

Subject card

Subject name and code	Microscopy in biological sciences, PG_00154691						
Field of study	Biology						
Date of commencement of studies	October 2025	Academic year of realisation of subject		2027/2028			
Education level	Bachelor's studies	Subject group					
Mode of study	full-time studies	Mode of delivery		at the university			
Year of study	3	Language of instruction		Polish			
Semester of study	5	ECTS credits		2.0			
Learning profile	academic	Assessment form		credit			
Conducting unit	Laboratory of Bioimaging -> Faculty of Biology -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Magdalena Narajczyk				
	Teachers		dr hab. Magdalena Narajczyk				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	E-learning hours included: 0.0						
	Additional information:						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	15		2.0		33.0	50
Subject objectives	1. Learning modern imaging techniques used in biological sciences. 2. Ability to use appropriate techniques and research tools in the fields of biology. 3. Ability to plan and carry out experiments with the use of a light and electron microscope as well as record and interpret the results. 4. The ability to work safely in the laboratory, plan and conduct experiments using a fluorescence and electron microscope, as well as record and interpret the results						
Learning outcomes	Course outcome		Subject outcome		Method of verification		

Subject contents	Students learn about the structure of the following microscope: optical, fluorescence, confocal, high-resolution, transmission and scanning electron microscopes, atomic forces, and scanning tunneling microscopes. They will be familiarized with the methodology of biological research: staining samples for an optical microscope, preparations used in fluorescence and transmission microscopy, cryo-TEM and scanning microscopy. Students learn about the use of all microscopes in biological research, and on the basis of the presented electronograms, the possibilities of analyzing biological samples. The use of electron microscopy in the diagnosis of diseases will be presented. Students learn research methods using in situ hybridization - fluorescence in situ hybridization (FISH), genomic in situ hybridization (GISH) and RNA-ISH. Analysis of three-dimensional images - conditions for sampling and digital image recording, z-stacking, 3D reconstructions. Analysis of digital documentation using the FIJI / Image J program. Overview of microscopy used in the study of biological material - from light microscopy to electron microscopy. Methods using microscopy. Preparation of material used for analyzes. Application of microscopy in the diagnosis of civilization and genetic diseases. Analysis of the obtained results.								
Prerequisites and co-requisites	none								
Assessment methods and criteria	<table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>test</td><td>51.0%</td><td>100.0%</td></tr></table>	Subject passing criteria	Passing threshold	Percentage of the final grade	test	51.0%	100.0%		
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Recommended reading	Basic literature	J.J. Bozzola, L.D. Russell Electron microscopy (Principles and Techniques for biologists) 1992 Jones and Barlet Publishers, Boston M. Pavelka, J. Roth Functional Ultrastructure (Atlas of Tissue Biology and Pathology) 2010 Springer-Verlag, Wien Ruzin SE.1999. Plant microtechnique and microscopy . Oxford, New York: Oxford University Press							
	Supplementary literature	Schwarzacher T., Heslop-Harrison P. 2000 Practical in situ Hybridization Springer https://imagej.nih.gov/ij/docs/guide/ Plachno, B.J.; Kapusta, M.; Stolarczyk, P.; Świątek, P. Arabinogalactan Proteins in the Digestive Glands of <i>Dionaea muscipula</i> J.Ellis Traps. Cells 2022, 11, 586. https://doi.org/10.3390/cells11030586 Steckiewicz KP, Cieciorński P, Barcińska E, Jaśkiewicz M, Narajczyk M, Bauer M, Kamysz W, Megiel E, Inkielewicz-Stepniak I. Silver Nanoparticles as Chlorhexidine and Metronidazole Drug Delivery Platforms: Their Potential Use in Treating Periodontitis. Int J Nanomedicine. 2022;17:495-517 https://doi.org/10.2147/IJN.S339046							
	eResources addresses								
Example issues/ example questions/ tasks being completed									
Work placement	Not applicable								

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