

Electrical Engineering

Programme course

6 credits

Elektroteknik

TMMI04

Valid from: 2017 Spring semester

Determined by

Board of Studies for Mechanical
Engineering and Design

Date determined

2017-01-25

Offered for the last time

Autumn semester 2018

Main field of study

Electrical Engineering

Course level

First cycle

Advancement level

G1X

Course offered for

- Mechanical 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

Electricity as a power source and information carrier is necessary for our modern society to function. The course treats the basics of these electrical systems, both theoretically and practically. The basic electronic components are treated as well for analogue electronics as for digital. The course gives knowledge to understand and deal with electrical and electronic problems at both home and in industry. Therefore the student should be able to:

- Make calculations on DC- and AC-circuits.
- Understand the function and make easier calculations at electromagnetic connections.
- Use structured methods for analysis and construction of electronic circuits.
- Make measurements on electrical quantities as voltage, current and power.
- Analyze and construct easier digital networks by using Boolean algebra and Karnaugh-diagrams.

Course content

- Direct current and alternating current.
- Voltage, current and power.
- Ohm's law and electric resistance.
- Serial and parallel connection.
- D/Y- and Y/D-transformation.
- Kirchhoff's laws.
- Superposition.
- Thévenin's and Norton's theorems.
- Mesh current and node voltage method.
- Sinusoidal alternating current, phasor diagram and the complex method.
- Power in alternating current circuits .
- Magnetism and the ideal transformer.
- The diode and the Zener diode.
- Rectifying and smoothing.
- The transistor and its operating point.
- Small signal models and basic amplifier stages.
- The operational amplifier.
- Electrical measurement instruments and measurement technology.
- Number systems and codes.
- Switching Circuits and Logical Design
- Gates and combinatorial networks.
- Boolean algebra och Karnaugh-diagrams.
- Flip-flops and sequential circuits.
- Specialized circuits, for example decoder, multiplexer, optocoupler, A/D and D/A converters.

Teaching and working methods

Lectures, tutorials and laboratory work

Examination

LAB1	Laboration course	1.5 credits	U, G
TEN1	Written exam	4.5 credits	U, 3, 4, 5

Grades

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

Other information

Supplementary courses: Measurement Technology, Automatic Control, Electric Power Engineering

Department

Institutionen för systemteknik

Director of Studies or equivalent

Tomas Svensson

Examiner

Sivert Lundgren

Course website and other links

<http://www.isy.liu.se/edu/kurs/TMMIo4/>

Education components

Preliminary scheduled hours: 64 h

Recommended self-study hours: 96 h

Course literature

Additional literature

Books

Söderkvist, *Kretsteori & Elektronik*

Compendia

Ekdahl/Franzén/Gralén/Lundgren, *Elektroteknik Övningssexempel*

Franzén/Lundgren/m.fl., *Laborationer*

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://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.