

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Fundamentals of Ecoengineering, PG_00058975								
Field of study	Environmental Engineering								
Date of commencement of studies	October 2023		Academic year of realisation of subject			2024/2025			
Education level first-cycle 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	3		ECTS credits		6.0				
Learning profile	general academic profile		Assessment form		exam				
Conducting unit	Department of Environmental Engine		eering Technol	ogy -> Faculty	of Civil	and Environmental Engineering			
Name and surname	Subject supervisor	dr hab. Katarzvna Jankowska							
of lecturer (lecturers)	Teachers								
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
of instruction	Number of study hours	30.0	15.0	30.0	0.0		0.0	75	
	E-learning hours inclu	ided: 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	75		7.0		68.0		150	
Subject objectives	The role of microorganisms in the environment and environmental engineering. Microbiological monitoring. Ability to perform basic chemical calculations.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	[K6_K01] can think and act in a creative and enterprising way; can set priorities for the implementation of an individual or group task; understands the need for continuous training and professional responsibility for their activities and team			Student works alone and in a team performing microscopic observation and problem-solving tasks. The laboratory facilities comply with safety rules and shows attention to equipment.			[SK1] Assessment of group work skills [SK3] Assessment of ability to organize work		
	[K6_U09] is able to use well- chosen methods and measuring devices that enable determination of basic parameters of the water treatment process and wastewater treatment; can perform simple laboratory tests leading to the assessment of water quality, pollutant load in sewage		Has knowledge of living organisms, basic biological processes, occurrence of microorganisms in natural environments and their importance in environmental engineering. Makes microscopic observations independently. Identifies and describes the structure of microorganisms. Has the ability to solve problem tasks			[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment			
[K6_W03] has a structured and theoretically founded knowledge in the field of chemistry and biology, including knowledge necessary to understand the technological processes related to water treatment, wastewater treatment, waste management and sludge management			Knowledge of living organisms, fundamental biological processes, the prevalence of microorganisms in natural environments as well as their role in environmental engineering. Proper microscope usage, problem solving skills			[SW1] Assessment of factual knowledge			

Subject contents	Lectures Microorganisms as a primary factor in ensuring natural circulation of matter. Characteristics of microorganisms: viruses, bacteria, algae. The role of algae in aquatic environments. Point and nonpoint source of water contamination. Oxygen line. The saprobic index as a basis for the assignment of water qual. Toxic water, testing methods. The growth of microorganisms. The nutritional requirements of microorganisms. Metabolism. The kinetics of enzymatic reactions. Energy source for heterotrophs, aerobic respiration, anaerobic respiration, fermentation. Energy source for autotrophs: litotrofy and fototrofy. Microbiological threats in potable water. Effect of physical and chemical factors on microorganisms. Disinfection of drinking water, chemical and physical methods, the sensitivity of microorganisms. Fundamentals of biological treatment of wastewater. Activated sludge and biofilters, the conditions of work. Biological methods to remove nitrogen and phosphorus from wastewater. Anaerobic wastewater treatment and disposal of sewage sludge. Sanitary aspects of wastewater and sewage sludge disposal. Biological stability of potable water in the water network. Tutorials Chemical calculations - a reminder of basic concepts. Fundamentals of stoichiometry. Concentrations of solutions. Electrolytic dissociation. Calculating acidity and alkalinity. Calculating hardness. Analysis of water/ wastewater composition and interpretation of results obtained. Laboratories Microscopy technique. Presence of cyanobacteria, algae, protozoa and multicellular animals in waters. Bacterial growth on solid and liquid media. Bacterial staining. Bacterial morphology and cells structure. Environmental factors and the bacterial growth rate. Sanitary quality of surface waters. Properties and quality of activated sludge. Biocenosis of activated sludge and biological filters.						
Prerequisites and co-requisites	Basic knowledge in biology, cher	nistry and ecology.					
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria	Tutorials - two written tests	60.0%	15.0%				
	Lectures- written exam	60.0%	60.0%				
	Laboratories - reports	60.0%	25.0%				
Recommended reading	Basic literature	Laboratorium z biologii środowis Politechnika Gdańska Mikrobiologia techniczna, tom 1 Żakowska. Wydawnictwo Nauko M.K.: Mikroorganizmy w ochron PWN Warszawa 2007. Błaszczy Wydawnictwo Naukowe PWN W Wastewater Microbiology, Gabri R.M. Atlasa, R. Bartha: Microbia Company, Reading 1981 Water Quality Assessments: Ed Microbial Enzymes in Aquatic E Verlag New York 1991	ska, Krystyna <i>Olańczuk-Neyman. Skrypt,</i> , Red. Z. Libudzisz, K. Kowal, Z. owe PWN Warszawa 2021.Błaszczyk ie środowiska, Wydawnictwo Naukowe yk M.K.: Mikrobiologia środowisk, Varszawa 2010. iel Bitton, John Wiley & Sons, 2005 al Ekology. Addison-Wesley Publishing I. Chapman&Hall, London 1992 nvironments: Ed. R.J. Chróst Springer				
	Supplementary literature	Zycie bakterii, Kunicki Goldfinge Warszawa 2006. Mikrobiologia Wód, Red. J. Palu Biologia Wód Śródlądowych, Mi Mikrobiologia ogólna, Schlegel I Warszawa 2005. Mikrobiologia Krótkie wykłady, N Killington R., Wydawnictwo Nau	Zycie bakterii, Kunicki Goldfinger W.J.H. Wydawnictwo Naukowe PWN, Warszawa 2006. Mikrobiologia Wód, Red. J. Paluch PWN, Warszawa 1973. Biologia Wód Śródlądowych, Mikulski J., PWN Warszawa 1974. Mikrobiologia ogólna, Schlegel H.G., Wydawnictwo Naukowe PWN, Warszawa 2005. Mikrobiologia Krótkie wykłady, Nicklin J., Graeme-Cook K., Paget T., Killington R., Wydawnictwo Naukowe PWN, Warszawa 2021,				
	eResources addresses	Adresy na platformie eNauczan	Adresy na platformie eNauczanie:				
Example issues/ example questions/ tasks being completed							

Work placement	Not applicable

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