SYLLABUS

Electromagnetic field theory 7.5 credits F0007T

Elektromagnetisk fältteori

Course syllabus admitted: Autumn 2023 Sp 1 - Present

DECISION DATE
2021-02-17

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Electromagnetic field theory 7.5 credits F0007T

Elektromagnetisk fältteori

First cycle, F0007T

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

Main field of study

Engineering Physics and Electrical Engineering

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 M0029M Calculus, M0030M Linear Algebra and Calculus, M0031M Linear Algebra and Differential Equations M0031M M0032M Functions of Several Variables and Computer Tools, M0018M Linear Analysis or equivalent courses where there mathematical analysis in several dimensions, and vector analysis are included.

Selection

The selection is based on 1-165 credits.

Course Aim

After completing the course, you should:

1. Knowledge and understanding

- Understand how electrostatic fields are generated and how the fields are affected by dielectric materials.
- Understand how magnetostatic fields are generated and how the fields are affected by magnetic materials.
- Understand the interaction between electric and magnetic fields: electromagnetism.
- Describe and exemplify the limitations of the possibility of solving electromagnetic problems analytically.
- Have insight into ongoing research and development work where electromagnetism is central.

2. Skill and ability

- Use vector analysis to solve electromagnetic problems.
- Determine when electromagnetic problems can be solved using symmetry.
- Apply electromagnetic problems in more complex geometry in a form suitable for numerical calculation.
- Make appropriate approximations and assumptions with regard to the physics of the problems described.

3. Approach and ability to estimate

- Have trained the ability for practical problem solving.
- Developed the ability to assess the reasonableness of achieved results linked to the electromagnetic theory.
- Knowledge of the need for knowledge in electromagnetism within one's own future professional discipline, and science and engineering in general.

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Contents

Vector analysis. Electrostatics and direct current, dielectrics and conductors. Special methods for potential and marginal value problems. Quasi-static magnetic fields, magnetic materials. Faraday's induction layer. Maxwell's equations. Electromagnetic waves.

Realization

Each course occasion´s language and form is stated and appear on the course page on Luleå University of Technology's website.
The course is organized according to the model: lectures and lessons. During the lessons, the student works with solving problems under the guidance of a teacher. Solutions to appropriately chosen problems in the course can be downloaded from the course room in the learning platform. During the course, the student works with solving problems that gradually builds up the student's ability to formulate and analyze problems in 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. Written exam and laboratory work that is examined with a written report. Grading takes place according to the grading scale G U 3 4 5. All examination parts must be completed for the final grade on the course.

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.

Remarks

The course can not be combined with F0056T.

Overlap

The course F0007T is equal to MTF105, F0056T

Course offered by

Department of Engineering Sciences and Mathematics

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0003	Laboratory work/Written report	U G#	1.5	Mandatory	S18	
0004	Written exam	G U 3 4 5	6	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 Head Faculty Programme Director Niklas Lehto 2021-02-17

Syllabus established

The syllabus was established by the Department of Applied Physics and Mechanical Engineering 2007-02-28, and remains valid from autumn 2007.