



Faculty of Health, Science and Technology
Electrical Engineering

Syllabus

Circuit theory 1

Course Code:	ELGA22
Course Title:	Circuit theory 1 <i>Kretsteknik 1</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 2023-03-17, and is valid from the Autumn semester 2023 at Karlstad University.

Prerequisites

Mathematics for engineers I, 7.5 ECTS credits, or equivalent

Learning Outcomes

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

- demonstrate knowledge of basic concepts and electrical components,
- demonstrate basic knowledge of electrical measuring methods and the use of electrical measuring instruments,
- perform calculations on simple electrical circuits using Ohm's law, Kirchoff's laws, node and loop analysis, the superposition theorem, and Thevenin's theorem,
- perform calculations on simple single-phase and three-phase alternating current circuits using phasors and the $j\omega$ method,
- perform calculations on transformers,
- perform simple connections with passive components,

- perform measurements on electrical circuits, and
- present laboratory results in written reports.

Content

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

Basic concepts: Charge, current, potential, voltage, conductors, resistance, power and energy, capacitance, inductance, and electric and magnetic fields.

Knowledge of components: Passive components (resistors, capacitors, and inductors) and transformers.

Circuit theory: Calculations using Ohm's law, Kirchoff's laws, the superposition theorem, Thevenin's theorem, and node and loop analysis. Power and power matching, equivalent circuits. Sinusoidal current and voltage for both single-phase and three-phase, calculations using phasors and the $j\omega$ method, resonance circuits. Charging and discharging of a capacitor.

Reading List

See separate document.

Examination

Assessment is based on a written exam, laboratory work, 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 5 (Pass with Distinction), 4 (Pass with Some Distinction), 3 (Pass), or U (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.