



SK2740 Introduktion till svepprob-mikroskopi 6,0 hp

Introduction to Scanning Probe Microscopy

Fastställande

Kursplan för SK2740 gäller från och med HT10

Betygsskala

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

Utbildningsnivå

Avancerad nivå

Huvudområden

Teknisk fysik

Särskild behörighet

A degree in mathematics, physics, chemistry or material science at the bachelor level.

Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

Lärandemål

The objective is to offer students an opportunity to learn the theory of operation of scanning probe microscopes, and to gain hands-on understanding of scanning probe microscope operation, with particular emphasis on the Atomic Force Microscope (AFM). To teach the fundamental physical principals behind the two basic modes of AFM, as well as to give a survey of the many variations of these two modes used in specialized measurement methods. Armed with this understanding and intuition, students should be able to:

- better interpret the images produced by the AFM and the measurements made by AFM that they encounter in the research literature
- finish with a deeper understanding of AFM and become more knowledgeable users of the instrument.

Kursinnehåll

The course is designed for students from a wide variety of educational backgrounds, from Physics, Chemistry and Biology, who would like to learn about the technical details of how SPM's work, and the possibilities and pitfalls in interpreting the images that SPM's produce. We will look in detail at some of the many different modes of SPM usage, with particular emphasis on Atomic Force Microscopy (AFM) and its many variations.

- SPM overview
- Scanners, Sensors, Feedback and Control
- Cantilevers and Tips, Force Measurements
- Fluctuations, Noise and Fundamental Limits
- Surface Forces, Adhesion and Friction
- AFM Colloidal Probe Technique
- Nonlinear Cantilever Dynamics
- SPM Application in Industry

Kurslitteratur

Various articles, lecture notes, and training manuals, made available to participating students.

Examination

- PRO1 - Projekt, 3,0 hp, betygsskala: A, B, C, D, E, FX, F
- LAB1 - Laborationer, 3,0 hp, betygsskala: A, B, C, D, E, FX, F

Examinator beslutar, baserat på rekommendation från KTH:s handläggare av stöd till studenter med funktionsnedsättning, om eventuell anpassad examination för studenter med dokumenterad, varaktig funktionsnedsättning.

Examinator får medge annan examinationsform vid omexamination av enstaka studenter.

När kurs inte längre ges har student möjlighet att examineras under ytterligare två läsår.

Övriga krav för slutbetyg

Attendance to the lectures and labs. Each of the two labs in the course requires a written report (LAB1, 3 hp, grading scale A-F). Students with sufficient mathematical background will do a computer simulation project, others not comfortable with this simulation project will do a literature project. These projects will require a written report (PRO1, 3 hp, grading scale A-F).

Etiskt förhållningssätt

- Vid grupparbete har alla i gruppen ansvar för gruppens arbete.
- Vid examination ska varje student ärligt redovisa hjälp som erhållits och källor som använts.
- Vid muntlig examination ska varje student kunna redogöra för hela uppgiften och hela lösningen.