



CORE FACILITIES

SC00004 Cellular Imaging, 3 credits

Cellulär avbildning, 3 högskolepoäng

Third-cycle level / Forskarnivå

Confirmation

This syllabus was confirmed by the Council for PhD Education at Sahlgrenska Academy on 2019-01-29, and is valid from Spring semester 2018.

Responsible Department

Core Facilities, Sahlgrenska Academy

Entry requirements

To qualify for admission to the course, the student has to be registered as a PhD student at Sahlgrenska Academy or at another faculty or university.

The course is an elective course within the third cycle at Sahlgrenska Academy.

Learning outcomes

After completing the course the student is expected to be able to:

Knowledge and understanding

- Have an overview of several basic and advanced fluorescence microscopy techniques in biomedical science/research.
- Describe the basics of the technology behind widefield and confocal microscopy, and the most common applications of these technologies in cell biology.
- Explain the principles of single-photon confocal scanning microscopes (CSM) and why such microscopes are specially adapted to image 3D samples with high optical sectioning capacity.
- Explain the principles of multiphoton excitation scanning microscopes, and describe their advantages and drawbacks as compared with CSMs.

Skills and abilities

- Set up imaging equipment for various applications and understand the limitations of each technology.
- Explain the advantages and limitations of each imaging technology and applications and be

able to select which instrument-type is best suited for specific sample types.

- Describe newly emerging technologies and how they relate to current approaches.

Judgement and approach

- Set up and use a modern microscope typically found at the bio-labs today: conventional fluorescence microscopes and laser scanning confocal microscopes.
- Plan, perform, present and criticize research projects using one of the microscopy techniques available at the Centre for Cellular Imaging.

Course content

- Basic concepts in modern fluorescence microscopy: What is fluorescence, different fluorochromes, excitation methods, emission characteristics, purpose and uses.
- How to prepare cells/tissues for light microscopy.
- Advanced laser systems: Laser Scanning confocal microscope: Fundamentals of confocal microscopy, advantages in comparison to fluorescence microscopy, different approaches and instrumentation limitations. Will include line scanning microscopy, spinning disk microscopy, multicolour, Z-stacks, user tips.
- Advance Techniques in microscopy (FRET, FRAP, FCS...)
- Application of modern microscopy methods for current research topics
- Multiphoton confocal microscopy
- Laser capture microdissection for non-contact sample handling
- High content screening fluorescence microscopy for system biology.

Types of instruction

Lectures, demonstrations, practical assignments, written assignments

Language of instruction

The course is given in English.

Grades

The grade Pass (G) or Fail (U) is given in this course.

Types of assessment

The examination of the course will be a written report from each doctoral student, and an individual practical examination on the microscopy equipment that the doctoral students have to choose during the course. In addition, to pass the course the doctoral student has to attend a minimum of 80% of the lectures and demonstrations.

A doctoral student who has failed a test twice has the right to change examiners, if it is possible. A written application should be sent to the Institute.

Course evaluation

There will be a written evaluation of the different parts of the course. The results of the

evaluation will be communicated to the doctoral students and will function as a guide for the development of the course.

Other information

The syllabus was confirmed by the Council for PhD Studies on 2015-09-15 and was last revised on 2017-09-12 to be valid from spring semester 2018 (reg.nr.: U 2017/543). It was entered into FUBAS 2019-01-22.