



Faculty of Health, Science and Technology  
Electrical Engineering

# Syllabus

## Electrical technology

**Course Code:** ELGA21

**Course Title:** Electrical technology  
*Elteknik*

**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 Mathematics for engineers I, 7.5 ECTS credits, or admission to the study programme in Mechanical Engineering or Innovation and Design Engineering, or equivalent

### Learning Outcomes

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

- perform calculations of simple electrical nets using Ohm's law, Kirchoff's laws and Thévenin's theorem,
- perform calculations of single-phase and three-phase alternating current circuits using phasor diagrams and the jw-method, and
- perform calculations on transformers, direct current machines, and three-phase asynchronous machines.

## **Content**

The course covers the following:

Electrical circuits: calculation with Ohm's and Kirchoff's laws of series and parallel circuits, Thevenin's theorem.

Single and three-phase alternating currents: definitions of sinusoidal voltage and currents, using phasor diagram and the jw-method, Y- and D-connected three-phase systems.

Power: active, reactive, and apparent power, phase compensation.

Transformer: design, windings-, voltage- and current ratio, transformer formula.

Non-synchronous machine: design, moment, rotational speed, slip, loss and efficiency, Y and D connected machine, frequency regulation.

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

## **Reading List**

See separate document.

## **Examination**

Assessment is in the form of 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 Pass with Distinction (5), Pass not without Distinction (4), Pass (3) or Fail (U) is awarded in the examination of the course.

## **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.