

## 2<sup>nd</sup> Year of the study – Modul: Medical biotechnology - Elective Courses

MEDBIOT-E01: MICROSCOPY IN BIOTECHNOLOGY	
<b>GENERAL INFORMATION</b>	
Course Coordinator(s)	Tatjana Belovari, PhD, full prof. with tenure Nikola Bijelić, PhD, assist. prof.
Associate(s)	Hrvoje Brkić, assist. prof. Edi Rođak, MSc
Study Programme	Interdisciplinary Graduate Study Programme in English: Biotechnology
Course Status	Elective
Year of Study, Semester	2 <sup>nd</sup> Year / 4 <sup>th</sup> Semester
Credits (ECTS)	<b>4</b>
Teaching Method (number of classes)	Lectures: 15; Seminars: 15; Exercises: 15
Expected Number of Students in the Course	25-30
<b>COURSE DESCRIPTION</b>	
<b>Course Aims</b>	
The objective of this course is to learn how to apply microscopy techniques in biomedical and biotechnology research.	
<b>Prerequisites for Enrolment and the Entry Competencies Required for the Course</b>	
Completed and passed courses from 1 <sup>st</sup> year of this study.	
<b>Learning Outcomes at the Programme Level Contributed by the Course</b>	
BIOTECH-2; BIOTECH-6; BIOTECH-7; MEDBIOT-2; MEDBIOT-4	
<b>Learning Outcomes at the Course Level</b>	
<ol style="list-style-type: none"> <li>1. After completing the course, the student will be able to:</li> <li>2. Reasonably explain the principles of operation of the most important types of microscope.</li> <li>3. To evaluate the possibilities of application of the most important microscopy methods in biotechnology.</li> <li>4. Predict which microscopic methods could be applied in the given cases.</li> <li>5. Apply the lessons learned in independent work.</li> <li>6. Critically evaluate the results of the various studies available in the scientific and professional literature.</li> </ol>	
<b>Course Content</b>	
<p><b>Lectures.</b> Physical fundamentals of microscopy. Interaction of light and matter. Types of microscopes and their application. Parts of microscope and their function.</p> <p><b>Seminars.</b> Light microscope, phase-contrast microscope, polarization microscope. Fluorescent microscopy. Immunohistochemistry and immunofluorescence. Confocal microscope. Electron microscope (SEM, TEM). Other types of microscopy and modern techniques in microscopy (FLIM-FRET, super-resolution microscopy etc.)</p> <p><b>Exercises.</b> Preparation of samples for basic microscopy analysis. Digital photography in microscopy and processing of photographs.</p>	
<b>Teaching Methods</b>	
Lectures; seminars; laboratory exercises	
<b>Students' Obligations</b>	
Attendance at all forms of classes is mandatory and the students are obligated to attend all knowledge tests. The students may be absent from 30% (full-time students) and 50% (part-time students) of each of the forms of classes, provided that the absence is justified. An exercise or a	

seminar which has not been completed must be made up through a midterm exam.

**Monitoring the Activity of the Students (*Connecting Learning Outcomes, Teaching Methods, and Grading*)**

Class-related activity	ECTS	Learning outcome	Student activity	Evaluation method	Grade points	
					Min.	Max.
Attending classes	0.2	1-5	Attendance	Keeping records	1	5
Seminars	0.6	1-5	Seminar drafting and presentation	Seminar presentation	3	15
Laboratory exercises	0.8	2-4	Practical exercises	Laboratory exercises	10	20
Final exam	2.4	1-5	Studying for the final exam	Written exam	36	60
<b>Total</b>	<b>4</b>				<b>50</b>	<b>100</b>

*Evaluation of the written part of the final exam*

Percentage of correct answers (%)	Grade
>95.00	60
90.00-94.99	58
85.00-89.99	55
80.00-84.99	52
75.00-79.99	48
70.00-74.99	44
65.00-69.99	40
60.00-64.99	36

*Forming the final grade:*

The points granted for the final exam are added to the grade points awarded during class attendance. The grading process is conducted by absolute distribution, i.e. based on total achievements, and compared to the numerical system in the following manner:

A – Excellent (5): 90-100 grade points; B – Very Good (4): 80-89.99 grade points; C – Good (3): 65-79.99 grade points; D – sufficient (2): 50-64.99 grade points

**Mandatory Literature (available in the library and via other media)**

Title	Number of copies in the library	Availability via other media
Murphy DB, Davidson MW: Fundamentals of Light Microscopy and Electronic Imaging. 2 <sup>nd</sup> Ed., Wiley-Blackwell, 2013.		
Mescher A: Junqueira's Basic Histology: Text and Atlas. 15 <sup>th</sup> Ed., McGraw-Hill, 2018.		

**Additional Literature**

1. Suvarna SK, Layton C, Bancroft JD: Bancroft's theory and practice of histological techniques. 7<sup>th</sup> Ed., Churchill Livingstone Elsevier, 2013.
2. Scientific and professional papers related to certain chapters (available on-line).

**Quality Assurance Procedures Designed to Ensure the Acquisition of Outcomes and Competencies**

Anonymous, quantitative, standardized student survey on the course and the teacher's work implemented by the Quality improvement office of the Faculty of Medicine Osijek and/or the Faculty of Food Technology Osijek.

**Note**

E-learning is not included in the class quota, but it is used in teaching and it contains links to various sites and video and audio materials available on websites.