



Course syllabus

Faculty of Technology

Department of Physics and Electrical Engineering

4ED464 Avancerad kraftelektronik, 7,5 högskolepoäng

Advanced Power Electronics, 7.5 credits

Main field of study

Electrical Engineering

Subject

Electrical Engineering

Level

Second cycle

Progression

A1F

Date of Ratification

Approved 2022-08-15.

The course syllabus is valid from spring semester 2023.

Prerequisites

Basic eligibility for advanced level studies and special eligibility:

Bachelor Degree in Engineering/Science/Technology in Electrical Engineering, Energy Technology, Mechanical Engineering or equivalent, 180 credits

Power Electronics, Electric Power Technology or Signals and Systems or equivalent, 7.5 credits

Multivariable and Vector Analysis or equivalent, 7.5 credits

English 6 or equivalent

Objectives

After completing the course the student should:

- Get an understanding for construction, structure and control of power electronic systems

- Value and analyse different solutions for DC-AC and DC-DC converters, e.g. for motor drives and generator drives, with the aid of power electronics
- Model and simulate, alternatively measure and evaluate, power converters or parts of these.

The course provides understanding of how power electronics can be used both in the electric power grid (PV and wind) as well as in applications such as electric vehicles, medical and industrial applications as well as UPS (Uninterruptible Power Supply).

Content

The course covers the following topics:

- Overview of power electronic systems in society
- Fundamentals of switch-mode converters and components
- Motor control and generator operation
- Single-phase and three-phase converters
- Control of converters
- Applications: How converters are used in, for example, battery chargers, X-ray machines, electric vehicles, wind turbines, UPS, and motor control

Type of Instruction

The teaching consists of lectures, seminars, two laboratories and a minor project.

Examination

The course is assessed with the grades A, B, C, D, E or F.

The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

The course is assessed through a written exam (4.5 credits, A-F), written and oral presentation of the laboratories and presentation of the project work (3 credits, U/G). Repeat examination is offered in accordance with Local regulations for courses and examination at the first and second-cycle level at Linnaeus University.

If the university has decided that a student is entitled to special pedagogical support due to a disability, the examiner has the right to give a customised exam or to have the student conduct the exam in an alternative way.

Course Evaluation

During the implementation of the course or in close conjunction with the course, a course evaluation is to be carried out. Results and analysis of the course evaluation are to be promptly presented as feedback to the students who have completed the course. Students who participate during the next course instance receive feedback at the start of the course. The course evaluation is to be carried out anonymously.

Other Information

Grade criteria for the A–F scale are communicated to the student through a special

document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

Required Reading and Additional Study Material

Ned Mohan and Siddharth Raju. Analysis and Control of Electric Drives – Simulations and Laboratory Implementation, latest edition. Wileys. Pages: 450 (540).

Distributed material, IFE, 100 pages.

Other literature

Power Electronics - A first course. Mohan, Ned. Wiley & sons, latest edition.