

Subject card

Subject name and code	Advanced chemistry laboratory - microbiology, PG_00072913						
Field of study	Chemistry						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2026/2027		
Education level	Master'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	1		ECTS credits		2.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Laboratory of Bionanotechnology -> Department of Molecular Biotechnology -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Joanna Jeżewska-Frańkowiak				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	20.0	0.0	0.0	20
	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	20		4.0		26.0	50
Subject objectives	1. To familiarize students with the principles of occupational health and safety in a microbiological laboratory. 2. To familiarize students with techniques for obtaining bacterial cell lysates. 3. To familiarize students with chromatographic separation of cell proteins on an ion-exchange bed and electrophoretic separation of bacterial cell protein fractions. 4. Developing the ability to work in a group, rationally divide tasks and develop a work schedule, including stages - training meetings and the preparation of results in the form of mini publication.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEMMU2_U01] Plans and implements chemical experiments of medium complexity.	Prepares the microbiological work place and equipment, performs necessary chemical calculations and develops the division of laboratory tasks in the student team.	[SU6] demonstration of practical skills [SU8] observation of student's independent or team work
	[CHEMMU2_U02] Critically assesses the results of conducted, performed observations and theoretical calculations and discusses errors.	Prepares experimental results in the form of mini publications with elements of abstract and graphical abstract, creates charts and prepares tables, and interprets and comments on the obtained results.	[SU2] presentation/project/paper/report [SU3] text preparation/written work
	[CHEMMU2_W03] Demonstrates extended knowledge in the field of modern measuring techniques used in chemical analysis.	Knows and differentiates the methods of bacterial cell lysis due to their nature.	[SW1] oral statement/conversation/discussion
	[CHEMMU2_W07] Selects experimental and theoretical techniques to the extent necessary to understand the description and modelling of medium complexity chemical processes.	Knows the isolation procedures and three-step strategy for protein purification from a cellular source.	[SW4] test/exam - oral or written
	[CHEMMU2_W10] Uses knowledge of the principles of operation of the basic scientific and research apparatus used in chemistry.	Knows the principles of protein separation in ion exchange chromatography and polyacrylamide electrophoresis under denaturing conditions.	[SW4] test/exam - oral or written
	[CHEMMU2_W01] Uses knowledge of spectroscopic methods of chemical compound analysis.	Knows the principles of selecting measurement conditions when analyzing chromatographic fractions using spectrophotometry.	[SW2] presentation/project/paper/report
	[CHEMMU2_K01] Knows the limitations of her/his own knowledge; understands the need for further education and can inspire other people to do so.	Demonstrates creativity in independent and team work, divides tasks and enforces their execution.	[SK2] presentation/project/paper/report [SK8] observation of student's independent or team work
[CHEMMU2_U08] Prepares and presents oral presentations in various fields of chemistry in Polish and English, using acquired knowledge and skills as well as basic sources of scientific information.	Speaks about issues in understandable professional language, discusses and agrees with other people the form and content of the study of experimental research results.	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU3] text preparation/written work	
Subject contents	GLP and BiHP of a microbiological/biotechnology laboratory, functions of cellular proteins, protein isolation and three-step purification strategy from cellular sources, cell lysis methods, chromatographic separation on an ion exchange bed, electrophoretic separation under SDS-PAGE conditions, implementation of a laboratory project involving the extraction of proteins from Escherichia bacterial cells coli, their separation on an ion exchange bed and quantitative and qualitative analysis of the obtained protein fractions using spectrophotometry and electrophoresis techniques. Substantive and graphic preparation of the results in the form of a mini-publication.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	mini publication	51.0%	40.0%
	test	51.0%	60.0%
Recommended reading	Basic literature	1. Ciepiela A.P. Ćwiczenia z biologii molekularnej. Kozak Druk S.C., Siedlce 2005 (str. 15-20, 29-33, 80-88). 2. Stepnowski P. i wsp. Techniki separacyjne. Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2010 3. Stryer L.: Biochemia, PWN, 1999. 4. http://www.gelifesciences.com	
	Supplementary literature	5. Green M.R., Sambrook J. Molecular Cloning. A Laboratory Manual. Cold Spring Harbor Laboratory Press, New York, 2012. 6. Scopes, R.K. Protein purification, principles and practice. 2nd Ed. Springer Verlag, New York, 1987. 7. Eisenthal, R., Danson, M.J. Enzyme Assays. IRL Press, Oxford University Press, 1993.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Topics: Lysis, chromatography, spectrophotometry, electrophoresis, laboratory and GMM safety.		
Work placement	Not applicable		

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