



HL2026 Electron Microscopy 7.5 credits

Elektronmikroskopi

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 HL2026 valid from Autumn 2010

Grading scale

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

Education cycle

Second cycle

Main field of study

Medical Engineering

Specific prerequisites

Bachelor's degree in Engineering Physics, Electrical Engineering, Computer Science or equivalent. Basic knowledge of anatomy.

Language of instruction

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

Intended learning outcomes

In their cellular environment proteins and other macromolecules are highly dynamic structures that can adopt a number of conformations related to the function they have in living organisms. Cryo electron microscopy has become one of the most important methods for investigating the structure and function of proteins and macromolecular complexes close to their native functional states.

Aim: To understand how transmission electron microscopy can be used to study different types of biological specimens. High-resolution structural analysis of large molecular assemblies and two-dimensional crystals of membrane proteins will be the major targets.

Content: Image formation in a transmission electron microscope, Electron diffraction, Protection against radiation damage - electron cryo microscopy, Specimen preparation, Methods for 2-D crystallization, Data collection strategies, Analysis of experimental data - crystals, Analysis of experimental data - non-crystalline objects, Interpretation of structural models

After completion of the course you should be able to:

- Prepare specimens for electron microscopy
- Understand the principles behind image formation and data collection
- Process data in 2D and 3D
- Interpret and visualize results using molecular graphics

Course contents

Specimen handling, practical electron microscopy, theory of image formation, different modes of electron microscopy, computer exercises using dedicated software for processing EM data and 3D reconstruction, computer exercises using molecular graphics programs for interpretation and visualization.

Course literature

Joachim Frank, Three-Dimensional Electron Microscopy of Macromolecular Assemblies, 2nd edition, Oxford University Press 2006, ISBN 0195182189

Examination

- PRO1 - Project Report, 1.5 credits, grading scale: P, F
- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- ÖVN1 - Exercises, 3.0 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.