

KEMB08, Chemistry: Molecular Interactions and Structure, 15 credits

Kemi: Molekylär växelverkan och struktur, 15 högskolepoäng
First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2009-02-04 and was last revised on 2009-02-04. The revised syllabus applies from 2009-02-04, autumn semester 2009.

General Information

The course is an optional first-cycle course for a degree of Bachelor of Science, main field of study Chemistry.

Language of instruction: English and Swedish
When necessary, the course in full is given in English.

Main field of studies

Chemistry

Depth of study relative to the degree requirements

G2F, First cycle, has at least 60 credits in first-cycle course/s as entry requirements

Learning outcomes

The aim of the course is to introduce the subject statistical thermodynamics and describe how molecules and particles interact in gas phase and in solution. Furthermore, in-depth studies are included in quantum chemistry and spectroscopy.

The aim of the course is that on its completion students will have acquired the following skills and knowledge:

- explain and apply the concept entropy especially its statistical interpretation
- explain the theory for and apply statistical thermodynamics
- describe how molecules, particles and ions interact and explain concept as potential of mean forces, dielectric response and shielding
- qualitatively and quantitatively explain and describe the relationship between spectroscopic measurements and molecular properties

- perform quantum mechanical calculations and accomplish logical arguments in the area of quantum chemistry

Course content

Lectures: advanced studies in quantum chemistry and spectroscopy. Fundamental NMR theory. Statistical thermodynamics, including concepts such as partition sums, the statistical interpretation of entropy, ensembles. Relations between the statistical concepts and macroscopic thermodynamics. Fundamental contributions to intermolecular interactions. Potential of mean forces, dielectric response. Interactions in salt solutions, screening. Interactions between particles and surfaces in solutions.

Laboratory exercises: aims to illustrate and exemplify the concepts that are introduced and discussed at the lectures.

Course design

Teaching is carried out through lectures, exercises and laboratory work. The laboratory parts are compulsory.

Assessment

Assessment is by written examination at the end of the course. During the course, written assignments will be distributed which gives possibility to bonus point at the regular examination. A re-sit examination is offered soon after the examination to students who do not pass.

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

Grades

Marking scale: Fail, Pass, Pass with distinction.

To be awarded Pass students must pass the examination, pass the laboratory work and participate in all compulsory course elements.

The examination grades are: Pass with Distinction, Pass or Fail. Grades for laboratory work and the compulsory elements included therein are: Pass and Fail.

The final grade for the course is determined by the grade on the final examination.

Entry requirements

To be eligible for this course students must have basic eligibility, English B and 90 higher education credits in completed Science courses, including passes in courses equivalent to:

- KEMA00 General and Analytical Chemistry 7.5 credits, KEMA01 Organic Chemistry – Basic Course 7.5 credits, KEMA02 Inorganic Chemistry – Basic Course 7.5 credits and KEMA03 Biochemistry – Basic Course 7.5 credits, or KEM101 General Chemistry 1 15 credits and KEM102 General Chemistry 2 15 credits, or

KEM111 Chemistry for Environmental and Biological Sciences – General Course 1 15 credits and KEM122 Chemistry for Environmental and Biological Sciences – General Course 2 15 credits

and

- KEMB09 Physical Chemistry – Basic Course 15 credits or KEM103 General Chemistry 3 15 credits,
- KEMB29 Spectroscopy and Dynamics 7.5 credits, and
- one of the courses MATA01 Mathematics for Scientists 1 15 credits, MATA11 Mathematics 1 Alpha 15 credits, MAT015 Mathematics for Scientists 1 15 credits or MAT131 Mathematics 1 Alpha 15 credits.

Admission requirements are also fulfilled for those with basic eligibility and passes in courses equivalent to:

- 90 credits in Physics including FYSA31 Physics 3: Modern Physics 30 credits or FYS023 Physics 3: General Course 30 credits and
- 30 credits in Mathematics

or

- 60 credits in Chemistry, 60 credits in Physics and 60 credits in Mathematics

Equivalent knowledge that has been gained in another way also provides eligibility for the course.

Further information

The course cannot be credited as part of a degree programme that also includes KEMB19 Physical Chemistry 15 credits or KEM016 Physical Chemistry 15 credits.

Subcourses in KEMB08, Chemistry: Molecular Interactions and Structure

Applies from H13

0903 Molecular Interactions and Structure, 12,0 hp

Grading scale: Fail, Pass, Pass with distinction

0904 Molecular Interactions and Structure, Laboratory Work, 3,0 hp

Grading scale: Fail, Pass

Applies from H09

0901 Molecular Interactions and Structure, 15,0 hp

Grading scale: Fail, Pass, Pass with distinction

0902 Molecular Interactions and Structure, Laboratory Work, 0,0 hp

Grading scale: Fail, Pass