Faculty of Science

KEMM37, Chemistry: Scattering Methods, 7.5 credits

Kemi: Spridningsmetoder, 7,5 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2008-04-29 and was last revised on 2008-04-29. The revised syllabus applies from 2008-07-01, autumn semester 2008.

General Information

The course is an optional second-cycle course for a degree of Master of Science in Chemistry and is a compulsory course for a degree of Master of Science in Organizing Molecular Matter.

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

Main field of studies	*Depth of study relative to the degree requirements*
Chemistry	A1N, Second cycle, has only first-cycle course/s as entry requirements
Organizing Molecular Matter	A1N, Second cycle, has only first-cycle course/s as entry requirements

Learning outcomes

The course aims to give a basic knowledge and understanding of different scattering methods used for studying structure and dynamics of colloidal dispersions.

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

- the ability to understand and explain the general principles of static scattering experiments, and what information that may be obtained from such experiments
- the ability to understand and explain the general principles of dynamic light scattering experiments, and what information that may be obtained from such experiments.

- knowledge of and the ability to describe the general experimental setups for light scattering and small angle scattering of X-rays and neutrons
- the ability to interpret the results from static scattering experiments from colloidal dispersions in terms of the static structure factor and the form factor
- the ability to interpret the results from dynamic light scattering experiments from colloidal dispersions
- the ability to compute the static scattering from a dispersion of spherical colloidal particles

Course content

Lectures: The course begins with basic scattering theory and a derivation, from basic principles, of the scattering from a dispersion of spherical colloidal particles. This is followed by a presentation of different experimental methods, such as small angle neutron scattering (SANS), small angle X-ray scattering (SAXS), and static and dynamic light scattering. As the main model system we treat dispersions of spherical particles but non-spherical particles will also be discussed.

Laboratory exercises: In the lab course we begin by studying the diffraction and scattering from slits and thin threads, as illustrations of the concept of scattering. We then do experiments on colloidal dispersions using SAXS and static and dynamic light scattering.

Course design

Teaching comprises lectures and exercises in which theoretical aspects are treated. During the course there will be a number of compulsory laboratory practicals that will be presented in writing.

Assessment

The course is assessed with a written or oral examination. Re-sit examinations are 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 on the whole course, students must pass the examination, pass the compulsory laboratory work and the submitted assignments.

The examination grades are: Pass with Distinction, Pass or Fail. Grades for the compulsory components are: Pass or Fail.

The final grade for the course is determined by weighting the results of the examination and the compulsory components.

Entry requirements

To be eligible for this course students must have basic eligibility 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,
- KEMB08 Molecular Interactions and Structure 15 credits, or KEM016 Physical Chemistry 15 credits/KEMB19 Physical Chemistry 15 credits and
- one of the courses MATA01 Mathematics for Scientists 1 15 credits, or 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 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 KEM065 Physical Chemistry – Advanced course, 15 credits.

Subcourses in KEMM37, Chemistry: Scattering Methods

Applies from H13

0711 Scattering Methods, 5,0 hp
Grading scale: Fail, Pass, Pass with distinction
0712 Scattering Methods, Compulsory Elements, 2,5 hp
Grading scale: Fail, Pass

Applies from H07

0701 Scattering Methods, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction
0702 Scattering Methods, Compulsory Elements, 0,0 hp
Grading scale: Fail, Pass