FSI3440 Conformations of Macromolecules 10.0 credits

Makromolekylers konformationer

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

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

Establishment

Course syllabus for FSI3440 valid from Spring 2009

Grading scale

Education cycle

Third cycle

Specific prerequisites

Phd student

Language of instruction

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

Intended learning outcomes

After completed course, the PhD student should be able to:

- apply statistical mechanics to macromolecules.
- pursue and realize the limitations with different approximations used to study polymer problems.
- apply renormalisation methods to polymer problems.
- describe different models för polymer dynamics.
- apply polymer physics to biological macromolecules.

Course contents

Characterisation of monomers and Macro molecules. Conformations. Random structures and mathematical models to describe these. The excluded volume problems. Flory-Huggins theory. Interactions between neighbouring atom grouper and their influence on molecular structures. Characterisation of some different polymers. Proteins. Conformations of amino acids and interactions between neighbouring groups. Ramachandran plots.Some structure types -helices, flakes. Methods to predict structures. Nucleic acids, DNA, RNA.Characterisation of nucleotide conformations. Different spiral structures. Couplings between base pairs. Polymeric materials, different states and transitions. Scaling-properties; dynamics based on scaling ideas.

Course literature

- **P.J. Flory, Statistical Mechanics of Chain Molecules, Interscience Publisher 1969.**
- **P.G. des Gennes, Scaling Concepts in Polymer Physics. Cornell Univ. Press, 1979.**
- **G.E. Schultz, R.H. Schirmer, Principles of Protein Structure, Springer, 1979.**

Examination

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.

Other requirements for final grade

Hand in assignments in combination with an oral exam.

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.