

SYLLABUS

Chemical Principles 7.5 credits K0016K

Kemiska principer

Course syllabus admitted: Autumn 2024 Sp 1 - Present

**DECISION DATE
2024-02-14**

Chemical Principles 7.5 credits K0016K

Kemiska principer

First cycle, K0016K

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	Kemi	Chemistry

Main field of study

Natural Resources Engineering, Chemical Engineering, Energy Engineering

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language + Upper secondary school courses Chemistry 1, Mathematics 3c or Mathematics D.

Selection

The selection is based on final school grades or Swedish Scholastic Aptitude Test.

Course Aim

After taking the course you should be able to:

- explain the organisation of the periodic table from the structure of the electron shells in the atoms.
- explain and systemize the characteristics of various substances by applying the concept of chemical bonding on both intra- and on a intermolecular level.
- use fundamental terminology and balance different chemical reactions as well as use balanced reactions for the calculation of heat- and material balances and for electrochemical calculations.
- use the concept chemical equilibrium to explain and predict changes in the form of a substance due to changes in parameters as concentration, pH, electron activity, pressure and volume. Also, to be able to apply the equilibrium concept to explain the speciation of some substances and their environmental impact. You should also be able to perform simpler calculations (one equilibrium).
- apply the concept spontaneous and non-spontaneous processes to predict and quantify. The relations free energy - chemical equilibrium and free energy - redox processes should be known.
- use and explain the concepts enthalpy and entropy as well as their impact on chemical equilibrium.
- perform and apply the theory in a lab. exercise and report the results.
- apply your chemical knowledge to explain various environmental, material and process related issues. material and process related issues of both global and also local relevance.

You should also improve your problem-solving and communicative skills, especially with focus on producing well-structured and formulated written reports.

Contents

Part 1 , Basic concepts:

Definitions. Chemical terminology and naming of chemical compounds. Reaction formulas.

Stoichiometry:

Concentrations and concentration units. Amounts of substances in a reaction. Gases.

Part 2 ,The Atom:

The atom and the periodic table.

Chemical bonding:

Intra- and interparticular bonding

Part 3 , Chemical equilibria:

Formulation of chemical equilibria. Acid-base equilibria, solubilities. The carbonic acid system.

Electrochemistry:

Redox reactions. The importance of redox reactions in the environment. Galvanic cells. Electrolysis.

Part 4, Thermodynamics:

Systems and surroundings. Internal energy. Enthalpy and Entropy. Gibbs free energy. Spontaneous and non-spontaneous reactions.

Various environmental- , material- and process issues will be discussed during lectures and classes.

Laboratory exercise, presented in a written report.

Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

Teaching consists of lectures, class meetings and a laboratory exercise. The lab. exercise is planned and performed in groups. Attendance is compulsory for the first lecture.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided.

Written exams for part 1 to 4.

Approved laboratory exercises and a well-structured and formulated written report. The report may be demanded to be written in English.

The final grading is based on the results from all items, in relation to their number of credits.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term "unauthorized aids" refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Overlap

The course K0016K is equal to K0025K, KGK040

Course offered by

Department of Civil, Environmental and Natural Resources Engineering

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0003	Written exam part 1	G U 3 4 5	1.5	Mandatory	A16	
0004	Written exam part 2	G U 3 4 5	2	Mandatory	A16	
0005	Written exam part 3	G U 3 4 5	1.5	Mandatory	A16	
0006	Written exam part 4	G U 3 4 5	1.5	Mandatory	A16	
0007	Laboratory work	U G#	1	Mandatory	A16	

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Last revised

by Assistant Director of Undergraduate Studies Eva Gunneriusson, Department of Civil, Environmental and Natural Resources Engineering 2024-02-14

Syllabus established

by the Department of Chemical Engineering and Geosciences 2007-02-28