



## Course syllabus

Faculty of Technology

Department of Physics and Electrical Engineering

4ED462 Avancerad kraftelektronik - hårdvara, 7,5 högskolepoäng

Advanced Power Electronics - hardware, 7.5 credits

### **Main field of study**

Electrical Engineering

### **Subject**

Electrical Engineering

### **Level**

Second cycle

### **Progression**

A1N

### **Date of Ratification**

Approved 2022-12-19.

The course syllabus is valid from autumn semester 2023.

### **Prerequisites**

General entry requirements for second-cycle studies and specific entry requirements:

- Bachelor's degree or equivalent in Electrical Engineering, Energy Technology, Mechanical Engineering, or related fields, 180 credits
- Knowledge in Power Electronics, Electric Power Engineering Signals and Systems, or equivalent, 7,5 credits
- Knowledge in Multivariable Calculus and Vector Calculus, or equivalent, 7,5 credits
- English 6 or equivalent

### **Objectives**

Upon completion of the course, the student is expected to:

- Gain an understanding of power electronic components and their non-idealities

- and be able to model them
- Be able to design and evaluate a high-power printed circuit board
- Be able to design, measure, and evaluate a high-power converter.

## Content

The course covers the following topics:

- Fundamentals of switch-mode components
- Switch-mode converters
- Measurement techniques and printed circuit boards for power electronics
- Simple rectifiers and inverters
- Applications

## Type of Instruction

The teaching is conducted in the form of lectures, seminars, two laboratory sessions, and a minor project assignment. Through lectures, seminars, guest lectures, laboratory sessions, and a minor project, an understanding is created of how power electronic components function, how to design a printed circuit board, and how to evaluate and measure. One application is high-power converters.

## 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

Analysis and Control of Electric Drives – Simulations and Laboratory Implementation,  
Ned Mohan och Siddharth Raju, latest edition. Wileys. Pages: 200 (540).

Scientific articles and other distributed materials, IFE, 100 pages