

MICRO-562

Biomicroscopy II

Instructors:
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TA:
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Theory

In BC01

Lecture: Thursdays from 1:15 pm to 3 pm

Exercise: Thursdays from 3:15 pm

TP

In BIOP Core Facility

Practical: Thursdays from 1:15 pm

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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
Lecture X	24 April	EASTER	
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	EXAM	
Lecture X	29 May	HOLIDAY	

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 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, 2nd Edition, Wiley-Blackwell