LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Termodynamik, våglära och optik
Thermodynamics, Waves and Optics

FAFA65, 7,5 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: BME1
Language of instruction: The course will be given in Swedish

Aim

The aim of this course is for the student to acquire a fundamental knowledge of thermodynamics, waves and optics and applications within the areas. A good understanding of these parts of physics is essential for concept-building within rapidly developing research areas.

The course will also train the students ability of problem solving, modelling, experimental work and written communication. The course is also aiming at stimulating the student to apply physics in explaining everyday phenomena.

Learning outcomes

Knowledge and understanding
For a passing grade the student must

- be able to analyze problems and perform and interpret calculations within the field.
- understand how mathematical models, analogies and pictures interact with experiments and reality.
- be able to explain everyday phenomena using correct concepts and an adequate language.

Competences and skills

For a passing grade the student must

- be able to use and interpret models.
- be able to apply the experimental methods presented in the course.
- be able to write a well structured project report in which experimental data are presented and analyzed.
- be able to perform oral presentations and participate in discussions.
- be able to search for and use relevant information within the field.

Judgement and approach
For a passing grade the student must

- be able to evaluate experimental methods used in the course.
- be able to evaluate results of different experimental methods.
- be able to independently, e.g. on the internet, search for and use relevant information within the field.

Contents

It is important that the student understands how different parts of the course relate to each other and to rapidly developing research areas. The laboratory work is essential for visualizing important concepts of physics.

The course deals with: Temperature and heat. Phase transitions. Equations of state for ideal and real gases. Friction and viscosity. Heat engines and refrigerators. Entropy and the laws of thermodynamics. Mechanical waves, interference and the Doppler effect. Sound intensity level and human hearing. Reflection of sound, ultrasound. Electromagnetic waves. Geometric optics and optical instruments. Diffraction and resolution. The grating spectrometer.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)
Assessment: Compulsory exercises/assignments, written examination and passed laboratory work. The result on the written examination settles the final grade. It is mandatory to attend the first lecture in order to be admitted to the course.

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: 0115. **Name:** Physics - Waves and Optics.
Credits: 3. **Grading scale:** TH. **Assessment:** Written examination. **Contents:** Mechanical waves, interference and the Doppler effect. Sound intensity level and human hearing. Reflection of sound, ultrasound. Electromagnetic waves. Geometric optics and optical instruments. Diffraction and resolution. Polarization.
Code: 0215. **Name:** Laboratory Projects and Reports.
Credits: 2. **Grading scale:** UG. **Assessment:** Active participation in laboratory work. Passed laboratory reports. **Contents:** Laboratory work: Experimental methodology. Heat engines. Diffraction of lightwaves. Geometrical optics.
Code: 0315. **Name:** Thermodynamics - Assignments.
Credits: 2,5. **Grading scale:** UG. **Assessment:** Passed compulsory assignments in Thermodynamics. **Contents:**

Compulsory assignments in Thermodynamics.

Admission

The number of participants is limited to: No
The course overlaps following course/s: FAFA50, FAFF40, FAFA01, FAF260, FAFF30, FAFA05, FAFA45, FAFA15, FAFA20, FAFA30, FAFA35, FAFA60, FAFF25, FAFA70, FAFA75

Reading list

- Jönsson, G: Våglära och optik. Teach Support 2018. ISBN: 978-91-639-4349-2.
- Jönsson, G: Fysik i vätskor och gaser. Teach Support 2021. ISBN: 978-91-637-9826-9.
- Laborationshandledning för BME.

Contact and other information

Course coordinator: Jonas Johansson, jonas.johansson@ftf.lth.se
Course coordinator: Claes-Göran Wahlström, claes-goran.wahlstrom@fysik.lth.se
Course homepage: http://Canvas
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.