Reg No: EMG221/20252

Faculty of Health, Science and Technology
Environmental and Energy Systems

Syllabus

Sustainable electricity system

Course Code:	EMG221
Course Title:	Sustainable electricity system *Hållbara elsystem*
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:
MEI (Environmental and Energy Systems)

Course Approval
The syllabus was approved by the Faculty of Health, Science and Technology 2025-03-12, and is valid from the Autumn semester 2025 at Karlstad University.

Prerequisites
Registered for Applied thermal dynamics, 7.5 ECTS credits, or Technical thermal dynamics, 7.5 ECTS credits, plus Fluid mechanics, 7.5 ECTS credits, and Sustainable development, 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, and Thevenin's theorem,
- perform calculations on single-phase and three-phase alternating current circuits,
- give an account of the electricity systems in Sweden and Europe,
- describe and calculate the effects of sustainable electricity production facilities,
- give an account of electricity use in industry, housing, service sectors, and transportation,
- analyse the importance of electricity storage for the power system, and

- give an account of the requirements of national and international authorities for sustainable power systems in the future.

Content
The course covers the following:
- electrical circuits, calculations using Ohms and Kirchhoffs laws on series and parallel circuits
- single-phase and three-phase alternating current
- type of power, active, reactive, and apparent power, power factor correction
- the electricity systems of Sweden and Europe
- sustainable electricity production facilities
- electricity usage in industry, housing, service sectors, and transportation
- energy storage
- requirements from national and international authorities for sustainable electricity systems in the future

Reading List
See separate document.

Examination
Assessment is based on oral and written presentations of project tasks and an individual written exam. Project tasks are graded U/G (Fail/Pass). Written exams are graded U/3/4/5.

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.