Reg No: ELGA22/20252

Faculty of Health, Science and Technology
Electrical Engineering

Syllabus

Circuit theory 1

Course Code:	ELGA22
Course Title:	Circuit theory 1 *Kretsteknik 1*
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 Introduction to electrical engineering, 7.5 ECTS credits, and 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 jw 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 jw method, resonance circuits. Charging and discharging of a capacitor.

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 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.