FSK3887 Characterization Techniques in Materials Physics using Neutron and Synchrotron Radiation 7.5 credits

Karakteriseringsmetoder i materialfysik med neutroner och synkrotronljustrålning

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

Establishment

Course syllabus for FSK3887 valid from Autumn 2018

Grading scale

G

Education cycle

Third cycle

Specific prerequisites

Enrolled as PhD student, with a Master of science degree in engineering physics, or equivalent.

Course in solid state physics.

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, students should be able to:

- Explain the fundamentals of material characterization methods using neutrons and synchrotron radiation.
- Describe the process of synchrotron radiation from a dipole magnet, undulator, and wiggler.
- Explain the central components as well as their function in an injector and storage ring.
- Describe the function of monochromators and beam monitors.
- Describe differences in properties of neutrons and photons and how these differences affect their use in experiments.
- Describe the principles of x-ray diffraction and scattering, neutron diffraction and scattering, x-ray absorption, x-ray emission, and photoelectron spectroscopy.

Course contents

High brilliance and intensity sources, X-ray diffraction and scattering, neutron diffraction and scattering, X-ray absorption, X-ray emission, Photoelectron Spectroscopy, Imaging techniques.

Disposition

Lectures
Seminar

Course literature

Giorgio Margaritondo, Elements of Synchrotron Light: For Biology, Chemistry, and Medical Research, Oxford University Press, USA (2002)
Jens Als-Nielsen, Des McMorrow, Elements of Modern X-ray Physics, Wiley (2001)
B.T.M. Willis, C.J. Carlile, Experimental Neutron Scattering, Oxford University Press (2009)

Examination

- INL1 - Assignments, 6.0 credits, grading scale: G
- SEM1 - Seminar, 1.5 credits, grading scale: G

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.

SEM1: Seminarium, 1.5 credits, grade scale: P/F
INL1: Hand-in exercises, 6 credits, grade scale: P/F

Other requirements for final grade

Passed (P) SEM1 and INL1.

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.