

COURSE SYLLABUS

Course code: KRE600

## Power Electronics, 5 HE credits

Kraftelektronik, 5 hp

Established: 2021-03-25 Established by: Department of Engineering Science Applies from: V22

## Learning outcomes

#### Knowledge and understanding

The student must, after completing the course, be able to:

- show understanding of the operation and use of semiconductor components.
- analyze the operation of the commonly used power electronic converters.
- analyze the characteristics of semiconductor components and the losses in a converter.
- explain the principles of control of converters.

### Competence and skills

The student must, after completing the course, be able to demonstrate skill and ability to:

- explain the operation of a converter.
- calculate the losses for a converter.
- calculate the steady state operation point of a converter.
- analyze a converter with simulation tools.

### Judgement and approach

The student must, after completing the course, be able to:

• argue for the choice of converter topology and semiconductor components for a given application.

### Entry requirements

Degree of Bachelor of Science in mechanical engineering or equivalent. Additionally the Bachelor of Science degree must be comprised of a minimum of 5 HE credits in programming and 15 HE credits in mathematics. In addition, verified knowledge of English corresponding to the course English B/English 6 in the Swedish Upper Secondary School or equivalent.

### The forms of assessment of student performance

Individual written exam. Individual written assignment.

### **Course contents**

Semiconductor components such as diode, thyristor and transistor. Selfcommutated converters: topology and control of the firing angle. DC-converters: topology, control and choice of switching frequency and inductance,

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capacitance.

One-phase and three-phase voltage source converters: topology, pulse width modulation and vector control.

Calculation of losses for a converter, evaluation of different transistors.

Implementation of power electronic in an electrified vehicle.

Simulation of the converters, including demonstration of the principle of operation and choice of parameters.

## Other regulations

Course grading: U/3/4/5 Course language: The teaching is conducted in English.

General rules pertaining to examination at University West are available at www.hv.se.

If the student has a decision/recommendation on special support due to disability, the examiner has the right to examine the student in a customized examination form.

**Cycle** Second cycle

## Progressive specialization

A1N - second cycle, has only first-cycle course/s as entry requirements

# Main field of study

Electrical Engineering