KE1080 Chemical Engineering Principles 7.5 credits

Kemitekniska principer

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

Establishment

Course syllabus for KE1080 valid from Autumn 2019

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

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

Specific entry requirements: Physics 2, Chemistry 1 and Mathematics 4. In each of the subjects the minimum grade required is Pass.

The upper-secondary school before 1 July 2011 and adult education at upper-secondary level before 1 July 2012

Specific entry requirements: mathematics E, physics B and chemistry A. In each of the subjects the grade required is Passed or 3.

Language of instruction

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

Intended learning outcomes

When you have passed the course you will be able to:

- analyse the energy and material consumption in a production plant based on chemi-co-technical, environmental, social and economical criteria
- reflect in a structured way over his professional role as engineer and his professional responsibility in relation to sustainable development
- dimension simple components in a chemical process system
- explain the concept of an ideal stage and utilise this at design of a separation system in continuous systems
- suggest appropriate separation method in a two-component system from the physical properties of the subjects
- explain how the driving force for mass transfer affects the design of a separation process with material transfer
- suggest design and control of ideal reactors to minimise waste based on ideal reactor models and selectivity criteria
- discuss the basic principles of process intensification and environmentally friendly production
- explain the importance of volume change in a gas phase reaction in ideal reactors and calculate the actual retention time
- analyse how kinetics, external material transfer and pore diffusion affect the design and control of catalytic reactors
- analyse electrochemical systems by means of application of basic electrochemical concepts
- show the ability to present and discuss ideas and results in both oral and written form

Course contents

Fundamental kinetic and reaction engineering concepts. Kinetics for electrode reactions. Multiple reactions and systems with volume change. Ideal reactor models and models for catalytic reactors. Residence times and space velocities. Heterogeneous catalysis, enzymatic reactions and bioreactors. Fundamentals in separation engineering directed towards heat and mass transfer between two phases. Phase equilibria and the ideal stage principle. Distillation, absorption and extraction. Evaporation and drying. Orientation about crystallisation and membrane separation processes. Orientation about equipment for separation

techniques and for production of chemicals. Equipment for heat exchange. Electrochemical power sources. Choice and operation of ideal reactors.

Course literature

1. Current edition of Richardson, J. F. and Harker, J. H., Coulson & Richardson´s Chemical Engineering, Vol. 2, Butterworth Heinemann, Oxford.

2. Current edition of Fogler, H. S., Elements of Chemical Reaction Engineering, Pearson Education, Upper Saddle River, N .J ., USA.

3. Behm, M., Lagergren, C. and Lindbergh, G., Electrochemistry for fuel cells and batteries, KTH Chemical engineering.

The above literature is supplemented by relevant compendiums and offprints

Examination

- TEN1 - Written exam, 4.5 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Course, 3.0 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.

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

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.