Faculty of Health, Science and Technology
Electrical Engineering

Syllabus

Renewable Energy Systems

Course Code:	ELGC20
Course Title:	Renewable Energy Systems *Förnybara energisystem*
Credits:	5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has at least 60 credits in first-cycle course/s as entry requirements (G2F)

Major Field of Study:
ETA (Electrical Engineering)

Course Approval
The syllabus was approved by the Faculty of Health, Science and Technology 2017-03-08, and is valid from the Autumn semester 2017 at Karlstad University.

Prerequisites
Mechanics, 7.5 ECTS cr and Electrical Machines and Transformers, 10 ECTS cr, or equivalent

Learning Outcomes
The aim of the course is that students acquire knowledge about altenative and renewable energy systems.

Upon completion of the course, students should be able to:
- demonstrate knowledge of different energy sources with regard to future renewable energy supply
- analyse the basic principles and functions of solar energy systems, wind power systems and hydro power systems,
- demonstrate knowledge of alternative energy systems
- give an account of the basics of smart energy systems technology.

Content
Instruction is in the form of lectures, exercises and mandatory laboratory sessions.
The following components are treated:

Reasons for alternative energy sources, global warming and the effect of greenhouse gases. International agreements. Main characteristics of alternative energy sources and renewable energy sources.
Solar energy systems: The function and use of photovoltaic cells. System characteristics. Components and their connections in different systems.

Wind power: Technology and applications. The steps in energy conversion and components for on-grid connection.
Hydroelectric power: Different type of plants. Basic turbine technology and on-grid connection.
Alternative energy systems: Geothermal, biomass, nuclear, ocean and fuel cells power systems.
Energy storage systems.
Integration of renewable energy systems with the help of the smart energy systems.

Reading List
See separate document.

Examination
Assessment is based on a written exam and mandatory laboratory reports.

Grades
One of the grades Distinction (VG), Pass (G), or Fail (U) is awarded in the examination of the course. Engineering students are awarded one of the grades Distinction (5), Some Distinction (4), Pass (3) or Fail (U).

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.