

# 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. 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

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

## 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/TSEIO1/>

## Education components

Preliminary scheduled hours: 60 h

Recommended self-study hours: 153 h

## Course literature

### Books

Molin, Bengt, *Analog elektronik*.