



PHYSICS

FYP104 Waves and optics, 7.5 higher education credits

Vågrörelselära och optik, 7,5 högskolepoäng

First Cycle

Confirmation

This course syllabus was confirmed by Department of Physics on 2011-09-13 and was last revised on 2017-06-08 to be valid from 2017-07-01, autumn semester of 2017.

Field of education: Science 100%

Department: Physics

Position in the educational system

The course is included in Physics and Medical Physics programs and is also given as a standalone course.

The course can be part of the following programmes: 1) Marine Science, Bachelor's Programme (N1MAV), 2) Bachelor of Science in Physics (N1FYS), 3) Medical Physicist Programme (N1SJU) and 4) Teacher Training Programme (L1LÄR)

Main field of studies

Physics

Specialization

G1F, First Cycle, has less than 60 credits in first-cycle course/s as entry requirements

Entry requirements

Completed courses from the first semester in the Physics program, or that the equivalent knowledge has been acquired in some other way.

Learning outcomes

On completion of the course, the student is expected to:

Knowledge and understanding

- have an understanding of basic properties of mechanical and electromagnetic waves
- have knowledge of function, possibilities and limitations for optical and acoustic instruments
- be familiar with different models for describing light

Skills and abilities

- with own words be able to explain optical and acoustic phenomena and instruments
- be able to make calculations on simple systems in the fields of wave physics's and optics's
- independently be able to carry out, evaluate and account for experimental studies of optical phenomena

Judgement and approach

- receive an understanding of the importance of sound and light for human communication
- be familiar with the importance of optics for our possibilities to study micro and macro cosmos and thereby create the scientific conception of the world

Course content

In this course the following is treated:

General wave physics and the wave equation.

Periodic oscillations.

Mechanical and electromagnetic waves.

Transverse and longitudinal waves.

Standing waves.

Mechanical waves in gases, liquids and solids.

Sound waves, infrasound and ultrasound. Doppler effect.

Musical instruments and the function of our hearing from a physical perspective.

Electromagnetic fields.

Polarisation, reflection, transmission, refraction, interference, diffraction and birefringence of light.

Imaging, optical instruments and the function of the eye from a physical perspective

Coherence. Lasers. The photon concept.

Different models for describing light.

Part 1: Wave physics and optics

This part consists of lectures, calculation exercises and individual studies. Examination takes place through a written examination.

Part 2: Laboratory sessions

In this, the student carries out experimental assignments. The preparatory assignments are presented orally at the laboratory session. The final assignment is presented through a written report.

Part 3: Demonstrations

The student will specialize within wave physics and optics around a specific experiment that then is presented orally.

Part 4: Programming with Matlab

In this part the student will develop and deepen the knowledge in programming and Matlab. The programming skills are applied on simulation and visualisation problems in wave physics and optics.

Form of teaching

Used forms of teaching:

Compulsory components with requirements of attendance: Laboratory sessions (part 2), demonstrations and presentations (part 3).

Language of instruction: Swedish

Assessment

Examination formats:

Part 1: written exam, 5.0 credits

Part 2: Project report, 1.0 credits

Part 3: presentation and written report, 0.5 credits

Part 4: handing in assignments, 1.0 credits

A student has the right to request a change of examiner if failed twice on the same exam, if this is practically possible. The application shall be sent to the board of the

department and has to be in writing.

Grades

The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).

For grade Pass (G) on the whole course, at least Pass in all parts is required.

For grade Pass with distinction (VG) on the whole course, Pass with distinction is required on part 1 as well as Pass on the parts 2, 3 and 4.

For each part applies:

Part 1: Written exam with grade Fail, Pass or Pass with distinction.

Part 2: For grade Pass, an approved laboratory report is required.

Part 3: For grade Pass, passed presentation as well as passed written report are required.

Part 4: For grade Pass, it is required that given exercises and handing in assignments are passed.

Course evaluation

At the end of the course an anonymous course evaluation is provided. The result is published on the course homepage in University of Gothenburg's learning management system (GUL).