

Course syllabus

Elektroteknikens grunder Electrical Engineering, Basic Course

EIEF35, 9 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: M3, MD3

Language of instruction: The course will be given in Swedish

Aim

Mechanical engineers need to use more electrical engineering today than ever before. Most products, processes, and systems involve one or more of the following items:

- measurement of electrical and non-electrical variables;
- signal processing;
- analogue and digital, power electronics and electromechanical energy conversion.

To be able to design and use such technology, the engineer needs basic knowledge of electrical engineering. The aim of this course is to give a broad knowledge of the wide field from Ohm's law to computer-based control of servo motors. The course is also a starting point for advanced courses in electric power systems, power electronics and electrical machines.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- be able to account for the theory of DC and AC circuits
- have basic knowledge in applied electronics, both analogue and digital

- have basic knowledge in electric measurement, sensors and how signals are amplified and filtered
- have basic knowledge in how electric machines in industrial drive systems work and are controlled
- have basic knowledge in Boolean algebra, digital combinatorial networks, the structure of the micro computer and basics for its programming
- have basic knowledge in programming of a PLC-system (industrial programmable digital control systems).

Competences and skills

For a passing grade the student must

- be able to analyse basic DC and AC circuits
- be able to suggest and analyse basic circuits in signal electronics, e.g. suggest a circuit for interfacing a sensor signal to its control computer
- be able to elect a suitable industrial drive system for a given application
- be able to perform basic automation control using a PLC-system.

Contents

DC: Current, voltage, resistance. Ohm's and Kirchhoff's laws. Electric energy, power and efficiency. Practical circuit computations.

AC: Measurement methods. Time, frequency, the j omega-method. Three phase. Active, reactive, apparent power and power factor.

Electronics: Diode, AC-DC converter, the transistor as a switch, OP-amplifiers. Bode diagram.

Digital systems: Binary code, Boolean algebra, states, programmable circuits. The microprocessor. Control using PLC (Programmable Logic Circuits).

Electric machines and power electronics: Industrial drive systems: electromagnetic force, fundamental electrical machines, power electronic components and circuits, control.

Measurement technology: Sensors. Measurement of electric and non-electric variables.

Examination details

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

Assessment: Passed laboratory work including preparatory tests and two written partial exams. Material from the first partial exam might occur also in the second one. The grade for the course is based on the weighted mean of the result of the two partial exams.

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: 0117. **Name:** Electrotechnics, Partial Examination 1.

Credits: 4. **Grading scale:** TH. **Assessment:** Written examination with three assignments.

Code: 0217. **Name:** Electrotechnics, Partial Examination 2.

Credits: 5. **Grading scale:** TH. **Assessment:** Written examination with three assignments.

Code: 0317. **Name:** Laboratory Exercise.

Credits: 0. **Grading scale:** UG.

Code: 0417. **Name:** Laboration Preparation.

Credits: 0. **Grading scale:** UG.

Admission

Assumed prior knowledge: FMAA01 One Dimensional Analysis.

The number of participants is limited to: No

The course overlaps following course/s: MIE012, MIE011, MIE030

Reading list

- ISBN: 978-126-0598-09-4. Rizzoni, G. Principles and Applications of Electrical Engineering, 7:th edition. McGraw-Hill, 2021.
- Compendium with exercises. Laboratory PMs can be downloaded.

Contact and other information

Course coordinator: Tekn dr Johan Björnstedt, Johan.Bjornstedt@iea.lth.se

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