Mechanics and Wave Physics

Programme course

6 credits

Mekanik och vågfysik

TNE043

Valid from:

Determined by

Date determined

LINKÖPING UNIVERSITY
FACULTY OF SCIENCE AND ENGINEERING

Main field of study
Applied Physics, Physics, Engineering

Course level
First cycle

Advancement level
G2X

Course offered for
- Electronics Design Engineering, M Sc in Engineering
- Communications, Transport and Infrastructure, M Sc in Engineering
- Media Technology and Engineering, M Sc in Engineering

Specific information
The course include a part of the syllabus block "oral and written communication in swedish"

Prerequisites
Courses in calculus and linear algebra, important subjects are vector algebra, differentiation and integration of elementary functions, linear differential equations with constant coefficients.

Intended learning outcomes

To give basic knowledge in some important areas and applications of classical physics. The laboratory work should give experience of planning,conducting and presenting experimental work. After completing this course students should be able to do the following:

- Apply basic kinematic relations, Newton´s laws formulated for both translational and rotational motion, energy relations and conservation laws in problem solving and describe under which circumstances these relations and laws can be applied
- Apply basic theory to model simple harmonic oscillations and the extension to mechanical waves
- Formulate the wave equation and give examples of solutions, determine properties like velocity of propagation, and give examples of applications
- Describe and apply basic concepts in acoustics like standing waves, resonance and the Doppler effect when formulating models and solving problems
- Describe and apply basic concepts in geometrical optics
- Describe and apply polarisation,coherence,diffraction,interference and superposition in problem solving in wave optics.
- Give examples of applications of mechanics and wave physics in scientific and technical areas of application
- Develop understanding of concepts,the ability to solve problems and the ability to formulate models in physics
- Describe how experimental problem solving is performed.
- Assess experimental results and perform dimensional analysis of physical formulae
- to individually write a technical report in Swedish.

Course content

Introduction to experimental problem solving, dimensional analysis, analysis of experimental data. Mechanics: Kinematics, force, Newton's laws, energy and work, oscillations, collisions, rotation about a fixed axis.Wave motion and optics: general wave motion, superposition, the wave equation, mechanical waves, acoustics, electromagnetic waves, interference, diffraction, geometrical optics.Technical report writing with increased demands on academic language.

Teaching and working methods

Lectures, tutorials and laboratory sessions. There will be a written examination at the end of the course. The laboratory work includes an individually written report in Swedish.

Examination

KTR1	Written test	0 credits	U, G
LAB2	Laboratory work	1 credits	U, G
TEN2	A written examination	4 credits	U, 3, 4, 5
UPG2	Written report and oral presentation in Swedish	1 credits	U, G

The written report will be assessed by a language teacher. The written report is a compulsory part of both LAB2 (assessed by lab supervisor) and UPG1 (assessed by language teacher).

Grades

,

Department

Institutionen för teknik och naturvetenskap

Director of Studies or equivalent

Adriana Serban

Examiner

Ulf Sannemo

Course website and other links

http://www2.itn.liu.se/utbildning/kurs/

Education components

Preliminary scheduled hours: 58 h
Recommended self-study hours: 102 h

Course literature

Halliday, Resnick, Walker:Principles of Physics