CB2300 Analysis and modelling of biomolecular therapeutics 7.5 credits

Strukturell analys och modellering av biomolekylära läkemedel

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

Establishment

The official course syllabus is valid from the autumn semester 2026 as decided by the Faculty Board decision PA-2025-0010. Date of decision: 2025-10-01.

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Biotechnology

Specific prerequisites

Completed bachelor's degree project 15 credits, 20 credits in cell biology, biochemistry, microbiology and genetic engineering/molecular biology, 15 credits in mathematics, numerical analysis and computer technology, and courses in programming equivalent to at least 5 credits.

Intended learning outcomes

After completing the course, the student should be able to:

- explain the basic principles of structural analysis methods and critically evaluate their strengths and limitations in the development of biomolecular drugs,
- use relevant computational tools and software to process, analyze and interpret extensive experimental datasets from structural analysis of biomolecular drugs,
- assess the quality of data fitting to assess the reliability and certainty of models in both experimental and theoretical data,
- utilize results from structural analysis and modeling to create insights into mechanisms of action and design principles for biomolecular drugs and justify and communicate the methodological choices that form the basis for the conclusions.

Course contents

The course provides an in-depth understanding of how the precise structure and dynamic behavior of biomolecular drugs affect their function. Students gain theoretical and practical skills in generating and analyzing datasets with a focus on small-angle scattering (SAS) and cryo-electron microscopy (cryo-EM).

The course also covers computational modeling for atomistic refinement and detailed characterization of biomolecular structures and their ensembles. It discusses how these methods, combined with ongoing innovation in machine learning, are accelerating modern drug development.

Furthermore, students develop a foundation in the mathematical principles required to generate, refine, and analyze biomolecular structures, preparing them to be able to generate and interpret data from large-scale research infrastructures.

During the course, students apply their knowledge in a project, where they propose, evaluate, and explore case studies in biomolecular drug development.

Examination

- TEN1 - Written exam, 3.5 credits, grading scale: A, B, C, D, E, FX, F
- PRO1 - Project work, 2.5 credits, grading scale: P, F
- LAB1 - Laboratory Work, 1.5 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.

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.