



Faculty of Health, Science and Technology
Electrical Engineering

Syllabus

Renewable energy sources and their applications

Course Code:

ELGB16

Course Title:

Renewable energy sources and their applications
Förnybara energikällor och deras tillämpningar

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 2019-09-11, and is valid from the Spring semester 2020 at Karlstad University.

Prerequisites

Introduction to Physics for Electrical Engineering, 7.5 ECTS credits, and Circuit Analysis II, 7.5 ECTS credits, or equivalent

Learning Outcomes

The aim of the course is that students acquire knowledge about renewable energy sources and their applications.

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

- give an account of their knowledge about different energy sources in terms of future demands for a renewable energy supply, and
- give an account of and analyse principles and functions of energy sources related to solar energy, wind

power, biomass, geothermal energy, hydro power, and fuel cells.

Content

Instruction is in the form of lectures, exercises, and laboratory sessions. The course comprises the following:

- Introduction to energy sources and their environmental impact
- Solar cells: The properties of photovoltaic cell structure, solar cell modules and their placement, data sheet parameters, concentrated photovoltaics
- Wind power: The wind power curve, Betz's Law, turbines with horizontal and vertical shafts, wind power parks
- Biomass technology: Biomass resources, biofuels, anaerobic digestion, biomass power and heating
- Geothermal technology: Geothermal resources, geothermal applications for electric power and heating
- Hydro Power: Energy in running water, hydroelectric technology and water turbines, wave and tidal electric power generation
- Fuel cells: The structure and function of the fuel cell, types of fuel cells, and applications

Reading List

See separate document.

Examination

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

If students have a decision from Karlstad University entitling them to special pedagogical 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 Distinction (VG), Pass (G), or Fail (U) is awarded in the examination of the course. For students in Engineering programmes, 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.