

Subject card

Subject name and code	Microscopy in biological sciences, PG_00154691						
Field of study	Medical Biology						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2026/2027		
Education level	Master's studies		Subject group		Obligatory subject group in the field of study Optional subject group		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	2		Language of instruction		Polish		
Semester of study	3		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						
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
	[BIOLMEDMU2_U02] is able to plan and conduct experiments and measurements based on advanced research techniques and tools, is able to interpret the obtained results and draw conclusions	- plans and performs research tasks or scientific assessment in the field of studied biological specialty, under supervision of a supervisor	[SU8] observation of student's independent or team work
	[BIOLMEDMU2_W01] has an in-depth knowledge of scientific fields and disciplines relevant to medical biology and the studied specialty and knows their main development trends	- consistently applies and disseminates the principle of a strict, based on empirical data, interpretation of biological phenomena and processes in research and practical activities - recognizes research problems from the border of biological sciences that require the use of advanced science tools	[SW4] test/exam - oral or written
	[BIOLMEDMU2_W04] knows the principles of planning research based on the achievements of biological and medical sciences, the principles of operation of equipment and apparatus used in medical biology research, and the principle of interpreting biological phenomena and processes based on empirical data in research work and practical activities	- recognizes the wealth of contemporary approaches and experimental techniques in biological sciences and properly plans to use them to solve given tasks	[SW4] test/exam - oral or written
	[BIOLMEDMU2_K02] is ready to recognize the importance of knowledge in solving cognitive and practical problems and to seek expert advice when having difficulty solving a problem on his own	- understands the need to use recognized sources of scientific and popular science information in the field of biological sciences in order to deepen knowledge	[SK8] observation of student's independent or team work
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	Subject passing criteria	Passing threshold	Percentage of the final grade
	test	51.0%	100.0%
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. <i>Cells</i> 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. <i>Int J Nanomedicine</i>. 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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