



# KE2040 Chemical Reaction Engineering 9.0 credits

Kemisk reaktionsteknik

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

## Establishment

Course syllabus for KE2040 valid from Spring 2014

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Chemical Science and Engineering, Chemistry and Chemical Engineering

## Specific prerequisites

### **Admission requirements for independent students:**

75 university credits (hp) in chemistry or chemical engineering, 20 university credits (hp) in mathematics and 6 university credits (hp) in computer science or corresponding. Documented proficiency in English corresponding to English B.

**\*\*Admission requirements for programme students at KTH:**

**\*\*At least 150 credits from grades 1, 2 and 3 of which at least 110 credits from years 1 and 2, and bachelor's work must be completed, within a programme that includes:**

75 university credits (hp) in chemistry or chemical engineering, 20 university credits (hp) in mathematics and 6 university credits (hp) in computer science or corresponding.

# Language of instruction

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

## Intended learning outcomes

The aim of the course is to give the students an enhanced understanding of the theory of chemical reactors and enhanced skill in formulation and analysis of mathematical models in chemical engineering. The exercises and the computer laboratory exercises aim to enhancing problem solving skills both with and without computer usage.

After you have worked through this course, including class and home problems, computer lessons exercises, you should be able to:

- Use correctly the "pillars" of chemical reaction engineering to solve a variety of problems concerning design, operation, analysis and synthesis of chemical reactors or systems of such, as well as systems similar to chemical reactors (for example, environmentally interesting reactions in the atmosphere, in the hydrosphere or in the ground or reactive processes taking place in living organisms such as enzyme catalysed reactions)
- Use the principles, relationships and patterns of chemical reaction engineering for qualitative reasoning.
- Detect and analyse problems, which may be solved by the methods of chemical reaction engineering.
- Transform calculation problems in chemical reaction engineering into mathematical models and, if necessary choose a numerical method for solving those models and, if necessary, choose suitable ready-made software and carry out the calculations on a computer.

## Course contents

Part 1: Theory and problem solving (3 credits)

There are three sections in this part, ideal reactor models, heterogeneous system and non-ideal reactors.

Part 2: Home and classroom problems (3 credits)

In this course there are exercises in the form of home and classroom problems that are solved by groups of three students each. Some of those problems are coupled to the computer laboratory exercises.

Part 3: Computer laboratory exercises (3 credits)

Computer laboratory exercises are carried out by groups of students. By this the students are to exercise the whole chain from a problem in chemical reaction engineering formulating a mathematical problem, choosing numerical algorithms, calculation methods and computer

software, and doing the computer calculations in the computer classroom. The second half of these exercises consists of an Open Ended Problem (OEP) in the form of a small calculation project.

## Course literature

H. Scott, Fogler: Elements of Chemical Reaction Engineering, 4th ed, 2005.

or

H. Scott, Fogler: Essentials of Chemical Reaction Engineering, 1st ed, 2011.

Additional material will be provided during the course.

## Examination

- BER1 - Assignments, 3.0 credits, grading scale: P, F
- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 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.

## Other requirements for final grade

Examination (TEN1; 3 hp)

Home- and classroom problems (BER1; 3 hp)

Laboration (LAB1; 3 hp)

## 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.