



# 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**

<b>Level</b>	G2F
<b>Education level</b>	First cycle
<b>Course identifier</b>	FY008C
<b>Credits</b>	7.5 cr
<b>Main field of study</b>	Physics
<b>Subject group</b>	Physics
<b>Disciplinary domain</b>	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