



# KA1015 Chemistry for Sustainable Development 6.0 credits

Kemi för hållbar utveckling

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

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

## Establishment

Course syllabus for KA1015 valid from Autumn 2015

## Grading scale

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

## Education cycle

First cycle

## Main field of study

Technology

## Specific prerequisites

Completion of upper-secondary school by 1 July 2011 and adult education at the upper-secondary level (gymnasium) by 1 July 2012

Specific entry requirements: Mathematics E, Physics B and Chemistry A. Passed or 3 in each of the subjects is required.

Completion of upper-secondary school from 1 July 2011 and adult education at upper-secondary level (gymnasium) from 1 July 2012 (Gy2011)

Specific entry requirements: Physics 2, Chemistry 1 and Mathematics 4. A pass in each of the subjects is the lowest acceptable grade.

## Language of instruction

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

## Intended learning outcomes

The general aim is that the students should receive a broad understanding of the chemical background to environmental problems, an understanding of the situation for finite and renewable raw materials, and an understanding of the problems and the possibilities for creating a sustainable technical culture.

This implies that on completion of the course the student can:

- Distinguish different stages in the history of technology from a sustainability and environmental perspective.
- Describe how the dependency on nonrenewable raw materials has increased under industrial expansion since the 18th century.
- Explain the chemistry behind:
  - Pollutive contaminants
  - Climate changes based on greenhouse gases
  - Decomposition of the ozone layer
  - Ozone near the Earth's surface
  - Acidification
  - Overfertilisation
  - Toxicity of hydrocarbons, halogenated organic species and heavy metals.
- Evaluate and counter various types of environmental threats from specific industries, and quantify the environmental impact.
- Anticipate and evaluate environmental impacts of process changes within the chemical industry.
- Review the environmental impacts of water shortages.
- Analyse processes with respect to amount of waste, biodegradability, and combustion of waste.

- Explain and evaluate the importance of biodiversity from a sustainability perspective.
- Account for the usage and the availability of nonrenewable raw materials such as:
  - Petroleum, natural gas and other fossil fuels/chemical raw materials.
  - Metals and particularly rare alloying metals.
  - Phosphorus
  - Sulphurs
  - Silica
  - Fuel for nuclear reactors
- Point out renewable alternatives to nonrenewable raw materials such as:
  - Biomass from plants
  - Chemicals from sea water
  - Chemicals from air.
- Suggest replacements for nonrenewable raw materials in different applications.
- Review the basics of heterogeneous catalysis and explain how catalysis can contribute to decreasing the energy used and minimise the formation of wastes
- Discuss environment and sustainability questions from an ethical perspective.

## Course contents

### Disposition

Lectures

Seminars

Group work where a study of environmental consequences is carried out for a number of industrial cases.

### Course literature

Environmental chemistry

Distributed literature

### Examination

- TEN1 - Written exam, 5.0 credits, grading scale: A, B, C, D, E, FX, F
- ÖVN1 - Assignment, 1.0 credits, 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.

## Other requirements for final grade

Pass in all parts of the course

## 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.