DEPARTMENT OF CELL AND MOLECULAR BIOLOGY

C5F3219, Basic Electron Microscopy for Cell Biologists, 1.5 credits (hec)

Grundläggande elektronmikroskopi för cellbiologer, 1,5 högskolepoäng

Third-cycle level / Forskarnivå

Approval

This syllabus was approved by the The Committee for Doctoral Education on 2023-12-01, and was last revised on 2025-02-12. The revised course syllabus is valid from spring semester 2025.

Responsible department

Department of Cell and Molecular Biology, Faculty of Medicine

Prerequisite courses, or equivalent

No prerequisite courses, or equivalent, demanded for this course.

Purpose & Intended learning outcomes

Purpose

The students take this course in order to learn about the ways electron cryomicroscopy (Cryo-EM) methods are used in the study of biological problems, and to gain knowledge in the theoretical basis of electron microscopy and some practical starting skills in electron microscopy methods.

Intended learning outcomes

After the completed course, the students understand and can explain the theoretical basis of Cryo-EM techniques, and explain how different kinds of biological research problems are studied using these techniques. The students have basic knowledge on the application of different preparation methods, and can critically analyse and relate them to cell biological research questions. The students have basic (novice level) practical knowledge on the different practical preparation techniques.

Course content

The course introduces students to cryo-EM and the kind of biological problems such as different biological functions and structures that are studied using electron microscopy. The course includes training in basic methods used to do research on biological material such as subcellular structures. The course includes theoretical lectures, discussions, a small literature project and practical sessions on specimen preparation for cryo-transmission electron microscopy. Most important sample preparation methods for cryo-electron microscopy: vitrification, cryo-confocal imaging for object identification, cryo-FIB-SEM preparation methods for transmission electron microscopy, cryo-volume imaging using FIB-SEM and cryo-transmission electron microscopy. There will be practicals on relevant methods in cryo-electron microscopy.

Forms of teaching and learning

The learning and teaching activities include talks (lectures), discussions, laboratory activities and demonstrations.

Language of instruction

The course is given in English

Grading scale

Pass (G) /Fail (U)

Compulsory components & forms of assessment

Compulsory components

The practical laboratories and demonstrations are obligatory. Absence from obligatory moments is regulated by instructions of the course leader.

Forms of assessment

The outcomes are examined through an individual quiz with multiple choice questions, and a short individual written report/reflection on how the participants can employ EM techniques in their own research.

Course literature

Recent articles and different web resources will be distributed well in advance of the start of the course.