Reg No: ELGA12/20252

Faculty of Health, Science and Technology
Electrical Engineering

Syllabus

Introduction to Electrical Engineering

Course Code:	ELGA12
Course Title:	Introduction to Electrical Engineering *Introduktion till elektroteknik*
Credits:	7.5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has only upper-secondary level entry requirements (G1N)

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
General admission requirements and upper secondary level Mathematics 3c or D, Physics 2, and Chemistry 1, or equivalent

Learning Outcomes
The aim of the course is for students to be introduced to the subject of electrical engineering, get a basic idea of their future course of study and their future professional role as engineers, and acquire knowledge of important tools that they will use as part of their education.

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

The basics of electrical engineering
- give an account of knowledge of and perform calculations on fundamental concepts and

laws in electricity, such as Ohm's law and Kirchhoff's laws,
- use electrical components in simple circuits, and use common electrical measuring instruments,
- plan and actively participate in an electrical engineering task or project completed in groups and within given frameworks, and present their work orally and in writing,
- use electric fields and magnetic fields, explain what they are, and highlight their applications,
- use Newton's laws of motion, provide an overview of the principles of kinematics, and define energy and the principle of energy,

The professional role
- give an account of and reflect upon the concepts of sustainable development and professional ethics from the perspective of an engineer, and

Study skills
- give an account of and apply received knowledge of study techniques, group dynamics, and project methodology.

Content
Instruction is in the form of lectures, exercises, seminars, and laboratory sessions.

The basics of electrical engineering
Introduction to electricity: Fundamental concepts in electricity, such as Ohm's law, Kirchhoff's laws, and Thevenin's theorem.
Electric fields: fundamental concepts, such as Coulomb's law.
Magnetic fields: fundamental concepts, such as Gauss's law.
Electromagnetism: fundamental concepts, such as mutual inductance.
- an electrical engineering group project that is presented orally and in writing,
- measurement principles and methods with electrical measuring instruments and data processing,
- overview of the various subject areas encompassed by the concept of electrical engineering,
- introduction to mechanics from an electrical engineering perspective, including the laws of motion and energy.

The professional role
- sustainable development and ethics in relation to the professional role of the engineer,
- the basics of common digital tools for electrical engineering, such as CAD,
- laboratory work and lab reports,
- workplace visits and meetings with working engineers.

Study skills
- introduction to study techniques for the academic level,
- the basics of group dynamics and project methodology.

Reading List
See separate document.

Examination
Assessment is based on a written exam, written reports, and oral presentations. Laboratory sessions and seminars are mandatory.

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 with Some Distinction (4), Pass (3) or Fail 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.