

Analog Electronic Circuits

Programme course

8 credits

Analog elektronik

TSEI01

Valid from: 2018 Spring semester

Determined by

Board of Studies for Electrical
Engineering, Physics and Mathematics

Date determined

Main field of study

Electrical Engineering

Course level

First cycle

Advancement level

G1X

Course offered for

- Engineering Electronics, B Sc in Engineering
- Computer Engineering, B 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 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. Miller 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

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/TSEIo1/>

Education components

Preliminary scheduled hours: 60 h

Recommended self-study hours: 153 h

Course literature

Books

Molin, Bengt, *Analog elektronik*.