



# SH1010 Physics for the Built Environment 9.0 credits

Fysik för den byggda miljön

This is a translation of the Swedish, legally binding, course syllabus.

## Establishment

Course syllabus for SH1010 valid from Spring 2012

## Grading scale

A, B, C, D, E, FX, F

## Education cycle

First cycle

## Main field of study

Physics, Technology

## Specific prerequisites

Recommended prerequisites: The course starts from level B in Physics from high school. Knowledge in algebra and single variable algebra is also assumed.

## Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

# Intended learning outcomes

The course will give the student a relative broad general knowledge in Physics and also give the base for further studies in the main and related areas.

After the course the student should be able to:

- Describe fundamental concepts, model and compute simple processes in mechanics, energy of flows, fluid mechanics and waves.
- Identify phenomena in the environment where physical principles are applicable.
- Write a report from a physical study of a phenomena, e.g. how the sun can be used to provide energy in buildings. The student then should be able to analyze parts of the process but also describe the whole.

## Course contents

Basic classical physics

Physical quantities, Units and Dimensions. Force and momentum. Equilibrium. Friction. Work, power and energy. Kinematics in Cartesian coordinate system.

Newton's laws. Equations of motion. Hooke's law - elasticity theory.

Simple harmonic motions in one dimension, damped oscillations.

Project task: Everyday mechanics

Energy processes and phase transitions

Equations of states. Reversible and irreversible processes.

Kinetic-molecular theory of an ideal gas. Transfer of heat. Thermodynamic concepts. The first and second law of thermodynamics. Different forms of energy. Applications of first law of thermodynamics on closed and open systems and also equation of energy.

Project task: Practical uses of energy

Electromagnetism

Electromagnetic waves. Electromagnetic spectrum, visible light - sunlight - long wave electromagnetic radiation. Sensors: Physical principles, ordinary designs.

Project task: Everyday applications of the laws of thermodynamics

Fluid mechanics and flow of energy

Hydrostatic pressure. Forces caused by fluids in motion. The continuity and energy equation of incompressible fluids. Energy equations. Dimensional equation. Flow in pipes and channels. Measuring of fluid properties. Transfer of heat.

# Course literature

J.S. Walker, Physics: Vol. 1, Addison-Wesley.

## Examination

- PRO1 - Project, 1.5 credits, grading scale: P, F
- TEN1 - Examination, 7.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

## Other requirements for final grade

Two written examinations (TEN1; 7.5 hp)

Project works (PROJ1; 1,5 hp)

## Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.