

Subject card

Subject name and code	Biotechnology in environmental protection, PG_00117758						
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 Optional subject group 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 Bionanotechnology -> Department of Molecular Biotechnology -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Joanna Jeżewska-Frąckowiak				
	Teachers						
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		5.0		15.0	50
Subject objectives	Familiarization with the issues of classical biotechnology in environmental protection and presentation of modern issues and prospects for the use of molecular biotechnology methods. Obtaining laboratory skills - classical and molecular diagnostics.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEMMU2_W05] Has extended knowledge in the field of the specialisation studied.	The student knows the methodology for obtaining GMO varieties and understands the purposefulness of using genetically modified organisms in environmental protection.	[SW4] test/exam - oral or written [SW5] implementation of a problem task
	[CHEMMU2_W10] Uses knowledge of the principles of operation of the basic scientific and research apparatus used in chemistry.	The student knows the basic processes and unit operations related to biotechnology in environmental protection.	[SW2] presentation/project/paper/report [SW5] implementation of a problem task
	[CHEMMU2_W03] Demonstrates extended knowledge in the field of modern measuring techniques used in chemical analysis.	The student knows and characterizes biotechnological methods of environmental analysis.	[SW4] test/exam - oral or written
	[CHEMMU2_K01] Knows the limitations of her/his own knowledge; understands the need for further education and can inspire other people to do so.	The student independently plans and performs assigned laboratory tasks, manages time and available infrastructure.	[SK2] presentation/project/paper/report [SK5] implementation of a problem task [SK8] observation of student's independent or team work
	[CHEMMU2_U04] Applies acquired knowledge of chemistry and related scientific disciplines.	Solve problem tasks independently and in pairs, record, prepare and interpret laboratory test results.	[SU3] text preparation/written work [SU5] implementation of a problem task [SU6] demonstration of practical skills
Subject contents	1. Basic legal regulations applicable in Poland regarding GMOs. 2. Biotechnological aspects of environmental protection. 3. Diagnostic methods used to detect the presence of GM plant varieties. 4. Popular breeding varieties of GMO plants and modifications occurring in them. 5. Morphological and microscopic determination of biodiversity of environmental samples of water and soil. 6. Determination of the number of microorganisms using the surface inoculation method and the titer method. 7. Principle of DNA purification from plant samples. 8. The principle of identifying genetic modification of plant DNA used in the exercise. 9. Processes occurring during each stage of subsequent PCR amplification cycles 10. Principle of electrophoretic separation and interpretation of the results of the separation of PCR reaction products.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	laboratory notebook with reports	51.0%	40.0%
	work card - problem task	0.0%	10.0%
	test	51.0%	50.0%
Recommended reading	Basic literature	1. Glick B.R., Pasternak J.J., Patten Ch. L. Molecular biotechnology 4th Ed. , ASM PRESS 2010 2. Libudzisz Z., Kowal K. Żakowska Z. Mikrobiologia techniczna T 2 , PWN 2008 3. Klimiuk E., Łebkowska M. Biotechnologia w ochronie środowiska, PWN 2005 4. Querci M., Maretti M., Mazzara M. Badanie próbek żywności na obecność Genetycznie Zmodyfikowanych Organizmów. European Comission Joint Research Centre, World Health Organization, Regional Office for Europe	
	Supplementary literature	5. indicated on-line resources 6. Klimiuk E., Łebkowska M.: Biotechnologia w ochronie środowiska, PWN, 20057. Glick, B.R., Pasternak, J.J., Patten, C.L.: Molecular biotechnology: Principles and applications of recombinant DNA. ASM PRESS, 20098. Libudzisz Z., Kowal K., Żakowska Z.: Mikrobiologia techniczna, tom 2, PWN 20089. Olańczuk-Neyman K.: Laboratorium z biologii środowiska, Wyd. PG, 1998	
	eResources addresses		
Example issues/ example questions/ tasks being completed	working with a DNA demonstration sequence		
	test questions		
Work placement	Not applicable		

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