

## Analog Electronic Circuits

Analog elektronik  
8 credits

Programme course

TSEI01

Valid from: 2024 Spring semester

|  |                                  |                                   |
|--|----------------------------------|-----------------------------------|
| <b>Determined by</b>   | <b>Main field of study</b>       |                                   |
| Board of Studies for Electrical Engineering, Physics and Mathematics | Electrical Engineering           |                                   |
| <b>Date determined</b>   | <b>Course level</b>              | <b>Progressive specialisation</b> |
| 2023-08-31   | First cycle                      | G1X                               |
| <b>Revised by</b>  | <b>Disciplinary domain</b>       |                                   |
|  | Technology                       |                                   |
| <b>Revision date</b>   | <b>Subject group</b>             |                                   |
|  | Electrical Engineering           |                                   |
| <b>Offered first time</b>  | <b>Offered for the last time</b> |                                   |
| Autumn semester 2007   |                                  |                                   |
| <b>Department</b>  | <b>Replaced by</b>               |                                   |
| Institutionen för systemteknik                                       |                                  |                                   |

## Course offered for

- Bachelor of Science in Computer Engineering
- Bachelor of Science in Engineering Electronics

## 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.

Analog simulation.

## Teaching and working methods

Lectures, lessons and laboratory lessons

## Examination

|      |                     |           |            |
|------|---------------------|-----------|------------|
| TEN2 | Written examination | 4 credits | U, 3, 4, 5 |
| LAB2 | Laboratory work     | 4 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 could be given in Swedish, or partly in English. Examination language is Swedish, but parts of the examination can be in English.
- If teaching language is “English”, the course as a whole is taught in English. Examination language is English.
- 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.

### Other

The course is conducted in such a way that there are equal opportunities with regard to sex, transgender identity or expression, ethnicity, religion or other belief, disability, sexual orientation and age.

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.

The course is campus-based at the location specified for the course, unless otherwise stated under “Teaching and working methods”. Please note, in a campus-based course occasional remote sessions could be included.