

Supramolecular Chemistry

Programme course

6 credits

Supramolekylär kemi

TFYA30

Valid from: 2017 Spring semester

Determined by

Board of Studies for Chemistry, Biology
and Biotechnology

Date determined

2017-01-25

Main field of study

Engineering Biology

Course level

Second cycle

Advancement level

A1X

Course offered for

- Engineering Biology, M Sc in Engineering
-
- 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

Basic knowledge about organic chemistry, biochemistry, thermodynamics, surface chemistry and quantum mechanics.

Intended learning outcomes

Supramolecular chemistry is a rapidly growing field at the boundary between several physical and chemical disciplines, and this course brings together aspects of those which are of relevance to supramolecular chemistry. The students will be introduced to the subject background, acquire in-depth knowledge about supramolecular building blocks, structures and methods, and learn about applications, with some emphasis on life sciences and its technologies. This implies that after the course, the students shall

- be able to account for fundamental concepts, methods and theories within supramolecular chemistry.
- be able to understand and account for current problems and research in the field.
- have special competence about the importance of supramolecular association within the life sciences and life science technologies.
- have practical experience from analytical methods for characterization of supramolecular systems.
- be able to interpret, analyse och evaluate experimental data of supramolecular interactions.

Course content

Introduction and background to the subject of supramolecular chemistry. Introduction to bottom-up methods: intermolecular forces and non-covalent interactions, inter- and intramolecular self-association, self-organization, supramolecular topology. Molecular recognition and complementarity, natural and synthetic host-guest pairs, lock-and-key versus induced-fit models. Chelators, coordination chemistry, cooperativity, multivalency. Organic and biomolecular building blocks. Biological membranes: structure, phase behaviour, domain formation, model systems, protein-membrane interaction, evolutionary aspects. Proteins and peptides: folding, synthesis strategies, labeling, immobilization, natural and synthetic receptors. Surface modification: 2- and 3-dimensional modification, monolayers versus hydrogels. Carbohydrates: biological and biomimetic recognition, coupling chemistry, receptors, molecular design and synthesis. A selection of application areas, such as sensor technology, membrane biophysics, proteomics, biomaterials, drug delivery, molecular devices, nanotechnology.

Teaching and working methods

Lectures, laboratory exercises and a project work in small groups. External lecturers will be invited to present current applications or research problems.

Examination

LAB1	Laboratory Work	1.5 credits	U, G
PRA5	Project work, written and oral presentation	2 credits	U, 3, 4, 5
UPG2	Literature assignment, written presentation	2.5 credits	U, 3, 4, 5

The final grade is a weighted average of the grades on UPG2 and PRA5.

Grades

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

Department

Institutionen för fysik, kemi och biologi

Director of Studies or equivalent

Magnus Boman

Examiner

Daniel Aili

Education components

Preliminary scheduled hours: 38 h

Recommended self-study hours: 122 h

Course literature

Additional literature

Books

Jonathan W Steed, Jerry L Atwood, (2009) *Supramolecular Chemistry* 2nd Ed

Articles

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://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.