

Subject card

Subject name and code	Biotechnology in Environment Protection, PG_00199719						
Field of study	Business and Environmental Technology						
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		3.0		
Learning profile	academic		Assessment form		exam		
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		dr Joanna Jeżewska-Frąckowiak				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	7.0	8.0	0.0	15.0	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		0.0		45.0	75
Subject objectives	1. Familiarizing students with the issues mentioned in the lecture program content. 2. Getting to know the issues of classical biotechnology in environmental protection and presenting modern issues and prospects for the use of molecular biotechnology methods. 3. Learning the basics of diagnostics of the presence of GMOs using the PCR method 4. Preparing and carrying out a project that involves determining and optimizing the conditions of a PCR diagnostic reaction.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[BiTEMU2_U08] searches, selects and analyzes the literature on environmental sciences, including scientific journals and databases, reading and understanding scientific texts in the native language and English	Using recommended Internet sources, he designs simulated diagnostic test elements for environmental analysis of the presence of GMOs.	[SU1] oral statement/conversation/discussion [SU5] implementation of a problem task
	[BiTEMU2_W10] explains in detail the mechanisms of unit processes used in remediation and environmental protection as well as waste management methods	The student knows the basic mechanisms of biotechnological protection and restoration of the environment.	[SW4] test/exam - oral or written
	[BiTEMU2_K02] understands the need to cooperate and work in a group, assuming responsible roles within it	The student takes on specific roles within a team performing an experimental task.	[SK6] demonstration of practical skills [SK8] observation of student's independent or team work
	[BiTEMU2_W11] has an in-depth understanding of and applies safety and hygiene rules when working independently at a research or measurement station in the laboratory or in the field at an advanced level	The student knows the possible use of genetically modified organisms in environmental protection, regulations regarding the release of GMOs into the environment and the methodology of detecting GMOs in the environment.	[SW4] test/exam - oral or written
	[BiTEMU2_K07] demonstrates responsibility for the safety of one's own work and that of others, taking into account the risks resulting from the research techniques used, and creates conditions for safe work in the laboratory or in the field	The student plans and safely performs assigned laboratory tasks, manages time and available infrastructure.	[SK6] demonstration of practical skills [SK8] observation of student's independent or team work
	[BiTEMU2_U05] is able to give a presentation and independently prepare various specialized written works appropriate for the field studied or in the area on the border of various scientific disciplines, using theoretical approaches, collecting various sources of data, their description and interpretation, and drawing conclusions based on scientific literature and the results of own research work	Documents, prepares, presents in an appropriate form and interprets the results of laboratory tests.	[SU2] presentation/project/paper/report [SU3] text preparation/written work
	[BiTEMU2_U07] proposes processes and methods of water treatment, sewage and waste gas treatment, environmental remediation, and waste management used in environmental protection	They design the components and conditions of a biotechnology experiment. The student can carry out a design task related to planning and optimizing the conditions of a diagnostic PCR reaction and discusses its assumptions and progress with the instructor during consultations and project blocks. The project blocks are included in the course schedule, and the consultation times and locations are published on the UG website.	[SU2] presentation/project/paper/report [SU5] implementation of a problem task [SU8] observation of student's independent or team work
	[BiTEMU2_K03] understands the need to properly set priorities, plan and organize tasks related to their implementation, as well as monitor and evaluate progress	The student completes assigned tasks on time and cooperates in a group.	[SK2] presentation/project/paper/report [SK5] implementation of a problem task [SK8] observation of student's independent or team work
	[BiTEMU2_W09] predicts the effects of human interference in the natural environment and analyzes the impact of human activity on the quality of the environment on a local, regional and global scale	The student knows the impact of microorganisms and their metabolites on the environment and the possibilities of their use in environmental protection.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion
	[BiTEMU2_U09] plans and performs research tasks in the field or laboratory and interprets research results on environmental protection issues	He is proficient in using research equipment intended for exercises.	[SU6] demonstration of practical skills [SU8] observation of student's independent or team work

	Course outcome	Subject outcome	Method of verification
	[BiTEMU2_U06] uses advanced methods, techniques, and tools to assess the quality of the environment and the effectiveness of the technological processes used	The student detects the presence of a genetically modified organism in an environmental sample.	[SU6] demonstration of practical skills
Subject contents	Basic equipment of a biotechnology laboratory, definition of biotechnology, white, red, green biotechnology examples, phylogenetic tree of life, microorganism databases, the most important chemical compounds in the cell, the flow of genetic information, native and recombinant organisms and proteins, molecular cloning and cloning of organisms, matter circulation and energy in nature, chain and network of food relationships, basics of ecosystem microbiology, cellular localization of biodegradation processes, engineering of biodegradation processes - what is it, example, wastewater treatment using the activated sludge method, land bioremediation, biotechnological products: biofuels, medicines, biodegradable polymers, GMO agriculture.		
Prerequisites and co-requisites	No requirements		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	report - experimental results processing	51.0%	10.0%
	test	51.0%	15.0%
	project task	51.0%	25.0%
	written exam	51.0%	50.0%
Recommended reading	Basic literature	1. Klimiuk E., Łebkowska M.: Biotechnologia w ochronie środowiska, PWN, 2005 2. Glick, B.R., Pasternak, J.J., Patten, C.L.: Molecular biotechnology: Principles and applications of recombinant DNA. ASM PRESS, 2009 3. Libudzisz Z., Kowal K., Żakowska Z.: Mikrobiologia techniczna, tom 2, PWN 2008	
	Supplementary literature	4. Olańczuk-Neyman K.: Laboratorium z biologii środowiska, Wyd. PG, 1998 5. indicated on-line resources	
	eResources addresses		
Example issues/ example questions/ tasks being completed	biogas drop-in biofuel syngas molecular cloning scheme of the indicated gene activated sludge method basics of GMO legislation		
Work placement	Not applicable		

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