

# MICRO-562

## Biomicroscopy II

Instructors:

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TA:

Daniil Riabov

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## Biomicroscopy II

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Where/When: **Theory**  
**In BC01**  
**Lecture:** Thursdays from 1:15 pm to 3 pm  
**Exercise:** Thursdays from 3:15 pm

Where/When: **TP**  
**In BIOP Core Facility**  
**Practical:** Thursdays from 1:15 pm

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## Biomicroscopy II

### **SUMMARY**

Introduce theory of contrast enhancing and high-resolution optical microscopy methods.

Hands-on experience with commonly used optical microscopes.

How to investigate biological samples?

How to obtain high quality images?

### **TEACHING METHODS**

In-class lectures with exercises - 6 lectures

Hands-on TP in the BioImaging and Optics Platform (BIOP) Core Facility - 6 lectures

# Biomicroscopy-II Syllabus – (TENTATIVE)

Lecture 1	20 February	Course	Brief Review, Dark-Field
Lecture 2	27 February	Course	Phase-Contrast, Polarization, Birefringence
Lecture 3	06 March	Course	DIC, Fluorescence Microscopy Techniques
Lecture 4	13 March	Course	Introduction to Confocal Microscopy
Lecture 5	20 March	Course	Advanced Microscopy-I
Lecture 6	27 March	Course	Advanced Microscopy-II
Lecture 7	03 April	TP	Practical: Intro to Wide-Field Microscopy
Lecture 8	10 April	TP	Practical: Transmission Techniques
Lecture 9	17 April	TP	Practical: Intro to Fluorescence
<b>Lecture X</b>	<b>24 April</b>	<b>EASTER</b>	
Lecture 10	01 May	TP	Practical: Intro to Confocal
Lecture 11	08 May	TP	Practical: Fluo/Conf
Lecture 12	13 May	TP	Practical: Fluo/Conf
Lecture 13	22 May	<b>EXAM</b>	
<b>Lecture X</b>	<b>29 May</b>	<b>HOLIDAY</b>	

# ABOUT PRACTICAL PART

## **Bioimaging and Optics Platform (BIOP) Core Facility**

- Located in the faculty of Life Science (SV) at the Ecole Polytechnique Fédérale de Lausanne (EPFL) and part of a network of core facilities at the faculty.
- Provides instruments and expertise to solve challenging (biological) questions with modern light-microscopy.
- Creates a link between life sciences and engineering to investigate jointly these fundamental fields.
- Promotes teaching, education as well as research projects.

## **BIOP Core Facility offers:**

- A broad range of light microscopic techniques ranging from simple wide-field imaging systems over standard point-scanning confocal microscopes up to a high-end 2-Photon-excitation microscope.
  - A strong computational competence and the necessary computer power to perform advanced image processing.
- ➔ Trains the users so that they can use the instruments independently.

## **CONTENT**

- Contrast enhancing microscopy techniques, including dark field, phase contrast, DIC
- Various fluorescence & confocal microscopy techniques
- Advanced microscopy methods (super-resolution, multi-photon, etc)
- Hands-on experience with wide-field, fluorescence and confocal microscopes

## **LEARNING OUTCOMES**

By the end of the course, the student should be able to:

- Choose an appropriate imaging method for investigating the biological sample of interest
- Estimate the performance and limitations of optical microscopes
- Sketch the essential elements of commonly used optical microscopes
- Operate wide-field, fluorescence, and confocal microscopes

## **COURSE MATERIAL**

Lecture slides, lab handouts, exercises/solutions, reading materials etc. will be posted on Moodle

## **SUGGESTED BOOK**

Fundamentals of Light Microscopy and Electronic Imaging,  
By Murphy & Davidson, 2<sup>nd</sup> Edition, Wiley-Blackwell