Physics 2 7.5 credits
F0005T

Fysik 2

Course syllabus admitted: Autumn 2024 Sp 1 - Present

DECISION DATE
2024-02-15

Physics 2 7.5 credits F0005T

Fysik 2

First cycle, F0005T

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	Fysik	Physics

Main field of study

Engineering Physics and Electrical Engineering

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language and F0004T Physics 1, Calculus M0029M, Linear Algebra and Calculus M0030M or equivalent.

Selection

The selection is based on 1-165 credits.

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Course Aim

After passed course the student will be able to:

Knowledge and understanding

- Give an account of wave properties,
- Give an account for propagating waves,
- Give an account for standing waves on a string and in pipes,
- Give an account for the treatment of waves as vectors in the complex plane,
- Give an account for phenomena as beats and the doppler effect,
- Give an account polarization of waves,
- Give an account for interference and diffraction,
- Give an account for Bohr's hydrogen model,
- Give an account for the origin of line spectra and continuous spectra,
- Give an account for photoelectric effect, the origin of x-ray radiation and to explain the physical principles behind the properties of the x-ray spectra,
- Explain the background of the Schrödinger equation,
- Give an account for the quantum numbers of the electron and relate those to the electron configurations of the atoms,
- Give an account for atom-atom interactions, molecule – molecule interactions and crystal structures and calculate material properties from information on the crystal structure,

Competence and skills

- Perform calculations on basic properties of propagating and standing waves,
- Perform calculations on superposition in the complex plane,
- Perform calculations on beats and the doppler effect,
- Perform calculations on polarization and apply Fresnels equation for reflection of waves,
- Perform calculations on interference and diffraction,
- Perform calculations on Bohr's hydrogen model and apply it on similar systems,
- Perform calculations on blackbody radiation and x-ray radiation,
- Perform calculations on crystal structures,
- Apply the Schrödinger equation on basic potentials, solve it and relate the resulting wavefunction to physical quantities,
- Plan, perform, analyse, and evaluate experiments from an open problem description,
- Prepare and perform an oral presentation of performed experiments, acquired results, and drawn conclusions,

Judgement and approach

- Justify his/her calculations and argue for the reasonableness of the acquired results.

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Contents

Within experimental methodology the following is addressed:

- Dimensionless units and relations, i.e. -groups
- Experimental work
- Measurement data analysis
- Oral presentation

Within wave theory the following is addressed:

- Basic wave properties
- Mathematical description of waves and the wave equation
- Mechanical waves, acoustic waves and electromagnetic waves
- Superposition
- Doppler effect
- Beat
- Polarisation
- Reflection and refraction
- Interference
- Diffraction

Within modern physics the following is addressed:

- Photoelectric effect
- X-ray radiation
- Blackbody radiation
- Bohr's model
- The laser
- Wave properties of particles
- The Schrödinger equation
- Quantum numbers and the exclusion principl
- Interaction between atoms and between molecules
- Crystal structures
- Semi-conductors

Realization

Each course occasion´s language and form is stated and appear on the course page on Luleå University of Technology's website.
The main part of the course is theoretical where the teaching consists of teacher-led lectures and lessons. The student is encouraged to participate in those lectures and lessons, to read the corresponding sections in the course literature and to solve the proposed problems in order to achieve the course aims.

The student also gets to develop his/her ability to work in groups of different compositions in two mandatory laboratory assignments. In these assignments the student will also train his/her ability to plan, structure and perform experimental tasks and to use Excel with the purpose to analyse measurement data. The results from the laboratory assignments are presented orally in order to improve the student's skills in communicating his/her results and conclusions in a clear and understandable way and to clearly give an account for the theory and experimental findings behind those. In order to assimilate this part of the course and achieve the corresponding course aims the student should be well prepared for the laboratory assignments and participate in an active manner.

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Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided. The course aims of theoretical nature are examined in writing with a grading scale according to U G 3 4 5. The course aims of practical nature are examined in the laboratory assignments and orally in the presentation off the experimental results, the grades are U G#.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term "unauthorized aids" refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Overlap

The course F0005T is equal to MTF097

The course is equal to MTF097.

Course offered by

Department of Engineering Sciences and Mathematics

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0003	Laboratory work/ Oral presentation	U G#	1.5	Mandatory	A21	
0004	Written exam	G U 3 4 5	6	Mandatory	A21	

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Last revised

by Nils Almqvist, Head of Undergraduate Education 2024-02-15

Syllabus established

The syllabus was established by the Department of Applied Physics and Mechanical Engineering 2007-02-28, and remains valid from autumn 2007.

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