



Subject card

Subject name and code	Water and Waste-water Technology II, PG_00043644						
Field of study	Environmental Engineering						
Date of commencement of studies	October 2020		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	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		4.0		
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. inż. Krzysztof Czerwionka				
	Teachers		dr inż. Alina Wargin				
			dr hab. inż. Krzysztof Czerwionka				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	0.0	60
	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	60		4.0		45.0	109
Subject objectives	Presentation of the basic scope of knowledge concerning the issues of quantity and quality of municipal wastewater and knowledge of the unit processes used for their treatment.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U01] has the ability to self-education, can obtain information from literature, databases and other sources, uses information technology, Internet resources; can integrate the obtained information, make their interpretation, as well as draw conclusions and formulate and justify opinions	Student understands the need to update knowledge in the field of wastewater characteristics and its impact on the selection of unit processes for pollutants removal	[SU3] Assessment of ability to use knowledge gained from the subject [SU5] Assessment of ability to present the results of task
	[K6_U10] can design basic equipment for water treatment, wastewater treatment and sludge and waste management	The student is able to present a sequence of wastewater treatment technologies	[SU3] Assessment of ability to use knowledge gained from the subject
	[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	Student is able to use the knowledge of chemistry and biology in order to evaluate the effectiveness of the processes used for wastewater treatment	[SW3] Assessment of knowledge contained in written work and projects [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	The student is able to perform laboratory tests in order to determine the parameters of unit processes of wastewater treatment	[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
Subject contents	<p>Lecture:</p> <p>Basic concepts and definitions. Indicators and criteria for assessing the quality of wastewater. Pollution loads. Discharge of sewage into the environment: sewage receivers, legal conditions. Technological processes of mechanical wastewater treatment. Basics of biological wastewater treatment: microbiological composition, development of bacterial culture. Biological unit processes: hydrolysis, oxidation, ammonification, nitrification, denitrification, biological dephosphatation. Technological parameters of the activated sludge method. Basic technological systems of biological wastewater treatment. Natural methods of sewage treatment: biological ponds, soil and plant treatment plants, household sewage treatment plants. Modern methods of nitrogen removal: partial nitrification / denitrification, anammox, deammonification. Laboratory exercises:</p> <p>Study of the wastewater COD fraction. Chemical removal of phosphorus from wastewater. Treatment of wastewater contaminated with oil emulsions. Research on the rate of nitrogen and phosphorus removal unit processes. Research on the efficiency of nitrogen removal in the deammonification process.</p>		
Prerequisites and co-requisites	Knowledge of subjects: environmental chemistry and biology		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Final exam	60.0%	70.0%
	Passing laboratories	60.0%	30.0%

Recommended reading	Basic literature	<p>1. Łomotowski J., Szpindor A.: Nowoczesne systemy oczyszczania ścieków. Arkady, Warszawa, 1999.2. Praca zbiorowa (red.: Oleszkiewicz J.): Poradnik eksploatatora oczyszczalni ścieków. Wyd. PZiTS, Poznań, 1997.3. Henze M., Harremoës P., Jansen J., Arvin E.: Oczyszczanie ścieków procesy biologiczne i chemiczne. Wyd. Politechniki Świętokrzyskiej, Kielce, 2002.4. Bever J., Stein A., Teichmann H.: Zaawansowane metody oczyszczania ścieków eliminacja azotu i fosforu, sedimentacja i filtracja. Wyd. Projprzem-Eko, Bydgoszcz, 1997.</p>
	Supplementary literature	<p>1. Magrel L.: Uzdatnianie wody i oczyszczanie ścieków. Wyd. Ekonomia i Środowisko, Białystok, 1999.2. Bernacka J., Kurbiel J., Pawłowska L.: Usuwanie związków biogennych ze ścieków miejskich. Wydawnictwo Instytutu Ochrony Środowiska, Warszawa, 1992.</p>
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	