Analog Electronic Circuits

Programme course

8 credits

Analog elektronik

TSEI01

Valid from: 2020 Spring semester

Determined by
Board of Studies for Electrical Engineering, Physics and Mathematics

Date determined
2019-09-23

Main field of study
Electrical Engineering

Course level
First cycle

Advancement level
G1X

Course offered for
- Bachelor of Science in Engineering Electronics
- Bachelor of Science in Computer 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 with the course is:

- to give knowledge of components and circuits for analog electronics
- to give basic knowledge of design principles and analysis methods for analog electronic circuits
- to give ability in analog simulation

After the course the student shall have skills to:

- characterize analog systems with system characteristics
- design amplifiers by use of operational amplifiers
- compensate for operational amplifiers non ideal properties
- design amplifiers by use of transistors
- perform functional and performance simulation
- implement the design

As parts of the course the student is expected to be able to:

- design circuits with help of linear models
- determine frequency response of amplifiers with Bode plots
- determine the characteristics of a feedback amplifier
- determine the margin of stability of a feedback amplifier
- design stabilizing networks

Course content

Semi-conductor theory. Simple transistor gain stages, linearized models, frequency properties. Mille effect, in- and output impedance, distortion. Amplifiers, Bode plots, feedback and stability.
Properties of operational amplifiers, realization of operational amplifiers, differential stages, current mirrors, output drivers, common-mode and differential voltages, common-mode rejection ratio, slew rate, open-loop gain, bandwidth, offset, bias current.

Fundamental linear and nonlinear circuits using operational amplifiers. Power amplifiers, thermal effects, feedback, complementary and pseudocomplementary output stages. Integrated power amplifiers.

Analog simulation.

Teaching and working methods

Lectures, lessons and laboratory lessons

Examination

LAB1	Laboratory work	2 credits	U, G
TEN1	Written examination	6 credits	U, 3, 4, 5

Grades

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

Other information

Supplementary courses: Computer Aided Design of Electronics Analog Design, second course

About teaching and examination language

The teaching language is presented in the Overview tab for each course. The examination language relates to the teaching language as follows:

- If teaching language is Swedish, the course as a whole or in large parts, is taught in Swedish. Please note that although teaching language is Swedish, parts of the course could be given in English. Examination language is Swedish.
- If teaching language is Swedish/English, the course as a whole will be taught in English if students without prior knowledge of the Swedish language participate. Examination language is Swedish or English (depending on teaching language).
- If teaching language is English, the course as a whole is taught in English. Examination language is English.

Other

The course is conducted in a manner where both men's and women's experience and knowledge are made visible and developed.

The planning and implementation of a course should correspond to the course syllabus. The course evaluation should therefore be conducted with the course syllabus as a starting point.

Department

Institutionen för systemteknik

Director of Studies or equivalent

Mikael Olofsson

Examiner

Jacob Wikner

Course website and other links

http://www.isy.liu.se/edu/kurs/TSEI01/

Education components

Preliminary scheduled hours: 60 h
Recommended self-study hours: 153 h

Course literature

Books

Molin, Bengt, *Analog elektronik*.