

Subject card

Subject name and code	Imaging techniques, PG_00146892						
Field of study	Genetics and Experimental Biology						
Date of commencement of studies	October 2025		Academic year of realisation of subject			2025/2026	
Education level	Bachelor's studies		Subject group			Obligatory subject group in the field of study Subject group related to scientific research in the field of study	
Mode of study	full-time studies		Mode of delivery			at the university	
Year of study	1		Language of instruction			Polish	
Semester of study	2		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	0.0	0.0	30.0	0.0	0.0	30
	E-learning hours included: 0.0						
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	30		4.0		16.0	50
Subject objectives	1 Learning modern imaging techniques used in biological sciences.2. ability to plan and carry out experiments using light and electron microscopy and to record and interpret the results.3. ability to use computer programs for analysis and calculation (FIJI ImageJ). 4. ability to work safely in the laboratory, plan and carry out experiments using fluorescence and electron microscope, and record and interpret the results						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[GBEL3_W05] the principles of research planning based on achievements in biological sciences and related fields, the potential application of their results in practice, the principles of operation of equipment and apparatus used in molecular genetics research, and the principle of interpreting biological phenomena and processes based on empirical data in research and practical activities, with consideration for sustainable use of biological diversity.	Knows the principles of planning research based on the achievements of biological sciences and the possibility of using their results in practice, the principles of operation of equipment and apparatus used in research in genetics and experimental biology, and the principle of interpreting biological phenomena and processes based on empirical data in research work and practical activities, taking into account the sustainable use of biodiversity	[SW4] test/exam - oral or written
	[GBEL3_K08] Responsibility for entrusted equipment/materials and respect for the work of others.	Is responsible for the equipment/ materials entrusted to him, his own work and respects the work of others	[SK8] observation of student's independent or team work
	[GBEL3_K02] Critical assessment of one's own knowledge and methods in the field of molecular biology and related disciplines, as well as the commercialization of research.	Is ready to critically evaluate and select methods in molecular biology	[SK8] observation of student's independent or team work
	[GBEL3_U03] Proficient in using research equipment and tools, while following the correct sequence of procedures, to conduct basic physical, biological, or chemical observations and measurements in laboratory work within the field of biological sciences.	Uses basic apparatus and research tools and, maintaining the correct sequence of operations, performs simple biological observations and measurements in laboratory work in cytology	[SU7] entries and opinions in the internship diary
	[GBEL3_U01] Independently perform practical tasks in the field of biological sciences and related disciplines, formulate research problems, analyze their results, and draw conclusions.	Student is able to independently perform practical tasks in imaging, histochemistry and light and electron microscopy	[SU7] entries and opinions in the internship diary
Subject contents	Immunocytochemical techniques - preparation of research material for vital staining with fluorescent markers, research material for immunocytochemical analysis . Analysis of three-dimensional images - sampling conditions and digital image registration, creation of stacks (z-stacks), 3D reconstructions . Analysis of digital documentation using FIJI/Image J software - digital processing of images, making measurements and calculations of biological objects. Making preparations of a biological sample from a liquid sample in negative staining, and then analyzing it in a transmission electron microscope. Getting acquainted with the operation of the ultramicrotome, staining slides with a slice and analyzing it in a transmission electron microscope. Preparing slides and making observations in a scanning electron microscope.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	colloquium	21.0%	100.0%
Recommended reading	Basic literature	Wędzony M. Mikroskopia fluorescencyjna dla botaników. 1996 Monografia 5 PAN Zakład Fizjologii Roślin Rogalska S, J. Małuszyńska, M.J. Olszewska (red.). 2005. Podstawy cytogenetyki roślin, PWN, Warszawa Ruzin SE.1999. Plant microtechnique and microscopy . Oxford, New York: Oxford University Press Litwin J, Gajda M 2011, Podstawy technik mikroskopowych, Wydawnictwo Uniwersytetu Jagiellońskiego	

	Supplementary literature	Bozzola J. J., Russell L. D. 1992. Electron Microscopy (Principles and Techniques for Biologists). Jones and Barlett Publishers, Boston. 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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