



SLUkurs

Syllabus

**PFS0179 Light microscopy and sample preparation in plant sciences,
3.0 credits**

Syllabus approved

2021-01-26

Subjects

Biology

Education cycle

Third cycle

Grading scale

Pass / Failed

The requirements for attaining different grades are described in the course assessment criteria which are contained in a supplement to the course syllabus. Current information on assessment criteria shall be made available at the start of the course.

Language

English

Prior knowledge

None

Objective, including learning outcomes

After the end of the course the student will be able to
- choose the most appropriate technique for sample preparation (fixation, sectioning)

as well as staining for her/his biological question

- use correct terms to describe various parts of a light microscope
- understand and apply the basic physical principles of light microscopy to optimally set up the microscope for her/his use
- diagnose basic problems at the microscope during sample imaging and solve them
- decide on and apply simple, scientifically correct image manipulations to prepare his/her images for publication
- critically evaluate the results of a microscopy experiment

Content

The purpose of the course is for the student to gain an overall understanding of light microscopy of plants, from sample preparation such as fixation, inclusion, sectioning and staining to the use of a microscope with its underlying optical principles. The student will acquire knowledge, tools and practice during this course in order to then choose the best strategy depending on various plant tissues and biological questions.

The five course days are spread over two weeks with obligatory time for own work in between to give the student the opportunity to apply new knowledge directly to their own plant samples. If needed, the first week of the course can also be followed at distance from other labs. The first day is devoted to sample fixation, inclusion and various sectioning methods via lectures and a demonstration in the lab (recorded if necessary). During the second day of the course, the student will follow lectures about different staining and localization methods for various cellular substances (histological staining), epitopes (immuno-localization of proteins and cell wall polymers) and RNA (in situ hybridization). The student also gets the opportunity to test different histological staining methods in the lab, and to continue working during the rest of the week with their own samples. Course days 3-5 are mandatory on site at Umeå Plant Science Center and are devoted to microscopy. The student will learn through lectures, practical exercises, and work with their own material about the optical principles of light microscopy, objective lenses, resolution, setting Köhler, contrasting methods (incl. darkfield, DIC, phase contrast), immersion, cameras and detectors and epifluorescence and about simple principles of image analysis and scientifically correct image manipulation. The course ends with group presentations by the students about their results, challenges with their specimen and possible solutions for future experiments. The presentation is mandatory.

Requirements for examination

The group presentation of the student's results on the last day of the course is mandatory. During this presentation, the students will explain the individually

chosen strategy for their samples, including preparation, sectioning and microscopy, what challenges they met on the way and how problems can be solved in the future. The students in the same group must also compare the different techniques and methods that were chosen and their success with these.

Additional information

Physical attendance on course day 3-5 at Umeå Plant Science Center is mandatory.

Responsible department

Department of Forest Genetics and Plant Physiology