



Faculty of Health, Science and Technology
Electrical Engineering

Syllabus

Power electronics

Course Code:	ELGA15
Course Title:	Power electronics <i>Kraftelektronik</i>
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:
ETA (Electrical Engineering)

Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2018-09-03, and is valid from the Spring semester 2019 at Karlstad University.

Prerequisites

Circuit Analysis 7.5 ECTS credits, or equivalent

Learning Outcomes

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

- demonstrate theoretical and practical knowledge of basic concepts and power electronic components,
- perform calculations on rectifiers for alternating current to direct current,
- perform calculations on inverters for direct current to alternating current,
- perform calculations on direct current converters,
- demonstrate knowledge of basic concepts for switching patterns of power converters in power electronics.

Content

- Introduction to power electronic systems and classification of power electronic semi-conductor switch: Scope and application, power processors and power switch, diodes, thyristors, bipolar transistors (BJT), field effect transistor (MOSFET), gate turn-off thyristors, insulated-gate bipolar transistors (IGBT), stable state, three phase voltage source and non-sinusoidal waveforms in stable states.
- Line frequency diode rectifiers: Basic concepts for rectifiers, single phase diode bridge rectifier and 3-phase fullbridge wave rectifier.
- Phase regulated line frequency rectifiers and inverters: Thyristor circuits and regulation, single phase converters and 3-phase converters.
- Direct current converters: Regulation, buck converter, boost converter and buck-boost converter.
- Switched inverters for direct and alternating current: Basic concepts for switched inverters, single phase inverters and 3-phase converters.

Reading List

See separate document.

Examination

Assessment is based on a written exam, mandatory laboratory sessions and lab 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 5 (Pass with Distinction), 4 (Pass with Some Distinction), 3 (Pass), or U (Fail) 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.