FCK3305 Carbohydrate Technologies in Glycoscience 7.5 credits

Kolhydratteknik inom glykovetenskap

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for FCK3305 valid from Autumn 2019

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Eligible for studies at the third-cycle level. Good knowledge in English.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After completion of the course the student should be able to

- Demonstrate knowledge about glycan diversity, its importance for biological systems, and how they can change the structure and function of other biological molecules.
- Demonstrate knowledge of the structure and function of plant cell walls, as well as an overall understanding of how its composition can be changed to enable new applications, e.g. to make it less recalcitrant to processing for energy and biomaterial production.
- Demonstrate the ability to describe and reflect on concepts and methods used to produce nanoscale building blocks from plant biomass, and how they can be assembled into new materials with tailored properties and functionalities.
- Demonstrate the ability to plan and perform practical experiments in carbohydrate technology and engineering, and to analyze and discuss the results in the form of written reports.
- Demonstrate ability to identify and discuss how carbohydrate technology and engineering can contribute to sustainable societal development in consumption, production and materials, e.g. by reusing already existing products, or manufacturing new resource-smart and renewable materials.

Course contents

Glycoscience is an interdisciplinary research area focused on understanding the structures and functional roles of glycans (carbohydrates) in biological systems. It covers subjects such as biology, biochemistry, chemistry, medicine, materials science, nanotechnology and computational science. The aim of the course is to provide an overview of current knowledge and technologies in glycoscience, challenges and opportunities for wide application of carbohydrate technology and engineering in health, energy and material science, as well as good theoretical insight and practical skills in how carbohydrate technologies can contribute to the sustainable development in energy and material science.

Topics covered include glycoscience in health, energy and materials science, glycan function, plant cell-wall structure, carbohydrate analysis of complex carbohydrates, glycans and glycoconjugates, carbohydrate-active enzymes, enzymatic degradation of plant biomass and enzymatic modification of plant fibers, the biosynthesis of cellulose and chitin in plants and microorganisms, modification of glycans by altering synthesis pathways, conversion of plant biomass to fine chemicals and feedstocks, polymeric materials and nanomaterials, assembly of bio-based nanomaterials for new materials and applications.

Examination

- TEN1 - Written exam, 1.5 credits, grading scale: P, F
- INL1 - Hand in assignment, 2.0 credits, grading scale: P, F
- LAB1 - Laboratory work, 4.0 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Grading criteria are specified in the course memo.

Other requirements for final grade

Passed written exam, approved assignments linked to the lectures, full attendance and completion of laboratory exercises, and approved laboratory reports.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.