



Course syllabus

Elektromagnetisk fältteori Electromagnetic Field Theory

EITF85, 6 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: F3, Pi3

Elective for: N4

Language of instruction: The course will be given in Swedish

Aim

The purpose of the course is to give a coherent description of the basic theory as well as of applications of electromagnetic theory. Emphasis will be on physical insight coupled to the use of mathematical models. The course is also intended to throw light upon the numerous applications of electromagnetic field theory such as optics, electronics, and communication technology.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- be able to explain how electric charge and electric current generate and are affected by electric and magnetic fields
- be able to describe the electromagnetic properties of different materials
- be able to apply the Maxwell equations to simple electrostatic, magnetostatic and electrodynamical problems
- be able to understand basic propagation and generation of electromagnetic waves

Competences and skills

For a passing grade the student must

- show ability to, from an engineering point of view, assess electromagnetic problems, make relevant approximations and choose suitable methods of solution
- show ability to analyze and model electromagnetic problems, to interpret and present the results

Judgement and approach

For a passing grade the student must

- be able to explain the strength and the generality of a field theoretical description of physical phenomena
- understand that electromagnetism is the foundation to electronics, optics and radio communications

Contents

Repetition of electrostatics. Magnetostatic fields. Vector potential. Magnetisation. Induction. Maxwell's equations. Electromagnetic waves.

Examination details

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

Assessment: Written examination.

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.

Admission

Assumed prior knowledge: FMAB65+FMAB70 Calculus in One Variable, FMAB35 Calculus in Several Variables. FMAB20 Linear algebra. FMAN55 Applied Mathematics. For N the requirement FMAB35 is replaced by FMAB30 Calculus in Several Variables, and FMAN55 is replaced by FMFF20 Mathematical Methods of Nanotechnology.

The number of participants is limited to: No

The course overlaps following course/s: ESS050, ETEF01, EITF80, ETE055

Reading list

- Griffiths, D J: Introduction to Electrodynamics. Cambridge University Press, 2017, ISBN: 978-1-108-42041-9.
- Karlsson, A, Kristensson, G, Sohl, C: Exempelsamling Elektromagnetisk fältteori.

Contact and other information

Course coordinator: Johan Lundgren, joan.lundgren@eit.lth.se

Course homepage: <http://www.eit.lth.se/course/eitf85>