

SYLLABUS

Electrical Engineering and Electromagnetic Field Theory 7.5 credits F0054T

Elektroteknik och elfältteori

Course syllabus admitted: Autumn 2023 Sp 1 - Present

**DECISION DATE
2022-02-14**

Electrical Engineering and Electromagnetic Field Theory 7.5 credits F0054T

Elektroteknik och elfältteori

First cycle, F0054T

| Education level | Grade scale | Subject | Subject group (SCB) |
|-----------------|-------------|---------|---------------------|
| First cycle | G U 3 4 5 | Fysik | Physics |

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language and basic courses in calculus, algebra, analysis and ordinary differential equations corresponding to the courses M0047M, M0048M, M0049M, M0032M.

Selection

The selection is based on 1-165 credits.

Course Aim

Knowledge and understanding

- Knowledge of components of linear electrical circuits
- Knowledge of methods for calculations on linear circuits
- Understand how electrical fields are produced and how they are affected by dielectric materials
- Understand how magnetic fields are produced, induction, and electromagnetic waves

Skill and ability

- Apply methods for calculations on linear electrical circuits
- Apply vector calculus on problems in electromagnetism
- Apply geometrical symmetry to solve electromagnetic problems

Approach and values

- Practice problem solving
- Practice the ability to make reasonable approximations and assumptions
- Judge whether a problem may be solved analytically, or if numerical methods are required
- Estimate if calculated results are reasonable
- Gain insight in applications of linear circuits and electromagnetism in science and engineering

Contents

Electrical engineering: Linear circuits, DC and AC voltages in stationary and transient processes.

Electromagnetic field theory: Electrostatics, dielectrics, conductors. Methods for potential problems. Magnetic fields. Maxwell's equations, including Faraday's law of induction.

Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

There will be lessons - lectures combined with problem solving - and two mandatory laboratory exercises in electrical engineering, in groups of 2-3 students. At least one of the labs will include a written report. The students will practice problem solving on their own and in groups, as well as handling modern lab equipment. The students will gradually develop their ability to formulate and analyze problems in electrical engineering and electromagnetism.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided.

Mandatory assignments, written exam, and laboratory exercises

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term "unauthorized aids" refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Course offered by

Department of Engineering Sciences and Mathematics

Modules

| Code | Description | Grade scale | Cr | Status | From period | Title |
|------|--------------|-------------|-----|-----------|-------------|-------|
| 0004 | Assignments | U G# | 2 | Mandatory | A18 | |
| 0006 | Laborations | U G# | 1 | Mandatory | A18 | |
| 0007 | Written exam | G U 3 4 5 | 4.5 | Mandatory | A21 | |

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Last revised

by Niklas Lehto, Programme Director 2022-02-14

Syllabus established

by HUL Mats Näsström 2017-02-14