SH012N Preparatory Refresher Course in Physics 7.5 fup

Förberedande kurs i fysik

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

Establishment

Course syllabus for SH012N valid from Spring 2015

Grading scale

P, F

Education cycle

Pre-university level

Specific prerequisites

Until and during the Spring term of 2014, the following applies:

General requirements: i.e. completed upper secondary education including documented proficiency in Swedish and English (for courses given in Swedish) or including documented proficiency in English (for courses given in English). Specific requirements: knowledge of Mathematics corresponding to MathematicsD /Mathematics 3c, Physics corresponding to Physics B/Physics 2 and Chemistry corresponding to Chemistry A/Chemistry 1 is required.

From the Summer term of 2014, the following applies:

General requirements i.e. completed upper secondary education including documented proficiency in Swedish and English (for courses given in Swedish) or including documented proficiency in English (for courses given in English).

Language of instruction

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

Intended learning outcomes

Motivate students for higher education.

Prepare students for studies in technology/natural science.

After completing the course the student should be able to:

- Explain basic concepts and connections within the areas of mechanics, electricity, magnetism, electromagnetic radiation, heat and modern physics
- Identify problems and motivate the use of mathematical models. The base being concrete physical problems
- Identify problems and motivate the use of mathematical models. The starting point is a concrete physical problems
- Separate reality from theoretical constructions. Understand that the connection between observable occurrences or results and mathematical models are generalized. Be aware of the limitations, idealizations and conditions the connections have.

Course contents

The course includes five parts and one final exam

1. Thermodynamics

- Heat and temperature
- Materials shape, phases and their properties, phase transitions
- The principal clauses of thermodynamics
- Energy supply
- Pressure and density
- Ideal law of gas

2. Statics

- Introduction to mechanics
- Elemental vectoralgebra
- Forces, fundamental reciprocal action, force sum
- Force moment, force system, resultant
- Masscentre och force of gravity
- Equilibrium, friction och hydrostatics

3. Partical Dynamics

- Scheduled movement
- Two-dimensional movement
- Newton's second law (Force equation)
- Work and energy for particles and particle systems
- Amount of movement, impulse and shock
- Circular- and harmonic oscillation

4. Electricity and electromagnetism

- Charges in movement, isolators and conductors
- Electrical circuits, Ohms law
- Electrical energy and effect
- Alternating currents, inductance and capacitance
- Electromagnetic waves and optics

5 Modern physics

- Relativity
- Four different forces
- Waves and particles
- The Atom
- The Atomic nucleus

The course ends with an assignment.

Course literature

Heureka! Fysik för gymnasieskolan, kurs A och kurs B, Bergström-Johansson-Nilsson-Alphonce-Gunnvald. Bokförlaget Natur och Kultur, 2005. ISBN 91-27-56721-4 respektive ISBN 9127-56722-2. Kursmaterial och hänvisningar till kompletterande kursmaterial finns tillgängligt på kursens hemsida.

Bokförlaget Natur och Kultur har arbetat om Heureka A och B till Heureka 1 och 2 i samband med gymnasiereformen 2011. Bägge versionerna fungerar utmärkt för denna kurs.

Examination

- MOM1 - Termodynamics, 1.5 fup, grading scale: P, F
- MOM2 - Statics, 1.5 fup, grading scale: P, F
- MOM3 - Particle Dynamics, 1.5 fup, grading scale: P, F
- MOM4 - Electricity and Electromagnetism, 1.5 fup, grading scale: P, F
- MOM5 - Modern Physics and Final Exam, 1.5 fup, grading scale: P, 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

Basic exams are examined separately for each part of the course. The final examination is performed in the Bilda Learning Management System (bilda.kth.se) and individual assignments for each part in submitted via the Student Lounge. All communication is handled via e-mail and Bilda/Ping Pong.

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.