

Course analysis Microscopy SK2500/SK2501/FSK3500/FSK3501 HT 2023

Number of credits: 6p for SK2500/FSK3500, 7.5 p for SK2501/FSK3501 (4 p exam A-F, 2 p labs P/F, 1.5 p seminar P/F on SK2501)

Course responsible: Iliara Testa

Other teachers: Anna Burvall (lectures, labs) and Francesca Pennachietti (lectures, labs).

Teaching hours: 16h lectures, 16 h labs, 3 h seminar (SK2501/FSK3501 only)

Number of registered students: 8 on SK2501

Number of pass at exam or re-exam: All registered students passed

Levels of pass: 100% on FSK3501

Total pass level: In total 100% pass after first re-exam

Number or answers to course evaluation: 4 (50%)

Course objectives:

After completing the course the student should be able to:

- adjust the illumination system to obtain optimal performance in transmission microscopy.
- select a suitable light source and optical filters, and correctly adjust the illumination system for fluorescence microscopy.
- select a suitable objective (correction, immersion etc) for various types of microscopic investigations.
- select a suitable contrast method (phase contrast, DIC, fluorescence, darkfield etc) and correctly use this technique to obtain high-quality images.
- calculate the expected image quality regarding resolution and signal-to-noise ratio for different practical imaging situations.
- understand and be able to describe the physical limitations for microscope performance concerning resolution and signal-to-noise ratio.
- describe performance for different types of microscopes by using (and in some simple cases calculating) optical transfer functions.
- select a suitable sampling density for digital image recording in microscopy.
- do computer processing of microscopic images to visualise three-dimensional structures.
- perform quantitative measurements in microscopic images using a computer.

Feedback from students: course evaluation

The four students who answered the course evaluation were positive to the course, as were the students we talked to during the course.

Couse analysis

Last year we had recorded materials from the covid years posted on the course Canvas page, but still gave the lectures on campus as before. This led to a very low degree of participation, which was boring for the teachers and felt like a waste of time. The time and effort invested in preparing and giving those lectures should be better used.

This year, each course week would contain one recorded lecture, containing the recorded materials from two of the earlier on-campus lectures. The recorded material contained the introductions of new concepts and of derivations, but not, e.g., solved examples. Then there was one on-campus session, containing answers to student questions, concept questions, and solving tasks. If you prepared questions for the on-campus session, and then attended it, you got bonus points for the exam.

Also, the confocal lab was completely re-made by Francesca, and now all of it is done at SciLife.

Both changes seem to have worked well. All students who answered were positive to the lecture format, and all teachers appreciated it. By spending less time on preparing the lectures, we were actually getting more student interaction. So the general consensus is to keep this format for next year.

In addition, the student answers show the labs were very much appreciated. This course is, in some ways, constructed around the labs which are the true learning sessions.

As for improvements, several students asked for some way of bridging the gap between theory and problem solving, perhaps by solving more old exam problems during on-campus sessions, or by providing a list of suggested tasks for each lecture.

Next year's course

Next year we continue like this year! Perhaps there is finally time to write a new part of the compendium, on statistical super-resolution imaging. We also consider how to get the students to solve more tasks during the course, for example by recommended tasks or by solving more tasks during on-campus sessions.