



Course syllabus

Elenergiteknik Electrical Engineering

ESSF15, 5 credits, G2 (First Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED E

Date of Decision: 2023-04-11

General Information

Main field: Technology.

Compulsory for: E3

Elective for: W4-et

Language of instruction: The course will be given in Swedish

Aim

The course is aiming at giving basic knowledge of the electric energy system and its use in society. It is aiming at identifying and explaining technology and systems for generation, transmission, and use of electric energy and the models thereof from an engineering point of view.

Relation to other compulsory courses in Electrical Engineering

The course connects to the course

- *Electromagnetic Fields* concerning the magnetic fields from overhead lines and working principle of transformers and electric machines
- *Electrical Measurements* concerning the measurement of both electric and non-electric variables
- *Analogue Circuits* concerning systems for control and electric power conversion
- *Physics of Devices* concerning the use of power electronic components.

The course is very relevant for sustainable development. In focus of the climate transition is the energy transition, where fossil energy is replaced by electric energy from renewable sources. Electric energy is also very important for our prosperity. The course describes generation, transmission and use of electricity and also solutions that minimise energy use and environmental impact.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

be able to

- use the concepts of energy and power generally, and especially for different types of electric power generation,
- describe methods for generation, transmission, conversion, and use of electric energy and their characteristics
- explain and use the modelling and analysis of the dynamic characteristics of certain energy systems.

Competences and skills

For a passing grade the student must

be able to

- inform and describe the subject in a mature way
- relate to the order of magnitude for various forms of energy use
- describe modelling and analysis of industrial electrotechnical problems.

Judgement and approach

For a passing grade the student must

- show insight in the possibilities and limitations of electric energy, its role in society, and man's responsibility for its use, including technical, economic, and environmental aspects.

Contents

Global view of electricity use and its geographic variation. Comparison of different types of electricity generation considering aspects such as availability, renewability, environment impact, and prospects. Assessment of the proportions of energy used for various purposes. Comparison of electricity use in the sectors of society, where buildings are emphasized.

Systems for generation and transmission of electric energy. Operating principles of various energy consumers like motors, heating and lighting.

Description, modelling and analysis of AC and DC machines, transformers, and AC and DC power electronic converters.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: Laboratory work and two written partial exams give the grade three during the course. For higher grades, or if any of the partial exams is not passed, there will be a written exam.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Parts

Code: 0112. **Name:** Continuous Examination and Laboratory Work.

Credits: 5. **Grading scale:** UG.

Code: 0212. **Name:** Electrical Engineering.

Credits: 0. **Grading scale:** TH.

Admission

Assumed prior knowledge: ESS010, EITA35 Electronics and ESSF01 Analogue Circuits or equivalent.

The number of participants is limited to: No

The course overlaps following course/s: ESS060

Reading list

- Föreläsningspresentationer och kompendietexter.

Contact and other information

Course coordinator: Professor Olof Samuelsson, olof.samuelsson@iea.lth.se

Course homepage: <https://www.lth.se/iea/utbildning/obligatoriska-kurser-i-lund/elenergiteknik/>