Linnæus University

Course syllabus

Faculty Board of Science and Engineering
School of Computer Science, Physics and Mathematics

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 by the Board of the School of Computer Science, Physics and Mathematics 2009-08-11

Revised 2010-08-05. Revision of prerequisites and course evaluation.

The course syllabus is valid from spring semester 2011

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

Expected learning outcomes
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 posses 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, propagating velocity, superposition, reflection, refraction, interference and diffraction
- Sound: sound pressure, sound intensity, standing waves, interference, Doppler effect, shock waves
- 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 interference patterns, diffraction in single and double slits, resolution, diffraction grating and spectrum.

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

Benson, H,*University Physics*,John Wiley & Sons, 1996.Pages 166 (942).
Hewitt, P G,*Conceptual Physics*,Addison-Wesley, 2003.Pages 142 (740).

Alternative literature

Norton, A,*Dynamic fields and waves*, Institute of Physics publishing, 2000.Pages 216 (266).