

Power Electronics

Programme course

6 credits

Effektelektronik

TSTE25

Valid from: 2017 Spring semester

Determined by

Board of Studies for Electrical
Engineering, Physics and Mathematics

Date determined

2017-01-25

Offered for the last time

Autumn semester 2023

Replaced by

TSTE28

Main field of study

Electrical Engineering

Course level

Second cycle

Advancement level

A1X

Course offered for

- Engineering Electronics
- Computer Science and Engineering, M Sc in Engineering
- Mechanical Engineering, M Sc in Engineering
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Electronics Engineering, Master's programme
- Information Technology, M Sc in Engineering
- Applied Physics and Electrical Engineering - International, M Sc in Engineering

Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites

Circuit Theory

Intended learning outcomes

The aim of the course is to give the student knowledge of principles for power electronics such as voltage conversion and power control. After completed course shall the student know how to

- explain and analyze the function of DC-DC, AC-DC and DC-AC converters
- calculate the waveforms in DC-DC, AC-DC. and DC-AC converters
- describe the function of common semiconductors used in power control
- describe and model thermal effects
- describe various pulse width modulation principles
- describe the control of DC-DC, AC-DC and DC-AC converters
- know about drive and protection circuits for power control

define the base requirements for selection of components in converter design

Course content

Power electronic applications, diode rectifiers, thyristor rectifiers, switch mode converters (DC-DC, AC-DC and DC-AC), power semiconductors, semiconductor rating and thermal effects, Boost, converter control and protection, switch-mode power supply, variable speed drive, high voltage applications (HVDC, SVC).

Teaching and working methods

The course is given through lectures, exercises and labs. A project task is included related to design of a power converter. The work will involve computer simulation, selection of components and measurements on the final circuit. Each sub-task will be separately reported. A final presentation is given to complete the project.

Examination

| | | | |
|------|-----------------|-----------|------|
| LAB1 | Laboratory Work | 1 credits | U, G |
| PRA1 | Project | 5 credits | U, G |

Grades are given as 'Fail' or 'Pass'

Grades

Two-grade scale, U, G

Department

Institutionen för systemteknik

Director of Studies or equivalent

Tomas Svensson

Examiner

Tomas Uno Jonsson

Course website and other links

<http://www.isy.liu.se/edu/kurs/TSTE25/>

Education components

Preliminary scheduled hours: 52 h

Recommended self-study hours: 108 h

Course literature

Additional literature

Books

N. Mohan, T M Undeland, W P Robbins, (2003) *Power Electronics, Converters, Applications, and design* Wiley

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.