



# FSK3741 Introduction to Scanning Probe Microscopy 7.5 credits

## Introduktion till Svepprobsmikroskopi

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 FSK3741 valid from Spring 2022

## Grading scale

P, F

## Education cycle

Third cycle

## Specific prerequisites

Acceptance to a Masters program, or a Masters degree in Physics, Chemistry or Biology.  
Experience of complex laboratory equipment.

## Language of instruction

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

## Intended learning outcomes

- Theoretical understanding of how SPM's work.
- Interpretation of images created by SPM's.
- Hands-on practical experience operating SPM's.

## Course contents

The course is designed for students with different education backgrounds, from Physics, Chemistry and Biology, who would like to learn about the technical details of how SPMs work, and the possibilities and pitfalls in interpreting SPM images. We will focus primarily on Atomic Force Microscopy (AFM) and the particular details of some of its many modes of operation. Including:

- Scanners, sensors and feedback control
- Cantilevers and tips, imaging artifacts
- Fluctuations, noise and the fundamental limits on force sensitivity
- Force-distance curves and quasi-static force measurement
- Nonlinear cantilever dynamics and dynamic force measurement
- Surface forces and bulk elastic forces in AFM.
- Lateral force and measuring friction with the AFM.
- Electrostatic forces and measuring surface potential.

## Examination

- LAB1 - Laboratory work, 1.5 credits, grading scale: P, F
- LAB2 - Laboratory work, 1.5 credits, grading scale: P, F
- LAB3 - Laboratory work, 1.5 credits, grading scale: P, F
- LAB4 - Laboratory work, 1.5 credits, grading scale: P, F
- TENA - Oral exam, 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.

## 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.