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Faculty of Health, Science and Technology

## Program Study Plan

Study Programme in Electrical Engineering

<b>Programme Code</b>	TGHEL
<b>Programme Title</b>	Study Programme in Electrical Engineering
<b>Credits</b>	180
<b>Programme Approval</b>	The Programme Study Plan was approved by the Faculty Board of Health, Science and Technology on 1 February 2018 and is valid from the autumn semester of 2018.
<b>Language of Instruction</b>	Svenska och engelska
<b>Degree Level</b>	Bachelor
<b>Degree Type</b>	Professional degree
<b>Prerequisites</b>	General admission requirements plus upper secondary school level Mathematics 3c, Physics 2, Chemistry 1, field-specific eligibility A8, or standard eligibility E 3, or equivalent.

### General Information

The programme aims at preparing students for engineering jobs in the field of electrical engineering, especially renewable electrical energy for sustainability.

The focus is on providing opportunities for students to develop abilities to work independently as an engineer and to work with other people.

Examples of future areas of work for students who choose *electrical engineering* as a major are:

- Planning, constructing, initial starting, testing and troubleshooting of apparatus and subsystems, especially for renewable electrical energy
- Operational monitoring, maintenance and optimization of electro technical systems, especially for renewable electrical energy.
- Marketing, purchasing and selling of electro technical systems and components, especially for renewable electrical energy.

## **Aims**

For a Bachelor of Science in Engineering degree, students at Karlstad University shall meet the requirements specified in the *Higher Education Ordinance* (SFS 2006:1053) as follows:

### *Knowledge and understanding*

For a Degree of Bachelor of Science in Engineering the student shall

- demonstrate knowledge of the disciplinary foundation of the engineering field chosen and proven experience in this field as well as awareness of current research and development work, and
- demonstrate broad knowledge in the engineering field chosen and relevant knowledge of mathematics and the natural sciences.

### *Competence and skills*

For a Degree of Bachelor of Science in Engineering the student shall

- demonstrate the ability to identify, formulate and deal with issues independently and creatively using a holistic approach and to analyse and evaluate technological solutions
- demonstrate the ability to plan and using appropriate methods undertake tasks within predetermined parameters
- demonstrate the ability to use knowledge critically and systematically to model, simulate, predict and evaluate series of events on the basis of relevant information
- demonstrate the ability to design and manage products, processes and systems while taking into account the circumstances and needs of individuals and the targets for economically, socially and ecologically sustainable development set by the community
- demonstrate the capacity for teamwork and collaboration with various constellations, and
- demonstrate the ability to present and discuss information, problems and solutions in speech and writing and in dialogue with different audiences.

### *Judgement and approach*

For a Degree of Bachelor of Science in Engineering the student shall

- demonstrate the ability to make assessments informed by relevant disciplinary, social and ethical aspects
- demonstrate insight into the possibilities and limitations of technology, its role in society and the responsibility of the individual for how it is used, including social and economic aspects as well as environmental and occupational health and safety aspects, and
- demonstrate the ability to identify the need for further knowledge and undertake ongoing development of his or her skills.

### *Independent project (degree project)*

A requirement for the award of a Degree of Bachelor of Science in Engineering is completion by the student of an independent project (degree project) for at least 15 credits.

Upon completion of the programme, students should, beyond the general requirements for a Bachelor's degree specified in the *Higher Education Ordinance*, SFS 2006:1053, be able to:

### *Knowledge and understanding*

- demonstrate knowledge and understanding of measurement technology, computer engineering and programming, electrical circuits, analogue and digital electronics, energy systems, automatic control, and signal processing,
- demonstrate basic knowledge of the principles of economic, social and ecological sustainability in electrical power production,
- demonstrate enhanced knowledge of electrical power systems for renewable energy

### *Competence and skills*

- demonstrate skills in using the standard equipment and instruments of an electric engineering laboratory
- demonstrate skills in using modern engineering aids (e.g. computer based tools) in analysis and problem solving
- demonstrate ability to design and write a technical report according to good industrial standard
- demonstrate ability to work efficiently in a team based on their training and reflections

### *Judgement and approach*

- demonstrate ability to assess electrical power systems with consideration of scientific, social and ethical aspects
- demonstrate insight into the possibilities and limitations of renewable electrical energy possibilities and limitations and its role in society, including social and economic aspects
- demonstrate ability to identify their lack of knowledge and formulate options for action with respect to these.

### **Program Structure**

In the first year students study an introductory course and basic courses in mathematics and electrical engineering. In addition, students take courses in programming and mechanical engineering.

The second year comprises basic and continuation courses in mathematics, electrical engineering and system engineering.

The third year provides opportunities to study continuation courses and applied courses within electronics, sustainable electrical production and applied electrical power engineering. A degree project, preferably in conjunction with the community or industrial partners, concludes the study programme. Students who plan to continue studying may do a shorter degree project and add an appropriate course.

### **Programme Curriculum**

The programme covers courses in electrical engineering, including circuit engineering, digital electronics, analogue electronics, automatic control engineering, electrical power engineering, electrical renewable energy systems and natural sciences courses (135-142 ECTS credits\*) of which 15 ECTS credits are electives. Mathematics 22.5 ECTS credits. The programme concludes with an independent degree project of 15 or 22.5. ECTS credits.

\*) Depending on the scope of the degree project

### **Degree Title**

Degree of Bachelor of Science in Engineering, Electrical Engineering

### **Credit Transfer**

Students may transfer credits from previously completed university courses in Sweden or abroad subject to approval according to current regulations.

### **Additional Information**

The local regulations for studies Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.