

KEMM15, Chemistry: Structural Bioinformatics, 15 credits

Kemi: Strukturbioinformatik, 15 högskolepoäng

Second Cycle / Avancerad nivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2008-12-10 and was last revised on 2011-08-26. The revised syllabus applies from 2011-08-29, autumn semester 2011.

General Information

The course is included in the main fields of Chemistry, Molecular Biology and Protein Science 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 second-cycle course for a degree of Master of Science in Chemistry, Molecular Biology and Protein Science.

Language of instruction: English

Main field of studies

Chemistry

Protein Science

Molecular Biology

Depth of study relative to the degree requirements

A1N, Second cycle, has only first-cycle course/s as entry requirements

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Learning outcomes

The course aims to provide an in-depth understanding of proteins with an emphasis on structure and its connection to biological functions. The course treats the principles that determine these properties and the methods, mainly X-ray crystallography, that is used to study them within modern molecular protein science.

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

- good understanding of the three dimensional structure, stability, interaction and dynamics of proteins
- theoretical knowledge and practical experience of X-ray crystallography
- the ability to account for relationships between enzymes and enzyme complex structures and their way of functioning, knowledge about basic principles that govern the interaction between proteins
- a high level of proficiency in the use of electronic databases and computer-based tools for analysing protein sequences and structures, the ability to carry out advanced homology-based modelling of proteins and be able to plan possible modifications of structure and function of a protein
- the capability to understand and critically assess scientific literature that treats protein structure and function

Course content

Lectures: Polypeptide conformations. The secondary and three-dimensional structure of proteins, structural classification and structure databases. Prediction and modelling of protein structure. The stability of proteins, dynamics, the interaction in proteins: packing and electrostatics. Ligand binding and structure-based design of drugs. Principles for X-ray crystallography and other methods such as small angle X-ray scattering, neutron scattering etc.

Laboratory work and computer exercises: Provide training in the relevant theoretical and experimental methods that are described for studying protein structure and dynamics.

Course design

Teaching comprises lectures, computer exercises and laboratory work. Except for lectures, all teaching is obligatory.

Assessment

Assessment comprises a practical exercise and 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 practical exercises and the examination.

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 practical exercise and the 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
- 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 KEMM05 Principles of Molecular Protein Science 15 credits or KEM046 Structural Biochemistry and Bioinformatics, 15 credits.

Subcourses in KEMM15, Chemistry: Structural Bioinformatics

Applies from H13

- 0811 Structural Bioinformatics, 7,5 hp
Grading scale: Fail, Pass, Pass with distinction
- 0812 Structural Bioinformatics, Compulsory Elements, 7,5 hp
Grading scale: Fail, Pass

Applies from H09

- 0801 Structural Bioinformatics, 15,0 hp
Grading scale: Fail, Pass, Pass with distinction
- 0802 Structural Bioinformatics, Compulsory Elements, 0,0 hp
Grading scale: Fail, Pass