

Subject card

Subject name and code	Multicellular organisms - Organization of plant structure, growth and physiology Methodology (M04_B3), PG_00196929						
Field of study	Biotechnology						
Date of commencement of studies	October 2026	Academic year of realisation of subject			2027/2028		
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	2	Language of instruction			Polish		
Semester of study	4	ECTS credits			3.0		
Learning profile	academic	Assessment form			credit		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor	dr Katarzyna Jasieniecka-Gazarkiewicz					
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	45.0	0.0	0.0	45
	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	45	5.0		25.0		75
Subject objectives	The program block allows students to exclude and perform biochemical and physiological-cytological analysis of plant material during laboratory work . The student became familiar with the experience, safety rules and basic information found in appropriate laboratories, as well as documenting the experience and interpreting the results.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[BIOTECHL3_U02] The graduate is able to plan and organise work effectively, independently or as part of a team, in particular work in a laboratory	The student effectively plans work in the laboratory and is able to cooperate in a team.			[SU2] presentation/project/paper/report [SU8] observation of student's independent or team work		
	[BIOTECHL3_U01] The graduate possesses practical skills in performing laboratory procedures, documenting results, and applying techniques necessary in biotechnology, including methods of isolation, modification, selection, and analysis of organisms, tissues, cells, and molecules; has the ability to operate advanced laboratory.	The student conducts experiments, applying safety rules and correctly using selected laboratory equipment, documents the experiments and interprets the results.			[SU2] presentation/project/paper/report [SU4] test/exam - oral or written [SU5] implementation of a problem task		
	[BIOTECHL3_K04] The graduate is aware of the importance of occupational safety rules, is able to apply them and react in hazardous situations, ensuring their own safety and the safety of others.	The student knows and applies health and safety regulations applicable in the laboratory			[SK8] observation of student's independent or team work		

Subject contents	<ul style="list-style-type: none"> • Anatomy and morphology of the root, stem and leaves and cell components (preparation of preparations and microscopic observation of cross-sections of stems, roots, leaves and selected cell organelles) • Plant growth and development (photoperiodism, vernalization, the influence of light on plant growth, seed structure and types of germination, energy and strength of seed germination, biochemical methods for determining seed viability) • Water management (factors influencing seed swelling, Traube cell, plasmolysis and deplasmolysis, measurement of osmotic potential, demonstration of the mechanism of active and passive water uptake by plants, structure and movement of stomata, intensity of stomatal and cuticular transpiration) • Respiration (determination of the respiratory coefficient of germinating seeds, the influence of external factors on the intensity of respiration, mobilization of reserve materials in germinating seeds) • Photosynthesis (extraction of photosynthetic pigments, chemical and physical properties of photosynthetic pigments, measurement of pigment content using the spectrophotometric method, detection of photosynthetic products, necessity of CO₂ for the photosynthesis process, activity of malate dehydrogenase in C₃ and C₄ plants, isolation of chloroplasts, Hill reaction) • Mineral management (elements found in plants, detection of nitrates and ammonium salts in fresh plant material, nitrate reductase activity) • Growth regulators (tests demonstrating the impact of individual groups of plant regulators on plants) • Plant movements (observations of plant movements; collection of data regarding growth regulators) • Summary exercise (student presentations of results; discussion) 																				
Prerequisites and co-requisites																					
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 779 794 808">Subject passing criteria</th> <th data-bbox="799 779 1137 808">Passing threshold</th> <th data-bbox="1142 779 1481 808">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 815 794 844">safety rules</td> <td data-bbox="799 815 1137 844">51.0%</td> <td data-bbox="1142 815 1481 844">10.0%</td> </tr> <tr> <td data-bbox="456 851 794 880">reports/presentation</td> <td data-bbox="799 851 1137 880">51.0%</td> <td data-bbox="1142 851 1481 880">10.0%</td> </tr> <tr> <td data-bbox="456 887 794 916">short tests</td> <td data-bbox="799 887 1137 916">51.0%</td> <td data-bbox="1142 887 1481 916">50.0%</td> </tr> <tr> <td data-bbox="456 922 794 952">laboratory reports</td> <td data-bbox="799 922 1137 952">51.0%</td> <td data-bbox="1142 922 1481 952">10.0%</td> </tr> <tr> <td data-bbox="456 958 794 987">activity&participation in discussion</td> <td data-bbox="799 958 1137 987">51.0%</td> <td data-bbox="1142 958 1481 987">20.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	safety rules	51.0%	10.0%	reports/presentation	51.0%	10.0%	short tests	51.0%	50.0%	laboratory reports	51.0%	10.0%	activity&participation in discussion	51.0%	20.0%
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Recommended reading	Basic literature	<p>Przewodnik do ćwiczeń z biochemiczno-biofizycznych podstaw rozwoju roślin. A. Banaś, K. Jasieniecka-Gazarkiewicz, K. Demski. 2017. Wydawnictwo Uniwersytetu Gdańskiego. ISBN: 978-83-7865-558-9</p> <p>Fizjologia roślin. J. Kopcewicz i S. Lewak, edytorzy. Wydanie 3, 2012 lub nowsze. Wydawnictwo Naukowe PWN Warszawa</p>																			
	Supplementary literature	<ul style="list-style-type: none"> • Fizjologia Roślin. A. Szwejkowska. 2004. Wydawnictwo Naukowe Uniwersytetu im. Adama Mickiewicza w Poznaniu • Plant Physiology. L. Taiz, E. Zeiger, Eds. Wydanie 5, 2010 lub nowsze. Sinauer Associates, Inc. 																			
	eResources addresses																				
Example issues/ example questions/ tasks being completed																					
Work placement	Not applicable																				

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