

## DESCRIPTION OF THE COURSE OF STUDY

<b>Course code</b>	<b>0511-2BIO-BC22-PTM</b>	
<b>Name of the course in</b>	Polish	<b>The principles of microscopy techniques</b>
	English	<b>Podstawy technik mikroskopowych</b>

### 1. LOCATION OF THE COURSE OF STUDY WITHIN THE SYSTEM OF STUDIES

<b>1.1. Field of study</b>	<b>Biology</b>
<b>1.2. Mode of study</b>	<b>Stationary</b>
<b>1.3. Level of study</b>	<b>First-degree studies</b>
<b>1.4. Profile of study*</b>	<b>General academic</b>
<b>1.5. Person/s preparing the course description</b>	<b>Dr Małgorzata Łysek-Gładysińska</b>
<b>1.6. Contact</b>	<a href="mailto:mglad@ujk.edu.pl">mglad@ujk.edu.pl</a>

### 2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

<b>2.1. Language of instruction</b>	<b>English</b>
<b>2.2. Prerequisites*</b>	

### 3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

<b>3.1. Form of classes</b>	25h- lectures, 25h- laboratories, (including e-learning)	
<b>3.2. Place of classes</b>	Courses in the teaching rooms of UJK	
<b>3.3. Form of assessment</b>	lecture (exam), laboratories (credit with grade)	
<b>3.4. Teaching methods</b>	Informative lecture	
	Laboratories- practical classes	
<b>3.5. Bibliography</b>	<b>Required reading</b>	-A. L. Mescher. Junqueira's Basic Histology Text & Atlas 13th Edition -M.J. Dykstra , L.E. Reuss . Biological Electron Microscopy. Theory, Techniques and Troubleshooting 2nd Edition.
	<b>Further reading</b>	X. Chen, B. Zhen, H. Liu. Optical and digital microscopic imaging techniques and applications in pathology. Anal Cell Pathol. 2011; 34 (12): 5-18

### 4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED LEARNING OUTCOMES

<p><b>4.1. Course objectives</b> (<i>including form of classes</i>)</p> <p>C1 - Acquaintance with the basic microscope techniques used in medical research</p> <p>C2 - Acquaintance with the correct principles of collecting and preserving the biological material for microscopic research</p> <p>C3 - Ability to analyze cell structure at the level of light and electron microscopes using modern microscopic techniques</p>
<p><b>4.2. Detailed syllabus</b> (<i>including form of classes</i>)</p> <p>Lectures:</p> <p>History of microscopy. Basic phenomena of optical physics used in optical microscopy. Familiarization with different types of optical microscopes - dark field microscopes, contrast-phase microscopes, interference-polarization microscopes. Principles of operation of fluorescence microscope. Confocal microscope - construction and application in biological research. Basic types of transmission electron microscopes (TEM) and scanning electron microscopes (SEM). Application of electron microscopy in biology. Procedures for preparation of biological preparations: principles of collection and fixation of material for examination, procedure for embedding sections of fixed tissues in paraffin, ways of obtaining paraffin sections. Methods of staining preparations. Slicing using microtomes. Procedures for preparing slides for transmission electron microscopy (TEM). Methods of preparing semi-thin and ultrathin sections for observation by light and electron microscopy. Methods of staining ultrathin sections.</p> <p>Laboratory:</p> <p>Practical familiarization with the construction of an optical microscope. Principles of working with the microscope in the brightfield technique. Making observations in polarization-interference contrast and phase contrast techniques. Using transmission electron microscopy to identify subcellular elements. Preparation of slides for examination in TEM. Construction and principle of operation of an epifluorescence microscope. Preparation of preparations for observation in fluorescence microscope.</p>

