



**Karolinska  
Institutet**

Course syllabus for

# **Complex tissue analysis using multistaining techniques and image analysis, 7.5 credits**

Komplex vävnadsanalys med multifärgningstekniker och bildanalys, 7.5 hp

This course syllabus is valid from spring 2025.

Please note that the course syllabus is available in the following versions:

Spring2024 , Spring2025

Course code	3BL010
Course name	Complex tissue analysis using multistaining techniques and image analysis
Credits	7.5 credits
Form of Education	Higher Education, study regulation 2007
Main field of study	Biomedical Laboratory Science
Level	AV - Second cycle
Grading scale	Pass with distinction, Pass, Fail
Department	Department of Laboratory Medicine
Decided by	Education committee LABMED
Decision date	2023-10-27
Revised by	Education committee LABMED
Last revision	2024-10-07
Course syllabus valid from	Spring 2025

## **Objectives**

### **Learning outcomes**

#### **Knowledge and understanding:**

- Compare current multi-staining technologies and reflect on their role in diagnostic pathology and research.
- Compare current image acquisition technologies and reflect on how they are used in diagnostic pathology and research.
- Reflect on how to construct an image analysis workflow using image analysis software.
- Compare different statistical analysis methods for analysis of image data.
- Summarize the role of machine learning and artificial intelligence in diagnosis and healthcare applications.

**Skills and abilities:**

- Apply image analysis workflow using image analysis software from initial image preparation to data analysis and oral/written presentation of results .

**Evaluation ability and approach:**

- Demonstrate the ability to identify his or her need for further knowledge and to take responsibility for his or her knowledge development .

**Content**

The course focuses on multistaining technologies and their role in diagnostic pathology and research. The topics cover the main steps of complex tissue analysis from tissue staining to image analysis and data handling. Course modules include discussion of different multistaining technologies, image acquisition technologies, image analysis workflows and statistical data analysis. The course provides theoretical background and hands-on experience.

**Teaching methods**

The pedagogy will be based on student-centered and student-activated pedagogy. The topics covered in the course are taught in two stages. Each topic starts with a week of independent preparatory work and is summarized by TBL-based learning. The second week consists of student-activating, deep learning activities where students work on a project and receive feedback from teachers . The learning activities in the preparatory stage include the use of pre-recorded lectures, scientific publications, presentations from experts and online tutorials. . The learning activities included in the deepening stage include for example project work in the form of written assignments, case studies, analysis of images in image analysis programs, data analysis and presentation.

**Examination**

The course is examined orally and in writing.

For VG, pass (G) is required on written assignments and VG on the final oral examination.

Students who do not pass a regular examination are entitled to re-sit the examination on five more occasions. If the student has failed six examinations/tests, no additional examination is given. Each occasion the student participates in the same test counts as an examination. Submission of a blank exam paper is regarded as an examination. In case a student is registered for an examination but does not attend, this is not regarded as an examination.

If there are special grounds, or a need for adaptation for a student with a disability, the examiner may decide to deviate from the syllabus's regulations on the examination form, the number of examination opportunities, the possibility of supplementation or exemptions from the compulsory section/s of the course etc. Content and learning outcomes as well as the level of expected skills, knowledge and abilities may not be changed, removed or reduced.

The teacher-led activities are compulsory as well as the project work. The examiner assesses if and, in that case, how, absence can be compensated. Before the student has participated in all compulsory parts or compensated absence in accordance with the course director's instructions, the student's results for respective part will not be registered. Absence from a compulsory activity may result in that the student cannot compensate the absence until the next time the course is given.

**Transitional provisions**

Examination will be provided during a period of two years after a possible closure of the course. Examination can take place according to a previous literature list during a period of one year after the time when a renewal of the literature list has been made.

For a course that has been discontinued, undergone major changes, or where the reading list has been significantly changed, an additional exam (other than the regular exam) of the previous content or literature should be conducted for a period of one year from the date the change took place.

## **Literature and other teaching aids**