Faculty of Science

KEMC03, Chemistry: Experimental Protein Chemistry, 15 credits

Kemi: Experimentell proteinkemi, 15 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2012-06-20 to be valid from 2012-07-01, autumn semester 2007.

General Information

The course is included in the main fields of Chemistry and Molecular Biology at the Faculty of Science. When one of these fields comprises the main field of the degree, the course shall be included in the main field.

The course is an optional first-cycle course for a Bachelor's degree in Science, with the main fields of Chemistry and Molecular Biology.

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

Learning outcomes

The aim of the course is that the students shall acquire up to date knowledge and skills for biochemical studies of proteins and acquire an understanding of how proteins work by theoretical and practical investigations of the function, properties and structural dynamics of proteins. After the course, the students shall be well prepared to participate in theoretical and practical research and development within molecular protein science.

The aim of the course is that the students shall have acquired the following knowledge and skills.

Knowledge and understanding

After the course the student should:

- be able to explain the principles of common methods which are used for protein purification and characterization, e.g. chromatography, electrophoresis, analysis of secondary structure, spectroscopy, analysis of protein interactions and MALDI-TOF mass spectrometry
- have acquired an understanding for the basic properties of proteins, including the relation of structure and function
- have acquired an understanding of sequence databases and central tools within bioinformatics and to be able to use these

Competence and skills

After the course the student should:

- be able to plan and conduct experiments according to a given problem
- be able to adjust the experimental set up according to the conditions at hand and to document and critically evaluate the results
- be able to plan, conduct and evaluate strategies for protein purification and characterization
- have good skills in presenting and discussing biochemical information both orally and in writing
- have good skills in finding and using biochemical information, including original scientific publications

Course content

Lectures: The lectures and exercises provide information how to study proteins on a molecular level and how proteins work. The lectures give insight in the research frontier and provide a theoretical background on experimental methods used for protein purification and investigations of protein properties/function and dynamics. These methods are e.g. preparative methods, protein purification by ion-exchange/adsorption/affinity chromatography, criteria for purity, SDS-PAGE, iso-electric focusing, 2D electrophoresis, mass spectrometry, methods to study protein interactions, analysis of post-translational modifications, spectroscopy to analyse the dynamics and secondary structure of proteins and bioinformatics. A presentation on biochemical literature and databases is also provided.

Practicals: Experimental protein chemistry is a central topic in the course. It is trained under guidance in practicals where the student is trained in experimental planning, execution and documentation. The student is also trained in the critical evaluation of results. The student is trained in the use of biochemical information, bioinformatics and databases. The student is trained in the use of important methods within protein purification and characterisation, including methods used for the study of properties and function and structural dynamics.

The student is trained in discussion and evaluation of results and in written and oral presentation. During the course the student conducts and presents a short project, for which the student choose the problem.

Course design

The course is focused on experimental investigations of proteins in the form of practicals and includes a short project. A computer practical is included. The lectures cover the theoretical and practical background for general studies within protein chemistry, including the methods experienced in the laboratory. Practicals and lectures are followed up with exercises, oral presentations and discussions of results from experiments and extracted from the literature.

Laboratory works, follow-up results discussions, reports and oral presentations are all compulsory.

Assessment

There will be a written examination at the end of the course.

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 laboratory work and participate in all compulsory components of the course.

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, and 60 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 MOBA01 Cell Biology 15 credits

and

- MOBA02 Chemistry of the Cell 15 credits

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 KEMB03 Biochemical Methods, 15 credits.

Subcourses in KEMC03, Chemistry: Experimental Protein Chemistry

Applies from H13

1211 Experimental Protein Chemistry, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction
1212 Experimental Protein Chemistry, Laboratory Work, 7,5 hp
Grading scale: Fail, Pass

Applies from H12

1201 Experimental Protein Chemistry, 15,0 hp
Grading scale: Fail, Pass, Pass with distinction
1202 Experimental Protein Chemistry, Laboratory Work, 0,0 hp
Grading scale: Fail, Pass