



FCK3312 NMR Spectroscopy and imaging – quantum mechanical principles 4.5 credits

NMR-spektroskopi och -avbildning – kvantmekaniska principer

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

Establishment

Course syllabus for FCK3312 valid from Spring 2020

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Knowledge corresponding to course FCK3311, NMR spectroscopy and imaging - basic principles, or equivalent.

Language of instruction

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

Intended learning outcomes

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

- explain the basic quantum mechanical principles for NMR spectroscopy
- explain the operation of the most common multidimensional NMR experiments
- explain how suitable combinations of NMR experiments can be used for structure determination of biomolecules
- define and compare the different methods, choose technique/method for specific analysis problems and motivate the choices
- use the above listed knowledge to plan, perform and evaluate a laboratory project within the subject area, in group (or individually, depending on the number of participants) including to perform a smaller literature study, and present the laboratory project in a written report and perform an opposition on another laboratory project in the course

Course contents

- Single spin in magnetic field
- The density operator formalism
- The effect of nuclear spin interactions
- Polarization transfer
- The mechanism of 2D COSY and HSQC experiments
- Dipole-dipole relaxation and the NOE effect
- The mechanism of 2D NOESY experiment
- Basic NMR strategies for biomolecular studies

Examination

- RAP1 - Report, 3.0 credits, grading scale: P, F
- LAB1 - Laboratory project, 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.

Approved report (RAP1; 3 ECTS)

Approved presentation of the laboratory study (LAB1; 1.5 ECTS)

Other requirements for final grade

The student should be able to fulfil all parts of the objectives on both a general and basic level, and on a detailed level, and with both width and depth. The student should also be able to use this knowledge to set up multidimensional NMR experiments to gain insight to particular problems, and relate this to own research.

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.