LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Fysik - Mekanik och vågor
Physics - Mechanics and Waves

FAFA01, 9 credits, G1 (First Cycle)

Valid for: 2023/24
Faculty: Faculty of Engineering, LTH
Decided by: PLED N
Date of Decision: 2023-04-17

General Information

Main field: Technology.
Compulsory for: E1
Language of instruction: The course will be given in Swedish

Aim

The student should develop his understanding of basic concepts and ideas within both classical and modern physics needed in subsequent courses and necessary for a future role as an electrical engineer. Many of the concepts introduced are also of great importance for a deeper understanding of the world around us and as parts of the general scientific knowledge. The course should also train the student in scientific problem-solving techniques and in written presentations of experimental data and comparisons with physics models. Together with other courses in the program the student should expand and maintain his ability to use high-level programs (e.g. MatLab) as a tool for presenting and analyzing experimental data and physics models.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- understand the relation between experiments, models and theory
- be able to use the fundamental laws of mechanics to investigate simple static and dynamic cases, particularly oscillating systems.
- understand basic wave phenomena and their application in optics and acoustics

Competences and skills

For a passing grade the student must

- be able to formulate and solve problems in physics using mathematical methods.
- appreciate the scientific method of applying the same models, with different degree of approximation, to a number of different problems.
- be able to plan and perform physics experiments.
- be able to write a laboratory report that presents and analyzes experimental data in relation to physical models.
- be able to use high-level software (e.g. MatLab) to visualize, present and analyze data and theoretical models

Judgement and approach
For a passing grade the student must

- be able to evaluate models and technical applications in a scientific manner
- increase his ability to work in a group towards a common goal

Contents

Key concepts of mechanics: velocity, acceleration, force, energy, power, momentum, moment of inertia, angular momentum and torque. Newtons laws. Conservation laws. Static equilibrium, center of mass, free body diagrams and friction. Harmonic oscillations: free, damped and driven. Basic understanding of various wave phenomena in acustics and optics. Examples of such phenomena are wave propagation, reflection, dispersion, diffraction and interference. Gratings and grating spectroscopy. Polarization.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Written exam and completed laboratory sessions.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Parts
Code: 0108. **Name:** Physics - Mechanics and Waves.
Credits: 7. **Grading scale:** TH. **Assessment:** Written exam. **Contents:** Physics - Mechanics and Waves
Code: 0208. **Name:** Laboratory Sessions in Mechanics and Waves.
Credits: 2. **Grading scale:** UG. **Assessment:** Completed laboratory sessions and reports. **Contents:** The laboratory sessions: Motion of a falling body, Oscillatory motion, Geometrical optics, Diffraction of light.

Admission

Assumed prior knowledge: FMAA05 Calculus in One Variable. Experience of MATLAB.
The number of participants is limited to: No
The course overlaps following course/s: FAF260, FAFA05, FAFF30, FAFA65, FAFF25, FAFF40, FAFA50, FAFA60

Reading list

- Tipler, P A, Mosca, G. Physics for Scientists and Engineers. Extended version, sixth edition. Freeman 2008, ISBN: 0-7167-8964-7.

- Laboratory work manual Fysik - Mekanik och Vågor för E.

Contact and other information

Course coordinator: Lars Rippe, lars.rippe@fysik.lth.se
Course homepage:
http://www.atomic.physics.lu.se/education/mandatory_courses/fafa01_fysik_mekanik_och_vaagor/
Further information: It is mandatory to attend the first lecture in order to be admitted to the course. Some elements may be taught and assessed in English. This includes a maximum of 1.5 hp, in the form of laboratory sessions or written assignments.