GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00058975		
Field of study	Environmental Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2023/2024
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 Engineering Technology -> Faculty of Civil and Environmental Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Katarzyna Jankowska	
	Teachers	mgr inż. Emilia Bączkowska dr inż. Agnieszka Kalinowska dr hab. Katarzyna Jankowska dr hab. inż. Aneta Łuczkiewicz dr inż. Karolina Fitobór dr inż. Aleksandra Sokołowska dr inż. Grażyna Gałęzowska	

Lesson types and methods of instruction							
	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	30.0	0.0	0.0	75
	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	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_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
	[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	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
	[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 .	[SK3] Assessment of ability to organize work [SK1] Assessment of group work skills
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, chemistry and ecology.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratories - reports	60.0%	25.0%
	Lectures- written exam	60.0%	60.0%
	Tutorials - two written tests	60.0%	15.0%

Recommended reading	Basic literature	Laboratorium z biologii środowiska, Krystyna *Olańczuk-Neyman*. *Skrypt,* Politechnika Gdańska Mikrobiologia techniczna, tom 1, Red. Z. Libudzisz, K. Kowal, Z. Żakowska. Wydawnictwo Naukowe PWN Warszawa 2021.Błaszczyk M.K.: Mikroorganizmy w ochronie środowiska, Wydawnictwo Naukowe PWN Warszawa 2007. Błaszczyk M.K.: Mikrobiologia środowisk, Wydawnictwo Naukowe PWN Warszawa 2010. Wastewater Microbiology, Gabriel Bitton, John Wiley & Sons, 2005 R.M. Atlasa, R. Bartha: Microbial Ekology. Addison-Wesley Publishing Company, Reading 1981 Water Quality Assessments: Ed. Chapman&Hall, London 1992 Microbial Enzymes in Aquatic Environments: Ed. R.J. Chróst Springer Verlag New York 1991
	Supplementary literature	Życie 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 eNauczanie: XDXDPodstawy Ekoinżynierii 2023/24 - Moodle ID: 34382 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34382
Example issues/ example questions/ tasks being completed	.	
Work placement	Not applicable	