

## Applied Power Electronics

Tillämpad effektelektronik  
6 credits

Programme course

TNE106

Valid from: 2025 Spring semester

|  |                                  |                                   |
|--|----------------------------------|-----------------------------------|
| <b>Determined by</b>   | <b>Main field of study</b>       |                                   |
| Board of Studies for Electrical Engineering, Physics and Mathematics | Electrical Engineering           |                                   |
| <b>Date determined</b>   | <b>Course level</b>              | <b>Progressive specialisation</b> |
| 2024-08-28   | First cycle                      | G2F                               |
| <b>Revised by</b>  | <b>Disciplinary domain</b>       |                                   |
|  | Technology                       |                                   |
| <b>Revision date</b>   | <b>Subject group</b>             |                                   |
|  | Electrical Engineering           |                                   |
| <b>Offered first time</b>  | <b>Offered for the last time</b> |                                   |
| Spring semester 2023   |                                  |                                   |
| <b>Department</b>  | <b>Replaced by</b>               |                                   |
| Institutionen för teknik och naturvetenskap                          |                                  |                                   |

## Specific information

The course can not be included in a degree together with TNE102.

## Course offered for

- Master of Science in Electronics Design Engineering

## Prerequisites

Circuit theory, Circuit theory, advanced course, Analog electronics

## Intended learning outcomes

After completing the course the students should be able to:

- describe and do calculations on converters including associated power electronic components and cooling thereof
- describe and do calculations on common electric machines and on simple non symmetric three phase systems with symmetric components
- be familiar with measurement methods in systems with common electric machines and power converters.
- do simulations of power electronic systems with dedicated software.

## Course content

The three phase system – Symmetric components

Electric machines – The DC machine, asynchronous and synchronous machines, single phase and three phase transformers.

Converters – Different types of power semiconductors for power converters. Classification of converters. Power converters for single and three phase. Converters with inductive load. Power calculations. EMC and impact on the grid. DC-choppers and DC-DC converters. Different types of inverters for DC-AC conversion.

Thermal calculations – Thermal resistance and thermal impedance.

Simulation of systems with power electronic semiconductor components.

## Teaching and working methods

Lectures, exercises and laboratory work.

## Examination

|      |                     |           |            |
|------|---------------------|-----------|------------|
| TEN1 | Written Examination | 4 credits | U, 3, 4, 5 |
| LAB1 | Laboratory Work     | 2 credits | U, G       |

Grades for examination modules are decided in accordance with the assessment criteria presented at the start of the course.

## Grades

Four-grade scale, LiU, U, 3, 4, 5

## Other information

Supplementary courses: CDIO-course

### About teaching and examination language

The teaching language is presented in the Overview tab for each course. The examination language relates to the teaching language as follows:

- If teaching language is “Swedish”, the course as a whole could be given in Swedish, or partly in English. Examination language is Swedish, but parts of the examination can be in English.
- If teaching language is “English”, the course as a whole is taught in English. Examination language is English.
- If teaching language is “Swedish/English”, the course as a whole will be taught in English if students without prior knowledge of the Swedish language participate. Examination language is Swedish or English depending on teaching language.

### Other

The course is conducted in such a way that there are equal opportunities with regard to sex, transgender identity or expression, ethnicity, religion or other belief, disability, sexual orientation and age.

The planning and implementation of a course should correspond to the course syllabus. The course evaluation should therefore be conducted with the course syllabus as a starting point.

The course is campus-based at the location specified for the course, unless otherwise stated under “Teaching and working methods”. Please note, in a campus-based course occasional remote sessions could be included.