Faculty of Science

# KEMA20, Chemistry: General Chemistry, 15 credits

*Kemi: Allmän kemi, 15 högskolepoäng*

**First Cycle / Grundnivå**

## Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2018-01-25 and was last revised on 2018-01-25. The revised syllabus applies from 2018-01-25, autumn semester 2018.

## General Information

The course is a compulsory first-cycle component of a Bachelor of Science degree in Chemistry.

*Language of instruction:* Swedish

| *Main field of studies* | *Depth of study relative to the degree requirements* |
|---|---|
| Chemistry | G1N, First cycle, has only upper-secondary level entry requirements |

## Learning outcomes

The aim of the course is to provide students with the knowledge of basic chemical concepts required for continued studies in chemistry or adjoining fields.

The laboratory exercises aim to provide skills in laboratory methodology by enabling students to practise planning and executing chemical experiments in small groups.

### Knowledge and understanding

On completion of the course, the students shall be able to

- systematically apply nomenclature and write formulas for inorganic and organic compounds, and use basic chemical concepts and terms
- describe simple models of atomic structure, electron configurations and explain their link to the periodic system and orbital theory
- describe and explain inter- and intramolecular forces of chemical substances

- account for the descriptive chemistry of the main group elements
- account for carbon and nitrogen cycles in nature and describe some important industrial processes
- account for the meaning of common variables and concepts in reaction kinetics

### Competence and skills

On completion of the course, the students shall be able to

- master stoichiometry and apply it in chemical calculations
- perform simple thermodynamic calculations and, using the laws of thermodynamics, explain the reaction tendency of a chemical process
- apply the concept of chemical equilibrium and analyse and solve problems of chemical equilibrium
- draw electrochemical cells, analyse electrochemical processes and calculate cell potentials
- perform calculations in basic kinetics
- perform elementary laboratory activities, in accordance with the description provided, and present theory and laboratory results in a final report

### Judgement and approach

On completion of the course, the students shall be able to

- present chemical calculations with correct units and numerical accuracy in a logical and relevant manner
- assess the risks associated with chemicals, and manage them safely

## Course content

*Lectures and exercises:*

- Nomenclature and formula writing for inorganic and organic compounds, including the most common trivial names
- The structure of simple organic molecules
- Orbital theory, the structure of the periodic system and models for chemical bonds
- Intermolecular interaction
- Stoichiometry
- Gas laws
- Elementary thermodynamics, basic chemical concepts such as enthalpy, entropy and free energy
- Physical and chemical equilibrium
- Acid-base equilibria in water solutions and solubility equilibria
- Descriptive chemistry for the main group elements and the elements cycle
- Solid state
- Electrochemistry
- Kinetics

*Laboratory exercises:* Experiments in chemical analysis, synthesis and reaction theory selected in order to illustrate the theoretical content of the course.

## Course design

The teaching consists of lectures, laboratory sessions, group exercises and project work. Compulsory participation is required in project work and laboratory sessions and associated elements

## Assessment

The assessment is based on a written exam during the course, 4 credits, a written exam at the end of the course, 6 credits, a project report, 2 credits and laboratory work, 3 credits.

Students who fail an assessment will be offered another opportunity for assessment soon thereafter.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

*Subcourses that are part of this course can be found in an appendix at the end of this document.*

## Grades

Marking scale: Fail, Pass.
For a grade of Pass on the whole course, the student must have passed the exams, laboratory work and project report, and participated in all compulsory components.

The grades awarded for all assessed components are Fail and Pass.

## Entry requirements

General and courses corresponding to the following Swedish Upper Secondary School Programs: Chemistry 2, Mathematics 4, Physics 1a/1b1+1b2.

## Further information

The course may not be included in a degree together with KEM10 General Chemistry, 7.5 credits, and KEMA12 Inorganic Chemistry – Basic Course, 7.5 credits.

## Subcourses in KEMA20, Chemistry: General Chemistry

Applies from H18

1801 General Chemistry, 6,0 hp
Grading scale: Fail, Pass
1802 General Chemistry, Part Examination, 4,0 hp
Grading scale: Fail, Pass
1803 General Chemistry, Project Work, 2,0 hp
Grading scale: Fail, Pass
1804 General Chemistry, Laboratory Work, 3,0 hp
Grading scale: Fail, Pass