



HÖGSKOLAN I GÄVLE

Electromagnetic Fields and Waves 7.5 cr

Elektromagnetiska fält och vågor 7,5 hp

Set by Faculty of Engineering and Sustainable Development

Version

Set at

Valid from

10/1/07

HT2007

Level	G2F
Education level	First cycle
Course identifier	FY008C
Credits	7.5 cr
Main field of study	Physics
Subject group	Physics
Disciplinary domain	Natural sciences 100.0 %

Learning outcomes

After finished course the student is expected to be able to:

- Deriving and applying Maxwells equations
- Expressing problems in terms of fields and forces
- Understand conceptually and quantitatively the connection between magnetism and relativity
- Understand the origin of inductance and the inductive force
- Be able to perform inductance calculations
- Understand and measure electric and magnetic material properties
- Be able to perform multipole expansion of electric and magnetic systems
- Deriving and applying the concept of the electromagnetic wave
- Be able to perform calculations on electromagnetic wave propagation in different materials

Course content

- Electric and magnetic force and energy
- Electric and magnetic potential
- Electric current
- Theory of special relativity
- Faraday-Henry induction
- Continuity conditions for fields
- Multipole expansion of electric and magnetic potentials

- Electric and magnetic material properties
- Maxwells equations
- Electromagnetic waves: plane waves, propagation, refraction, reflection

Teaching

Lectures and laboratory work.
Problem solving

Prerequisites

B.Sc. Electrical Engineering or 30 credits in basic physics

Examination

Written examination and Laboratory work.

Grade

A, B, C, D, E, Fx, F

Sustainable environment

Content with sustainable development is not relevant to this course.

Module

0010	Written examination	6 cr	Grade: AF
0020	Laboratory work	1.5 cr	Grade: UG