



Faculty of Health, Science and Technology
Electrical Engineering

Syllabus

Electrical Engineering for Master Students in Engineering Science

Course Code:	ELGB13
Course Title:	Electrical Engineering for Master Students in Engineering Science <i>Elteknik för civilingenjörer</i>
Credits:	7.5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has less than 60 credits in first-cycle course/s as entry requirements (G1F)

Major Field of Study:
ETA (Electrical Engineering)

Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2025-02-06, and is valid from the Autumn semester 2025 at Karlstad University.

Prerequisites

Registered for Linear algebra, 7.5 ECTS credits, or equivalent

Learning Outcomes

Upon completion of the course, students should be able to:

- perform calculations on simple electrical networks using Ohm's law, Kirchhoff's laws, Thevenin's theorem, and node and mesh analysis,
- perform calculations on single-phase and three-phase alternating current circuits using phasor diagrams and the $j\omega$ method,
- perform calculations on transformers, direct current machines, and three-phase asynchronous machines,

- describe the function and use of passive components, operational amplifiers, transistors, and diodes, and
- perform calculations on simple semiconductor circuits.

Content

The course covers the following:

Electric circuits: Calculations with Ohm's and Kirchoff's laws of series and parallel circuits, Thevenin's theorem, node and mesh analysis

Single-phase and three-phase alternating current circuits: Definitions of sinusoidal voltage and currents, the use of phasors and the $j\omega$ method, Y- and D-connected three-phase systems

Power: Active, reactive, and apparent power, phase compensation

Transformers: design, windings, voltage, current ratio, transformer formula

Asynchronous machines: design, moment, rotational speed, slip, loss, and efficiency, Y/D-connected machine

Direct current machines: design, separate and series magnetised machine, moment, rotational speed, loss, and efficiency

Semiconductors: Semiconductors of n-type and p-type, diode, transistors, operational amplifiers, rectifiers and inverters, simple semiconductor circuits

Reading List

See separate document.

Examination

Assessment is based on a written exam, mandatory laboratory sessions, and lab reports.

If students have a decision from Karlstad University entitling them to Targeted Study Support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

Grades

One of the grades Distinction (VG), Pass (G), or Fail (U) is awarded in the examination of the course. Engineering students are awarded one of the grades Pass with Distinction (5), Pass with Some Distinction (4), Pass (3), or Fail (U).

Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional information

The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.