



## Course syllabus

Faculty of Technology

Department of Physics and Electrical Engineering

2FY810 Elektromagnetisk fältteori, 7,5 högskolepoäng

2FY810 Electromagnetic Field Theory, 7.5 credits

### **Main field of study**

Physics

### **Subject Group**

Physics

### **Level of classification**

First Level

### **Progression**

G2F

### **Date of Ratification**

Approved 2009-12-01

Revised 2018-04-23 by Faculty of Technology. Removal of ECTS-grading scale and course evaluation is changed.

The course syllabus is valid from autumn semester 2018

### **Prerequisites**

Physics 45 credits and Mathematics 30 credits including a course in Vector analysis or equivalent.

## Objectives

After successfully completing the course the student should have:

- a deeper knowledge of electromagnetic field theory,
- knowledge of the use of mathematics and simulation as tools in problem solving and model building in electromagnetic field theory
- understanding of the importance of measurement and observation and the different roles played by experiment and theory in physics.

## Content

The course contents is:

- electrostatics: Gauss law, spherical and cylinder symmetric solutions, potential, dipole, capacitance
- electrical properties of materials, polarization, dielectric material, conductors

- magnetostatics: Biot-Savart's law, induction, inductance
- Lorentz-force
- time dependent electromagnetic fields and radiation, plane wave solutions and basic optics.

### Type of Instruction

The teaching consists of lectures, problem solving exercises, computer simulations and laboratory work. Participation in the laboratory work and simulations is obligatory.

### Examination

The course is assessed with the grades Fail (U), Pass (G) or Pass with Distinction (VG).

The examination may be given in writing or orally and consist of theoretical questions or problems to solve. The principal assessment method for the course is determined at the beginning of the course.

### Course Evaluation

During the course or in close connection to the course, a course evaluation is to be carried out. The result and analysis of the course evaluation are to be communicated to the students who have taken the course and to the students who are to participate in the course the next time it is offered. The course evaluation is carried out anonymously. The compiled report will be filed.

### Other

On request, a Swedish University course certificate will be awarded upon successful completion of the course.

Students who receive a passing grade in the course may download a course certificate through the Student Portal. Otherwise they may request a course certificate from the school secretary.

### Required Reading and Additional Study Material

#### Required reading

Engström, L E, *Elektromagnetism*, Studentlitteratur, 2000. Pages 175 (180).

ALT:

Lorrain, P & Corson, D R, *Electromagnetism*, Freeman 1990. Pages 317 (467).

ALT:

David K Cheng, *Field and Wave Electromagnetics* (2nd Edition), Addison-Wesley. UK 1989. 717 pages.