Protein Chemistry

Programme course

12 credits

Proteinkemi

NKED15

Valid from: 2017 Spring semester

Determined by
Board of Studies for Chemistry, Biology and Biotechnology

Date determined
2017-01-25

Offered for the last time
Spring semester 2022

Replaced by
NKED27

Main field of study
Chemical Biology, Chemistry

Course level
Second cycle

Advancement level
A1X

Course offered for
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- Chemistry
- Organic Synthesis and Medicinal Chemistry, Master's programme
- Protein Science, Master's programme
- Chemical Biology

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
General Chemistry, Organic Chemistry, Biochemistry

Intended learning outcomes

The objectives of the course is to provide comprehensive knowledge in the following areas:
Protein chemistry, protein engineering, structure and function relationships, physicochemical properties of proteins and methodologies for characterization of proteins. After studies well learned the student will have proficiency to:

- Identify structure motifs and from this draw conclusions regarding the structure and function of proteins.
- Search for information from various data bases to visualize protein structures and compare amino acid sequences.
- Draw conclusions about protein dynamics, structure and function from detailed chemical and physical properties.
- Comprehend the fundamental mechanisms of protein folding and to have a deeper understanding of the factors determining the stability of a protein.
- Define scientific problems within this area that can be tackled and solved by experiments.
- Adopt a reflecting, scientific attitude to the theories and obtained experimental results.
- Work in a group in a project-oriented way in the laboratory.

Course content

Theoretical part: Different structure motifs of proteins. Multifunctional enzymes, membrane proteins, prediction of protein structures. Studies of physico-chemical properties of proteins and methodology for studies of these properties: Chemical characteristics of polypeptides, protein engineering, physical interactions determining the properties of proteins, role of hydrophobic interaction, conformation flexibility, protein stability, mechanisms of protein folding, interaction with other proteins, enzyme catalysis.
Project part: Studies of physico-chemical properties of proteins and methodology for studies of these properties. Methodology used for these studies is biophysical methods such as fluorescence spectroscopy and CD. Sequence analysis and structure modeling are used for result analysis.

Teaching and working methods

The course is divided into a theoretical and a project part in order to give opportunity to deeper and more intergrated studies.The theory is presented and treated at lectures and lessons. Three-dimensional structures of proteins and computer simulations are performed in smaller groups. During the project part the students work with genetically mutated proteins cloned in bacteria. The origin of the mutated protein can be proteins that have been mutated by the students in an earlier course in gene technology or can be provided by the research group. The protein variants are characterized. Starting with a project plan the students perform the detail plans for the experimental work. This planning process will proceed interactively through meetings between the groups and the teacher/lab.assistant. The students should then independently evaluate their experimental results. The results of the experimental work is presented in a written report in enlish.

Examination

PRA1	Project work	6 credits	U, G
TEN1	Written examination	6 credits	U, 3, 4, 5

The exercises of the written examination and the test elucidate how well the student perform the the demands of the course.

Grades

Four-grade scale, LiU, U, 3, 4, 5

Department

Institutionen för fysik, kemi och biologi

Director of Studies or equivalent

Magdalena Svensson

Examiner

Lars-Göran Mårtensson

Education components

Preliminary scheduled hours: 55 h
Recommended self-study hours: 265 h

Course literature

David Whitford, Proteins Structure and Function, Wiley. Projektbeskrivning från institutionen.

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.