



## Subject card

Subject name and code	Water and sewage management in the energy sector, PG_00055880						
Field of study	Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2022/2023		
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	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			4.0		
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	dr hab. inż. Krzysztof Czerwionka					
	Teachers	dr hab. inż. Krzysztof Czerwionka dr hab. inż. Rafał Bray dr hab. inż. Eliza Kulbat					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	0.0	0.0	45
	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	45	6.0		49.0		100
Subject objectives	To acquaint students with models of water and wastewater management and the basic processes of water and wastewater treatment in the energy sector.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U10] can use correctly selected methods and measuring devices for determination of basic parameters during the water treatment process and wastewater treatment control; can perform basic laboratory tests leading to the assessment of water quality, pollutant load in wastewater	The student is able to choose the methods and measuring devices and perform basic water and sewage quality tests. The student is able to use the obtained results to evaluate the course of water and wastewater treatment processes.			[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information		
	[K6_W14] has a theoretical knowledge in the field of chemistry, biology, physics and mathematics including knowledge necessary to understand the technological processes related to water treatment, wastewater treatment, waste management in energy facilities, circular economy	The student has a structured knowledge of the basics of chemistry, biology, physics and mathematics necessary to understand the technological processes related to water treatment, wastewater treatment, waste management in energy facilities, closed-loop management.			[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge		
Subject contents	Wykład: Stan aktualny i kierunki transformacji systemu energetycznego Polski w aspekcie gospodarki wodno-ściekowej. Potencjalny wpływ energetyki na środowisko wodne. Modele gospodarki wodno-ściekowej w energetyce. Podstawowe zabiegi i procesy w oczyszczaniu wody (podziemna i powierzchniowa). Stabilność chemiczna i biologiczna wody. Ścieki wytwarzane w elektrowniach węglowych. Oczyszczanie ścieków. BAT w energetyce. Gospodarka wodno-ściekowa w biogazowniach.  Laboratorium: Parametry jakości wody (wody powierzchniowe i podziemne); wymagania jakości wody stosowanej w układach chłodzenia oraz do celów kotłowych. Podstawowe zabiegi i procesy w oczyszczaniu wody: dekarbonizacja i koagulacja metodami chemicznymi, wymiana jonowa, filtracja, procesy membranowe.						
Prerequisites and co-requisites	Basic knowledge of chemistry, biology, physics and mathematics.						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	lectures - test	60.0%	60.0%
	laboratory - class work assessment, test	60.0%	40.0%
Recommended reading	Basic literature	<p>Bartkiewicz B., Umiejewska K., Oczyszczanie ścieków przemysłowych, PWN, 2022</p> <p>Kowal A.L. Odnowa wody. Podstawy teoretyczne procesów, Wyd. Politechniki Wrocławskiej, 1997</p> <p>Świdarska-Bróz M., Kowal A.L., Oczyszczanie wody, PWN, 2009</p> <p>Bodzek M., Konieczny K., Wykorzystanie procesów membranowych w uzdatnianiu wody, Projprzem-eko, 2005</p>	
	Supplementary literature	Szymkiewicz R., Dolna Wisła - rzeka niewykorzystanych możliwości, Wyd. PG, 2018	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<p>Assessment of energy demand for water.</p> <p>Comparison of cooling systems used in Poland; the problem of the discharge of heated water to the receiver.</p> <p>Selection of water treatment methods to achieve boiler water quality.</p> <p>Quality parameters of wastewater generated in conventional coal-fired power plants.</p>		
Work placement	Not applicable		