



Subject card

Subject name and code	Environmental Microbiology and Chemistry for Sustainable Solutions, PG_00071940						
Field of study	Circular economy and water management						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2026/2027		
Education level	second-cycle studies		Subject group		Obligatory subject group in the field of study		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		English		
Semester of study	1		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Environmental Engineering Technology -> Faculty of Civil and Environmental Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Aneta Łuczkiwicz				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	15.0	0.0	30
	E-learning hours included: 0.0						
	eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=9260						
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	To deepen understanding of microbiological and chemical processes in the environment and their roles in ecosystem functioning and environmental engineering systems.						
	To explain interactions between microorganisms and chemical substances, with particular emphasis on pollutant transformation, bioavailability, and effects on organisms and engineered processes.						
	To introduce methods for monitoring environmental quality and assessing chemical and microbiological hazards, recognising the connections between human, animal, and environmental health within the One Health approach.						
	To develop ability to apply microbiological and chemical knowledge to select sustainable solutions for water and wastewater treatment, environmental remediation, waste processing, and resource recovery.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_K03] clearly communicates the results of their work and activities, engages in lifelong learning, and adheres to professional ethics.	The student presents the results of their work and activities.	[SK2] Assessment of progress of work
	[K7_U01] searches for, selects, and interprets information in a comprehensive manner in the fields of water management and the circular economy, using reliable scientific sources, standards, regulations, and technical documentation.	The student searches for, selects, and interprets information on the circular economy in a comprehensive manner, using reliable scientific sources, standards, and regulations.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information
	[K7_W01] identifies in a comprehensive manner the phenomena and processes related both to water management and the circular economy, including the cycles of water, energy, and materials, as well as their connections with environmental and technical systems, while indicating reliable sources of knowledge and information relevant to the analyzed issues.	The student identifies, in a comprehensive manner, the phenomena and processes related to the circular economy, including the circulation of water, energy, and matter, as well as their connections with environmental and technical systems, indicating reliable sources of knowledge and information relevant to the issues being analysed.	[SW2] Assessment of knowledge contained in presentation
Subject contents	<p>Course content – lecture</p> <ul style="list-style-type: none"> • Microbiological and chemical foundations of environmental systems • Interactions between microorganisms and chemical substances • Environmental fate and transformation of pollutants • Chemical and microbiological hazards: a One Health approach • Environmental quality monitoring • Microbiological and chemical processes in sustainable environmental technologies • Waste processing and resource recovery • Microorganisms and chemical processes in the built environment • Sustainability assessment of engineering solutions 		
	<p>Course content – project</p> <ul style="list-style-type: none"> • Identification and characterisation of an environmental problem, its causes and consequences • Analysis of legal frameworks and strategic documents at international, EU, national and local levels • Critical evaluation of scientific literature and available data, including the identification of knowledge gaps • Synthesis and presentation of findings and comparative assessment of potential solutions • Analysis of public perceptions of the problem and acceptance of proposed solutions 		
Prerequisites and co-requisites	Basic information in the field of environmental microbiology and chemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	report	30.0%	30.0%
	test	30.0%	30.0%
	project	40.0%	40.0%

Recommended reading	Basic literature	<p>Directive (EU) 2024/3019 of the European Parliament and of the Council of 27 November 2024 concerning urban wastewater treatment (recast). OJ L, 2024/3019, 12.12.2024.</p> <p>Directive (EU) 2026/805 of the European Parliament and of the Council of 30 March 2026 amending Directive 2000/60/EC establishing a framework for Community action in the field of water policy, Directive 2006/118/EC on the protection of groundwater against pollution and deterioration and Directive 2008/105/EC on environmental quality standards in the field of water policy. OJ L, 2026/805, 20.04.2026.</p> <p>Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the quality of water intended for human consumption (recast). OJ L 435, 23.12.2020, pp. 1–62.</p>
	Supplementary literature	-
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Practical activities within the subject	Not applicable	

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