#### 4.3 Intended learning outcomes

Code	A student, who passed the course	Relation to learning outcomes
within the scope of <b>KNOWLEDGE:</b>		
W01	Defines issues related to optical physics	BI01A_W01 BI01A_W03
W02	Presents different types of light microscopes their construction, understands the principle of their operation	BI01A_W08
W03	Presents the basic methods of preparing slides for light and electron microscopy.	BI01A_W08
W04	Describes the possibilities of using microscopic techniques in biological research	BI01A_W10
within the scope of <b>ABILITIES:</b>		
U01	Independently constructs light microscopes for the indicated microscopic technique (phase contrast, Nomarski interference contrast)	BI01A_U01 BI01A_U06
U02	Independently prepares slides and correctly performs microscopic observation	BI01A_U06
U03	Correctly performs documentation of the microscopic observation performed	BI01A_U10
within the scope of <b>SOCIAL COMPETENCE:</b>		
K01	Takes care of specialized microscope equipment	BI01A_K02
K02	Maintains safety of work in the laboratory and follows health and safety regulations	BI01A_K02

#### 4.4. Methods of assessment of the intended learning outcomes

Teaching outcomes (code)	Method of assessment (+/-)																				
	Exam oral/written*			Test*			Project*			Effort in class*			Self-study*			Group work*			Others* e.g. standardized test used in e-learning		
	Form of classes			Form of classes			Form of classes			Form of classes			Form of classes			Form of classes			Form of classes		
	L	C	...	L	C	...	L	C	...	L	C	...	L	C	...	L	C	...	L	C	...
W01				+															+		
W02				+															+		
W03				+															+		
W04				+															+		
U01					+						+									+	
U02					+						+									+	
U03					+						+									+	
K01																				+	
K02																				+	

\*delete as appropriate

#### 4.5. Criteria of assessment of the intended learning outcomes

**Lecture:** The final grade is obtained on the basis of the final credit test and participation in lectures.

**Laboratory:** The final grade is obtained on the basis of the final credit test and participation in laboratories.

Form of classes	Grade	Criterion of assessment
lecture (L) (including e-learning)	3	Receiving from 51% - 65% the total number of points available from the final test
	3,5	Receiving from 66% - 75% the total number of points available from the final test
	4	Receiving from 76% - 85% the total number of points available from the final test
	4,5	Receiving from 86% - 95% the total number of points available from the final test
	5	Receiving from 96% - 100% the total number of points available from the final test

<b>classes (C)* (including earning)</b>	<b>3</b>	Receiving from 51% - 65% the total number of points obtained from the credit test
	<b>3,5</b>	Receiving from 66% - 75% the total number of points obtained from the credit test
	<b>4</b>	Receiving from 76% - 85% the total number of points obtained from the credit test
	<b>4,5</b>	Receiving from 86% - 95% the total number of points obtained from the credit test
	<b>5</b>	Receiving from 96% - 100% the total number of points obtained from the credit test

## 5. BALANCE OF ECTS CREDITS – STUDENT'S WORK INPUT

Category	Student's workload	
	Full-time studies	Extramural studies
<b>NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/</b>	<b>50</b>	
<i>Participation in lectures*</i>	<b>25</b>	
<i>Participation in classes, seminars, laboratories*</i>	<b>25</b>	
<i>Preparation in the exam/ final test*</i>		
<i>Others (please specify e.g. e-learning)*</i>		
<b>INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/</b>	<b>25</b>	
<i>Preparation for the lecture*</i>	<b>10</b>	
<i>Preparation for the classes, seminars, laboratories*</i>	<b>5</b>	
<i>Preparation for the exam/test*</i>	<b>10</b>	
<i>Gathering materials for the project/Internet query*</i>		
<i>Preparation of multimedia presentation</i>		
<i>Others * 25</i>		
<b>TOTAL NUMBER OF HOURS</b>	<b>75</b>	
ECTS credits for the course of study	<b>3</b>	

*\*delete as appropriate*

**Accepted for execution** (date and legible signatures of the teachers running the course in the given academic year)

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