

## **BIMA3217 Hands-on Advanced Optical Microscopy (3 ECTS)**

### **Course description:**

Learn fluorescent microscopy techniques through practical sessions. During the course students are familiarized with microscope optics through theoretical lectures and a hands-on session, acquire practical skills on widefield, confocal, and STED techniques and learn how to prepare test samples and use them to perform microscopic quality control procedures such as measuring point spread function. Furthermore, students prepare biological samples, which they use to image and perform basic image analysis on. Finally, the work is reported in the form of a written report.

### **Contents:**

Theoretical lectures, hands on fluorescent microscopy instrumentation and optical components, hands on sample preparation, Fluorescence applications: widefield, confocal and STED

### **Modes of Study:**

Introductory lectures, laboratory work in groups, practical training in widefield, confocal and STED, written essay in the scientific article format

### **Evaluation:**

Pass/Fail

### **Proceeding Studies:**

Bioimaging and microscopy 5 ECTS, Fluorescence in bioanalytical research 4 ECTS. Advanced microscopy 5 ECTS is a plus.

### **Recommended Year of Study:**

All interested master's and PhD students are encouraged to apply. However, it is mostly aimed for second year bioimaging master's students who are doing internships/master's theses.

### **Teachers in charge:**

Elnaz Fazeli (elnfaz (at) utu.fi)

Joanna Pylvänäinen (jpylvana (at) abo.fi)

Elena Tcarenkova (eletca (at)utu.fi)

### **Registration:**

Please send an Email to Elnaz Fazeli ( elnfaz (at) utu.fi ) to register to the course. Include your background with a short description of your project, samples, sample preparation protocol you are currently using and the type of image processing you would need in your project.

### **Learning outcomes:**

Practical sessions for sample preparation, microscopy quality control and basic image analysis. Moreover, students are familiarized with optical microscopy setup and learn how to write a scientific report.

### **Implementation methods:** Lectures: 7 hours

Hands-on optics: 3 h

Hands-on laboratory work: 6 h

Imaging sessions: 12 h (1h /student)

Image processing: 4 h Independent study: 30 h

Written report work: 27 h

**Programme:**

Week number	Session	Date	Time	Place
36	Introduction	31.8	9-12	PHA3
36	Microscope instrumentation - theory	1.9	9-11	Biokemi, BioCity Kurslab or biophysics
37	Sample preparation	8.9	9-16	
37	Widefield microscope 1-1	10.9	10-13	CIC
37	Widefield microscope 1-2	11.9	10-13	CIC
38	Microscope instrumentation - hands on	14.9	12-16	Biophysics
38	Confocal microscope 1-1	15.9	10-13	CIC
38	Confocal microscope 1-2	16.9	10-13	CIC
38	STED microscope 1-1	17.9	10-13	CIC
38	STED microscope 1-2	18.9	10-13	CIC
39	Widefield microscope 2-1	21.9	10-13	CIC
39	Widefield microscope 2-2	22.9	10-13	CIC
39	Confocal microscope 2-1	24.9	10-13	CIC
39	Confocal microscope 2-2	25.9	10-13	CIC
40	STED microscope 2-1	28.9	10-13	CIC
40	STED microscope 2-2	29.9	10-13	CIC
40	Image Analysis	2.10	9-13	Teutori