

**SYLLABUS**

# **Fundamentals of Electrical Engineering 7.5 credits E0013E**

**Grundkurs i elektroteknik**

**Course syllabus admitted: Autumn 2023 Sp 1 - Present**

**DECISION DATE  
2022-09-08**

# Fundamentals of Electrical Engineering 7.5 credits

## E0013E

### Grundkurs i elektroteknik

#### First cycle, E0013E

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	Elektroteknik	Electrical Engineering

## Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language and basic mathematics (M0049M Linear Algebra and Differential Equations); especially required knowledge of linear algebra, complex analysis and ordinary differential equations.

## Selection

The selection is based on 1-165 credits.

## Course Aim

The student should

- be able to analyse and perform analysis of linear circuits for direct and alternating current in stationary and transient states,
- be able to use node and mesh analysis for calculations in electrical networks consisting of linear components for both direct and alternating current,
- be able to analyse circuits including ideal operation amplifiers for both stationary, transient and harmonic states,
- be able to use a Spice based simulation software for analysis and design of electrical circuits,
- be able to perform analysis of balanced and unbalanced three-phase systems, ideal transformers and basic DC and AC motors,
- be able to demonstrate laboratory skills by designing and building electrical circuits on prototype boards and using oscilloscopes, function generators and multimeters to measure various electrical entities.

## Contents

Electrical engineering is a vast area and the content of the course are therefore restricted to analysis of linear circuits. The course covers DC and AC voltage analysis for stationary and transient processes. The course also includes a electrical power part that covers basic concepts in electromechanics and rotating machinery. The course used Matlab as a tool to make calculations and to collect and present measurement results from the laboratory work included. The course covers concepts as circuit theorems, constitutive relations for passive components, mesh- and nodal analysis, transient processes, operational amplifiers, the complex method, active and passive filters of different order, resonant circuits, complex power, transformers, direct and alternating current machines and the three-phase system.

## Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

The teaching consists of lectures - lectures combined with problem solving - and four mandatory labs in groups of 2-3 students. Three of the four labs will be presented in report form. The course emphasizes individual problem solving, work in groups and the handling of modern laboratory measuring equipment.

## Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided.

A summative assessment is done through a combination of completed laboratory sessions (U G) and a written exam with differentiated grades (U 3 4 5).

## Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term "unauthorized aids" refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

## Remarks

The course can not be included in the degree together with one of the Electrical Engineering courses E0012E/E0001E/SME093 or Elkretsteorikursen E0003E/SME096.

## Overlap

The course E0013E is equal to E0006E, E0012E

## Course offered by

Department of Computer Science, Electrical and Space Engineering

## Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0002	Laboratory work	U G#	2.5	Mandatory	A09	
0003	Written exam	G U 3 4 5	5	Mandatory	A21	

## Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

## Last revised

by Robert Brännström, Head Faculty Programme Director at the Department of Computer Science, Electrical and Space Engineering. 2022-09-08

## Syllabus established

by the Department of Computer Science and Electrical Engineering 2008-12-15