exercises, and laboratory work cover:

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

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

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