

Title of module

Modular Advanced Practical and Seminar
in the Focal Point Programme
"Molecular Medicine", VZ: 185780, 183781
"Electron microscopy of biological specimens"

Credit points

4

Available in semester(s)

1

Hours per week

5.25

Compact course



Lecturer(s)

A. Unger and teaching assistants

Teaching methods

Two-week advanced laboratory course with an intergrated seminar, one of four lab courses to be completed in the first term

Evaluation of learning progress

Active participation in the laboratory tasks and seminar, feedback during the experiment

Mode of examination

Assessment of active and successful participation in the practical (50%) and a written project report (50%)

Learning objectives

In this course we will acquire basic aspects of the organisation of animal cells with different electron microscopical techniques. We elaborate the theoretical EM background and provide a full program for the preparation of specimens and analysis. This includes tissue preparation, fixation, dehydration and embedding into resins. The participants can learn how to cut ultrathin sections with glas- and diamond knives and counter-staining with different heavy metal salts. Candidates will independently work with a Zeis EM 910 including digital camera system.
After completion of the course students will have aquired basic skills in the preparation of electron microscopical specimens, analysis with the EM and interpretation of self-made pictures and plates.

Soft skills

Participans should elucidate and present the obtained results on a poster.

Contents of module

Topic:

"Electron microscopy of animal specimens"

Content:

- 1) Cytoskeletal structures of animal cells
- 2) Demonstration of actin filaments by negative stain
- 3) Titin stains in negative contrast
- 4) The extracellular matrix: Collagen
- 5) DNA-preparation for EM
- 6) Localisation of structural proteins by various Immuno-EM techniques

Methods:

- 1) Tissue dissection, fixation, resin embedding
- 2) Ultramicrotomy (40-80nm sectioning)
- 3) Counter- & Immunostainings (Nano-Gold)
- 4) Negative staining
- 5) "Freeze fracture" techniques (if possible)
- 6) to some extent: native preparation of proteins
(Chromatography, SDS-PAGE, Blotting)

Note:

The course can qualify students for further independent diploma/master/PhD works in our EM facility of the RUB.