



DEPARTMENT OF LABORATORY MEDICINE

H5F2987, Preclinical Imaging Techniques, 1.5 credits (hec)

Prekliniska avbildningstekniker, 1,5 högskolepoäng

Third-cycle level / Forskarnivå

Approval

This syllabus was approved by The Committee for Doctoral Education on 2024-02-01, and was last revised on 2025-09-15. The revised course syllabus is valid from spring semester 2026.

Responsible department

Department of Laboratory Medicine, Faculty of Medicine

Contributing department/s

Department of Clinical Neuroscience

Department of Clinical Science, Intervention and Technology

Department of Laboratory Medicine

Prerequisite courses, or equivalent

Students must have passed the courses in laboratory animal science: Function A - Rodents and lagomorphs before attending this course.

Purpose & Intended learning outcomes

Purpose

The purpose of the course is to provide an overview on state-of-the-art small animal imaging techniques including fluorescence imaging, bioluminescence imaging, ultrasound, photoacoustic imaging, computed tomography (CT), magnetic resonance imaging (MRI) and Positron Emission Tomography (PET). The course will cover (1) basic theory and instrumentation principles of various imaging modalities, (2) applications of small animal imaging in translational research, (3) multi-modality imaging and co-registration for accurate diagnostic and follow-up of treatment efficacy and (4) hands-on training in imaging acquisition, imaging analysis and imaging reconstruction.

Intended learning outcomes

At the end of the course, the doctoral student is expected to be able to:

- (1) explain the basic concepts and expected outcomes of different imaging modalities;
- (2) design and perform small animal imaging experiments using various techniques;
- (3) apply and describe principles to process and analyze imaging data;
- (4) integrate and evaluate multi-modality imaging studies, including assessment of co-registration data and outcome;
- (5) select and justify the appropriate imaging modality, animal model and experimental design in preclinical studies within their own research field.

Course content

This course will fully cover the background, theory and principles underlying each imaging modality used in preclinical imaging, with extensive practical training in the lab. There will be a general introduction to all the different imaging modalities including theory, principle of concept and application in research. For each modality, students will be introduced to theory and instrumental principles, experimental design in different research areas, research project case study and critical review. In the hands-on sessions, students will have the opportunity to acquire images in different animal models and to use several kinds of software to process imaging analysis, imaging reconstruction and co-registration.

Forms of teaching and learning

Lectures/seminars, group discussions, critical review literature studies, and hands-on training.

Language of instruction

The course is given in English

Grading scale

Pass (G) /Fail (U)

Compulsory components & forms of assessment

Compulsory components

The individual assignment, as well as attendance during the theoretical and hands-on parts of the course, is compulsory.

Forms of assessment

The intended learning outcomes will be assessed by an individual assignment. The individual assignment is to describe a research project in the student's own research area utilizing the small animal imaging techniques introduced during the course. In the assignment, students are required to describe the experimental design in detail, as well as the rationale behind the experimental design and methodology in data acquisition/analysis. Students must complete the assignment by the end of the course. Students who do not obtain a passing grade in the first examination will be offered a secondary examination within two weeks of the final day of the

course. The examination includes a written report of 1-2 pages and oral presentation of the report followed by a question and answer session.

Course literature

Recommended literature

Small animal imaging: basic and practical guide. Fabian Kiessling, Bernd J. Pichler, Peter Hauff. 2017. Springer-Verlag Berlin Heidelberg. ISBN 978-3-31-942200-8. DOI 10.1007/978-3-319-42202-2.