AL1130 Physics, Chemistry, Energy and the Environment for CL 14.0 credits

Fysik, Kemi, Energi och miljö för CL

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

Establishment

The course syllabus is valid from Autumn 2020 according to the Head of school decision: A-2019-1574, 3.2.2Decision date: 2019-08-20

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

General and specific entry requirements for Master of Science programmes.

Obligatory in year 1 at Master of Science in Engineering and in Education (CLGYM), not open for other students.

Language of instruction

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

Intended learning outcomes

The course is an introduction to university studies in Physics, Chemistry and Technology with focus on energy and sustainable development. The aim of the course is to give a broad basis in natural and technical science for studies and future working life. After the course, the student should be able to:

- Describe the main features of the Swedish energy system
- Identify pros and cons with a chosen type of energy from a sustainability perspective
- Describe the Swedish environmental goals mirroring important environmental impacts and use these in an educational context
- From a natural science basis, describe the processes behind the greenhouse effect and critically analyse how this effect has been influenced by anthropogenic factors
- Describe the definition of and discuss difficulties with Sustainable development
- Collaborate in groups and be able to discuss problems inside the group as well as suggest solutions for these problems
- Individually and in groups search for scientific information, compile it and present it in a scientific way in an oral presentation as well as in a written report
- Solve technical problems of implemented electro physical topics
- Follow, and for higher grades also in greater detail follow and engage in, chemistry technological discussions and reasoning related to the course content,
- Perform relevant estimation calculations and judge magnitude and reasonableness in physical and chemical problems
- use and understand restrictions and limitations in physical measurements and instruments
- explain physics and chemistry problems, boundary conditions and limitations for collaborators or other audience without any science education
- be able to implement safety instructions and safely perform chemical laboratory work

Course contents

The course is divided into three parts

The first part deals with the environment and energy, energy systems and sustainable development. Global warming is an important example that will also serve as an introduction for methods on how to approach an environmental problem as well as the engineer's role to handle and find solutions to an environmental problem.

The second part deals with: Chemical reactions and reaction formulas. Representation of chemical compounds with names, formulas and models. Atomic structure, periodic table,

electron configuration, orbitals, models of chemical bonding, Lewis structures and VSEPR model. Chemical reactivity, kinetics, and equilibrium. Stoichiometry. Thermo- chemistry. Application examples. Laboratory safety and chemical hazards. Communicating chemistry.

The third part concerns: Fundamentals of electric and magnetic fields, Models of atoms, Band model for solids, Radiation especially heat radiation, Light sources, Laser, Laser metrology, Spectroscopy

The course includes an academic introduction that includes group dynamics, how to search for scientific information and how to write a scientific report.

Examination

- TEN1 - Written exam, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- PRO1 - Project work, 2.0 credits, grading scale: P, F
- INL2 - Assignment, 1.0 credits, grading scale: P, F
- LAB2 - Laboratory work, 1.0 credits, grading scale: P, F
- TEN2 - Written exam, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN3 - Examination, 4.0 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

Attendance at compulsory modules is required for the final grade

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.