



## Subject card

Subject name and code	Natural methods of wastewater treatment , PG_00048024						
Field of study	Environmental Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2021/2022		
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	Part-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Environmental Engineering Technology -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Hanna Obarska-Pempkowiak					
	Teachers	dr hab. inż. Katarzyna Kolečka prof. dr hab. inż. Hanna Obarska-Pempkowiak					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	10.0	0.0	10.0	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		4.0		55.0	89
Subject objectives	Getting acquainted with water and sewage infrastructure in non-urban areas.Domestic and local wastewater treatment plants and the rules of their design.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U12] can design: developed water and sewage system, complex heat source, pool water treatment technology, mechanical ventilation installation or underground water intake, drainage of urban water catchment, reservoir control system during flood seizure or water treatment technology, domestic waste water treatment plant	The student is able to design a single-family wastewater treatment plant.	[SU1] Assessment of task fulfilment
	[K7_W07] has an in-depth, structured and theoretical knowledge of municipal management, including water treatment and water renewal technologies, various types of wastewater treatment technologies, including landfill leachate, sewage sludge treatment technologies; knowledge of natural methods used in water and wastewater treatment or construction, functioning, operation and closure of waste landfills	The student has in-depth, orderly, theoretically founded knowledge of natural methods used in wastewater treatment.	[SW1] Assessment of factual knowledge
	[K7_U14] can technically and economically analyze and evaluate the solutions and functioning of facilities and systems in the sanitary engineering or flood protection, water intakes and water infrastructure or water and wastewater treatment plants; can assess the suitability and potential of using new achievements in materials, fixtures, devices and methodologies for designing and modeling the analyzed technical infrastructure and industrial objects, including innovative solutions	The student is able to analyze and evaluate in terms of technical and economic solutions of single-family wastewater treatment plants.	[SU1] Assessment of task fulfilment
	[K7_K02] understands the need to formulate and communicate to the public information and opinions on the achievements in the environmental engineering and other aspects of the engineering activity in the sanitary sector; is aware of the importance and understands non-technical aspects and effects of engineering activities; strives to convey such information and opinions in a universally understandable manner, presenting various points of view	The student understands the need to formulate and provide information and opinions on the achievements of environmental engineering to the public.	[SK5] Assessment of ability to solve problems that arise in practice
Subject contents	Water and sewerage infrastructure in non-urban areas. Policy for the protection of water resources in areas with dispersed development in Europe. Programs of sewage collection and treatment. Drainage infiltration. Mounds filter. Sand filters. Characteristics of constructed wetlands for water and wastewater treatment. Biochemical processes in constructed wetland systems. The types of constructed wetland systems. The use of constructed wetlands. Constructed wetlands used in the second stage of wastewater treatment. Constructed wetlands used in the third and higher stage of wastewater treatment. Hybrid objects. The newest technologies of wastewater separation. Systems which are enabled to close cycle of water and organic substances in non-urban areas. Wastewater treatment plants with energy recovery and the rational management of water.		
Prerequisites and co-requisites	The knowledge of environmental chemistry and wastewater technology		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project	100.0%	40.0%
	Credit of lecture	60.0%	60.0%

Recommended reading	Basic literature	1. Obarska-Pempkowiak H., Gajewska M., Wojciechowska E., Ostojki A.: Oczyszczalnie w ogrodzie. Poradnik jak zastosować innowacyjne rozwiązania gospodarki wodnej i ściekowej z wykorzystaniem systemów hydrofitowych, wyd. Seidel-Przywecki Sp. z o.o, 2012 2. Błażejowski R.: Kanalizacja wsi. PZITS, Poznań 2003, 3. Heidrich Z.: Przydomowe oczyszczalnie ścieków. Poradnik. Wyd. COIB, warszawa 1998, 4. Królikowski A.: Gospodarka wodno-ściekowa na terenach niezurbanizowanych, BbiWE, Białystok, 1994
	Supplementary literature	1. Obarska-Pempkowiak H., Gajewska m., Wojciechowska E.: Hydrofitowe oczyszczalnie ścieków. Wyd. Naukowe PWN, 2002, 2. Oleszkiewicz J.: Gospodarka osadami ściekowymi. Poradnik decydenta, LEM s.c., Kraków, 1998
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	