



Course syllabus

Faculty Board of Science and Engineering
School of Computer Science, Physics and Mathematics

2FY810 Elektromagnetisk fältteori, 7,5 högskolepoäng
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 by Organisational Committee 2009-12-01

The course syllabus is valid from autumn semester 2010

Prerequisites

Physics 45hec, Mathematics 45hec

Expected learning outcomes

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: potential, the electric dipole, the electric quadrupole, boundary value problems.
- Magnetostatics: Biot-Savart's law, the magnetic dipole, induction, the vector potential, energy of the magnetic field
- Time dependent fields and radiation
- Maxwell's equations: electromagnetic waves, electric and magnetic properties of solids, polarization, dielectrics, dia- and paramagnetism, hysteresis
- Waveguides, Relativistic concepts in electromagnetic field theory, Lorentz invariance, the dynamics of charged particles.

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.

On request, students may have their credits translated to ECTS-marks. Such a request must be sent to the examiner before the grading process starts.

Course Evaluation

A written course evaluation will be carried out at the end of the course in accordance with the guidelines of the University. The course evaluation will be filed at the department

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).