

Subject card

Subject name and code	Imaging techniques, PG_00146893						
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		1.0		
Learning profile	academic		Assessment form		exam		
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						
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		8.0	25
Subject objectives	1 Learning modern imaging techniques used in biological sciences.2 Ability to apply appropriate techniques and research tools in the field of biology.3 Ability to plan and conduct experiments using light and electron microscopes and to record and interpret the results.4 Ability to work safely in the laboratory, plan and conduct experiments using fluorescence and electron microscopy, and record and interpret results.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[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_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 principles 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		

Subject contents	Students will become familiar with the construction of the following microscopes: optical, fluorescence, confocal, high-resolution, transmission and scanning electron, atomic force, scanning tunneling microscope. They will be introduced to the methodology of biological research: staining of samples for optical microscopy, preparation used in fluorescence microscopy, transmission microscopy, cryo-TEM, scanning microscopy. Students will learn about the use of all microscopes in biological research, and, based on the electronograms presented, the possibilities for analyzing biological samples. The use of electron microscopy in disease diagnosis will be presented. Students will learn about research methods using in situ hybridizations - fluorescence in situ hybridization (FISH), genomic in situ hybridization (GISH) and RNA-ish.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test	51.0%	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 JA, 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. Schwarzacher T., Heslop-Harrison P. 2000 Practical in situ Hybridization Springer https://imagej.nih.gov/ij/docs/guide/ Wróbel B., Zienkiewicz K, Smoliński DJ, Niedojadło J, Świdziński M 2005. Podstawy mikroskopii elektronowej, Wydawnictwo UMK	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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