



Subject card

Subject name and code	WASTEWATER TREATMENT AND DISPOSAL OF SEWAGE SLUDGE, PG_00065999						
Field of study	Green Technologies						
Date of commencement of studies	February 2027		Academic year of realisation of subject		2027/2028		
Education level	second-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	1		Language of instruction		English		
Semester of study	2		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Biotechnology and Microbiology -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Ilona Kłosowska-Chomiczewska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	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	The aim of the course is to learn the characteristics of different types of wastewater depending on their origin (industrial sector) as well as introduce the commonly used technologies for removing pollutants from wastewater and get to know an alternative methods. Another goal is to understand the problems of management of sewage sludge generated in municipal wastewater treatment plants and industrial plants.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_K04] is aware of the responsibility for decisions made, observing and developing the principles of professional ethics and working to ensure compliance with these principles		Demonstrates awareness of responsibility for decisions related to wastewater treatment processes, adherence to professional ethical principles, and taking action to protect the environment and public health.		[SK4] Assessment of communication skills, including language correctness [SK2] Assessment of progress of work		
	[K7_W06] defines the principles of sustainable development, national and European conditions for environmental management, in the field of intellectual property protection and patent law		Has the knowledge necessary to define the principles of sustainable development and the national and European frameworks governing wastewater management.		[SW1] Assessment of factual knowledge		
	[K7_U04] is able to design and supervise environmentally friendly technologies, waste-free technologies, and also perform expert opinions on the environmental impact of technologies already in use		Is able to design and supervise environmentally friendly wastewater treatment and sludge management technologies and assess the environmental impact of the technologies in operation.		[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		

Subject contents	Course content – lecture		
	Characteristics of municipal and industrial wastewater depending on the origin. Wastewater treatment: basic physical and physicochemical processes (sedimentation, flotation, extraction, coagulation, adsorption, dialysis, reverse osmosis, ion exchange), chemical processes (neutralization, precipitation, chlorination, reduction, oxidation), and biological processes (aerobic biodegradation, acid fermentation, methane fermentation). Electrochemical oxidation in wastewater treatment. Modern solutions for industrial waste treatment and biological removal of biogenic impurities. Selection of wastewater treatment technology for selected examples of wastewater from food, chemical and engineering industry. Characteristics and treatment of leachate from municipal landfills and wastewater resulting from the remediation of oily soil. Characteristics of the sludge from different stages of sewage treatment (grit and sludge from primary settling tanks, excessive biological sludge). Sewage sludge processing technologies: methods for thickening and dewatering of sewage sludge (lagoons, reed beds, belt-filter presses, conditioning by polyelectrolytes), biological, thermal and chemical stabilization (mechanism and technology). Autothermal, thermophilic, aerobic sludge hygienisation. Sanitation and fermentation of sewage sludge. Thermal processing for sewage sludge management, combustion. Requirements for the safe storage of sewage sludge. Fertilizing properties of sludge from municipal sewage treatment plants and their processing into mineral-organic fertilizer. Agriculture utilization of sewage sludge (composting, reed beds, vermicultures). Use of sewage for remediation of degraded areas and industrial waste disposal (eg. lime after flotation). The recovery of phosphorus from sewage sludge. The most common problems associated with wastewater treatment and serious failures.		
	Course content – laboratory		
	Mechanical wastewater treatment – characteristics of treatment processes and assessment of their efficiency. Biological wastewater treatment – use of biological processes for pollutant removal and assessment of treatment efficiency. Wastewater sludge dewatering – dewatering methods, assessment of process efficiency, and possibilities for further sludge management. Anaerobic digestion of wastewater sludge – principles of the process, operating conditions, biogas production, and possibilities for its utilization.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture: written exam	60.0%	60.0%
	Laboratory: tests and reports	60.0%	40.0%
Recommended reading	Basic literature	1. Metcalf & Eddy, et al. Wastewater engineering: treatment and reuse. McGraw Hill, 2003. 2. Obarska-Pempkowiak, Hanna, Magdalena Gajewska, and Ewa Wojciechowska. Hydrofitowe oczyszczanie wód i ścieków. Wydawnictwo Naukowe PWN, 2010.	
	Supplementary literature	Kowal, Apolinary Leszek, and Maria Świdarska-Bróż. Oczyszczanie wody: podstawy teoretyczne i technologiczne, procesy i urządzenia. Wydawnictwo Naukowe PWN, 2007.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. What is the principal of biological nitrogen removal from wastewater. Transformation of nitrogen compounds - reactions. 2. Characterize the wastewaters from the selected industries (petrochemical, galvanization, food etc.) and prepare a technological scheme of sewage treatment. What types of contaminants are removed at various stages? 3. What are the principals of wastewater treatment in case of sewage containing emulsified oils? 4. What is the purpose and what are the parameters of the thermal sewage sludge treatment? 5. What is the purpose of sludge conditioning and what methods are designed for this?		
Practical activities within the subject	Not applicable		

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