LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Elektromagnetisk fältteori
Electromagnetic Fields

EITF80, 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: E3
Elective for: D4
Language of instruction: The course will be given in English

Aim

The student shall acquire fundamental knowledge of vector analysis and electromagnetic theory.
The student shall acquire a good ability to perform calculations on given problems.
The student shall acquire good knowledge of the electromagnetic concepts that are used in electrotechnical applications, e.g., electronics, measurement techniques and electric power techniques.

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 use cylindrical coordinates, spherical coordinates, the nabla operator, Stokes´ theorem and Divergence theorem.
- be able to use equations such as Coulomb's law, Biot-Savart law, the law of induction and Maxwell's equations.
- be able to explain concepts such as capacitance, inductance, induction, wave propagation and antenna.

Competences and skills
For a passing grade the student must

- be able to analyse an solve basic problems of electrostatics, magnetostatics, quasistationary and general electromagnetic field theory.
- be able to explain how given problems of electromagnetic field theory can be solved.

Judgement and approach
For a passing grade the student must

- understand that electromagnetic field theory is fundamental for all technique and all science that involves electric, magnetic and electromagnetic fields.
- be able to describe the strength of and the possibilities of a mathematical model of the type that electromagnetic field theory is an example of.

Contents

Vector analysis, electrostatics, magnetostatics, induction and general time-dependence. Examples of what is treated in the course are divergence, curl, electric fields in vacuum and in materials, capacitors, system of conductors, the image method, Biot-Savart law, force, inductance, the law of induction, Maxwell's equations, plane waves and antennas.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Compulsory written test and 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.

Parts
Code: 0117. **Name:** Written Examination.
Credits: 6. **Grading scale:** TH. **Assessment:** Written examination. **Contents:** Vector analysis and electromagnetic field theory.
Code: 0217. **Name:** Control Examination.
Credits: 3. **Grading scale:** UG. **Assessment:** Written examination. **Contents:** Vector analysis and electromagnetic field theory.

Admission

Admission requirements:

- FMAB30 Calculus in Several Variables

Assumed prior knowledge: FMAA01 or FMAA05 Calculus in one variable, FMA420/FMAB20 Linear algebra.
The number of participants is limited to: No
The course overlaps following course/s: ESS050, ETE055, ETEF01, FMFF01, EITF85

Reading list

- David K. Cheng: Field and Wave Electromagnetics (2nd Edition, Pearson New International Edition). Pearson, 2013, ISBN: 1292026561, ISBN: 978-1292026565.

Contact and other information

Course coordinator: Buon Kiong Lau, buon_kiong.lau@eit.lth.se
Course homepage: http://www.eit.lth.se/course/eitf80
Further information: