



## Course syllabus

Faculty of Technology

Department of Physics and Electrical Engineering

1FY803 Vågrörelselära och optik, 7,5 högskolepoäng

Waves and Optics, 7.5 credits

### Main field of study

Physics

### Subject Group

Physics

### Level of classification

First Level

### Progression

G1N

### Date of Ratification

Approved 2009-08-11

Revised 2014-06-26 by Faculty of Technology. Content and literature list are revised.  
The course syllabus is valid from spring semester 2015

### Prerequisites

General entry requirements and Physics B, Mathematics D. (Field-specific entry requirement 8 with the exception of Chemistry A).

## Objectives

The students are expected:

- to understand the fundamentals of simple harmonic oscillation, energy in simple harmonic motion, mechanical waves, wave characteristics, superposition of waves, traveling harmonic waves, reflection and transmission, standing waves, the nature of a sound wave, Doppler effect, the longitudinal waves, electromagnetic waves, lenses and optical instruments, interference and diffraction, thin films, gratings, and coherence
- to show the interrelationships among these subjects.
- to interpret the wave quantities in terms of laws and principles.
- to gain a coherent conceptual framework capable of describing and predicting the properties of waves.
- to appreciate the application of the concepts and theories to real life problems.
- to possess knowledge of the fundamental processes of propagation of waves in gases, liquids and solids.
- to be able to understand principles involved and function of applications; such as sound propagation and light as an electromagnetic wave.

## Content

- Wave motion: oscillations, harmonic oscillation, transversal and longitudinal waves, energy of waves, propagation velocity, superposition, reflection, refraction, interference and diffraction
- Sound: sound pressure, sound intensity, interference, Doppler effect and ultrasonic speed, overtones and sound spectra
- light as an electromagnetic wave: Young's experiment, interference patterns, diffraction in single and double slits, gratings, resolution, and spectra
- Optics: image formation by plane and spherical mirrors, Snell's law, image formation in lenses, lens formulas, optical instruments, lens corrections, wave nature of light, Young's experiment, dispersion, interference and

## Type of Instruction

The teaching consists of lectures, problem solving exercises, laboratory measurements and tutorials. Participation in the laboratory work is obligatory. Teaching may also include elements of training in transferable skills adapted to the student's orientation of study.

## Examination

The course is assessed with the grades Fail (U), Pass (G) or Pass with Distinction (VG).

The examination may be given in writings or orally and consists of theoretical questions or problems to solve.

On request, students may have their credits translated to ECTS-marks. Such a request must be sent to the examiner before the grading process starts.

## Course Evaluation

A course evaluation will be carried out at the end of the course in accordance with the guidelines of the University. The result of the course evaluation will be filed at the department.

## Required Reading and Additional Study Material

### Required reading

Hewitt, P G, *Conceptual Physics*, Pearson 2012. Pages 142 (740).

### Alternative literature

Young, HD and Freedman RA, *University Physics*, 2012. Pages 250 (1600).