IM1601 Elementary Physics 9.0 credits

Grundläggande fysik

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for IM1601 valid from Autumn 2014

Grading scale

A, B, C, D, E, FX, F

Education cycle

First cycle

Main field of study

Physics

Specific prerequisites

Basic and specific requirements for engineering program.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The course aims to provide students with a basic knowledge and skills in applying Newtonian mechanics, wave theory and electrostatics and apply these skills to practical problems. Below is a list of specific goals that students must meet after completing the course.

Newtonian mechanics:

- Apply Newton's three laws of motion for simple mechanical systems.
- Solve simple equations of motion.
- Apply the laws of the kinetic energy and momentum.
- Solve problems with harmonic oscillation with and without damping.
- Draw the forces and moments as well as set up the equations of motion and energy relations for a body.
- Use the equations of motion and energy to determine properties such as velocity and position as a function of time.

Waves:

- Relate to and apply the basic differences between mechanical and electromagnetic waves.
- Relate a real harmonic or spherical wave to its mathematical description.
- Apply basic concepts such as interference, beats, diffraction, standing waves and polarization.

Electrostatics (electric and magnetic properties):

- Relate to fundamental questions of and solve technical problems related to electric and magnetic fields.

Overall:

- Applying all of the above to solve realistic problems.
- For higher grades: all the above should be applied in diverse areas of wave physics, mechanics and electrostatics. This includes applications that have not been discussed in the course.
- Develop and deepen the student's understanding of basic concepts and methods in science.
- Performing and critically assess the results of some physics experiments and report the results in a well written and concise lab report.

Course contents

- **Mechanics:** Vectors, forces, inertial systems, Newton's laws, work, power, energy, circular motion, center of mass, inertia, particle systems and CG motion, linear fluctuations, harmonics, damped oscillations.
- **Waves:** harmonic and spherical waves, wave propagation, mechanical waves, intensity, reflection, standing waves. Electromagnetic waves, polarization, interference, diffraction, lasers, basic geometrical optics.

- **Electrostatics (electric and magnetic properties):** Electrical power, field strength and potential, Gauss' theorem, electric field and electric potential in metals and dielectrics, the principle of the capacitor, electrostatic energy. Magnetic force, magnetic materials, magnetic energy. Electromagnetic induction.

Course literature

"Sears and Zemansky's university physics : University physics", R.A. Freedman, H.D. Young, A.L. Ford

Examination

- LAB1 - Laboratory Work, 1.5 credits, grading scale: P, F
- TEN1 - Examination, 7.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.