# Circuit Theory and Transform Methods

Programme course

10 credits

Kretsteori och transformmetoder

TSEI11

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
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
Calculus and linear algebra

## Intended learning outcomes
The purpose of the course is to give proficiency to analyse, and to a certain extent, design electrical circuits, consisting of linear passive components. The course shall give directly applicable knowledge and be preparatory for other courses as well. After completing the course you should be able to:

- analyze and perform measurements on DC and AC circuits
- use transforms to solve differential equations and circuit problems
- analyze and verify measurements on simple filters.

## Course content
DC theory and AC theory with the complex method. Periodic signals, Fourier series on complex and trigonometric form. Mean value and power. Impulse and step response, sinc function. Fourier transform, magnitude, phase, and energy spectrum. System of differential equations, Laplace transform, convergence region. Transfer function, poles and zeros, stability and causality. Introduction to continuous-time filters.

## Teaching and working methods

The course is organised in lectures, lessons and laboratory work.
The course runs the entire spring semester.

## Examination

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|---|---|---|---|
| KTR1 | Optional test | 0 credits | U, G |
| LAB1 | Laboratory assignments | 2 credits | U, G |
| TEN1 | A written examination | 8 credits | U, 3, 4, 5 |

A pass on the optional test gives a bonus on the written examination (TEN1). The bonus is valid 12 months from the date of passing.

## Grades

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

## Other information

Supplementary courses: Linear Systems, Automatic Control, Telecommunication, Filters, Analog Electronic Circuits, Electrical Engineering

## Department

Institutionen för systemteknik

## Director of Studies or equivalent

Tomas Svensson

## Examiner

Mark Vesterbacka

## Course website and other links

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

## Education components

Preliminary scheduled hours: 78 h
Recommended self-study hours: 189 h

# Course literature

## Additional literature

### Books

Söderkvist, S., *Formler och tabeller*.
Söderkvist, S., *Kretsteori, Från alpha till omega, övningsbok*.
Söderkvist, S., *Kretsteori, Från alpha till omega*.

# 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.