KE1010 Introduction to Chemical Engineering 10.5 credits

Inledande kemiteknik

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

Establishment

Course syllabus for KE1010 valid from Autumn 2011

Grading scale

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

Education cycle

First cycle

Main field of study

Chemistry and Chemical Engineering, Technology

Specific prerequisites

Completed upper secondary education including documented proficiency in English corresponding to English A. For students who received/will receive their final school grades after 31 December 2009, there is an additional entry requirement for mathematics as follows: documented proficiency in mathematics corresponding to Mathematics A.

And the specific requirements of mathematics, physics and chemistry corresponding to Mathematics E, Physics B and Chemistry A.

Language of instruction

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

Intended learning outcomes

After the course you should be able to describe chemical engineering industry and structure activities into categories (e.g., pulp and paper industry, petroleum industry, or pharmaceutical industry). You are to summarize the most important industrial processes and describe the steps ”from raw material to product”.

• You should be able to apply a system approach to chemical engineering problems. This includes:

- Suggesting a suitable system boundary for the problem such that the problem becomes solvable using a given set of data.

- Using the important chemical engineering tool ”mass and energy balances”, modifying the general form of these balances to fit a given problem, and solving the resulting set of equations.

- Using tables for material data (e.g., enthalpy and specific heat) in problem solving.

- Identifying environmental problems and analyzing the possibilities for minimising their impact.

• You should be able to describe and exemplify design alternatives for chemical engineering processes: continuous versus batch operation, stationary versus transient conditions, open versus closed systems, excess air, degree of recirculation, yield and selectivity. You should also be able to modify the mass and energy balances for such design alternatives, and combine and apply these models to problem solving.

• You should be able to explain today’s important global environmental threats and be able to exemplify what policy instruments could be used in society and industry to minimize the environmental impact from a certain process or product.

• You should be able to describe and analyze the concept of Sustainable Development from an environmental, social and economical point of view. You should also be able to list ecological prerequisites for Sustainable Development.

• You should be able to use project work as a method for solving chemical engineering problems in a structured way.

• You should be familiar with questions regarding applied ethics and moral obligations in technical projects.

Course contents

The course consists of four parts. In the first part, the application of mass and energy balances to different systems encountered in connection with chemical engineering is taught. Funda-

mental ecological conditions, ecology and the society, important environmental threats and their effects on humans and the ecosystem are also treated, along with tools and measures used to protect the environment.

The second part is a project that is performed in groups. The projects consider various chemical processes and give insights into important chemical engineering concepts along the way from raw material to final product. Environmental issues in the project are in focus in the third part, a poster presentation. A role play with practical ethical problems is the fourth part. It deals with questions about ethical responsibilities in technical projects.

Course literature

Elementary Principles of Chemical Processes, R.M. Felder och R.W. Rosseau, John Wiley & Sons, Inc., 3rd Edition, 2000. ISBN-nr 0-471-37587-X. Svensk kemiindustri av Lars-Arne Sjöberg (Karlstads Universitet, 2004).

Kompendium i miljöskydd, del 1 "Ekologi" av Perarvid Skoog m.fl. (Industriellt Miljöskydd, KTH, 1995).

Kompendium i miljöskydd, del 2 "Miljöskyddsteknik" av Per Olof Persson och Lennart Nilson (Industriellt Miljöskydd, KTH, 1993).

Kompendium i miljöskydd, del 4 "Miljöeffekter" av Nils Brandt och Fredrik Gröndahl (Industriellt Miljöskydd, KTH, 1999).

Stencilsamling "Piska, morot och predikan - styrmedel inom miljöpolitiken". (Industriellt Miljöskydd, KTH, 1998).

Examination

- INL1 - Assignment, 1.5 credits, grading scale: P, F
- PRO1 - Project, 4.5 credits, grading scale: P, F
- TEN2 - Examination, 4.5 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

Tasks (INL1; 1,5 credits)
Project work (PRO1; 4,5 credits)
Examination (TEN2; 4,5 credits)

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.