



Subject card

Subject name and code	EQUIPMENT FOR WATER TREATMENT , PG_00042698						
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			Optional subject group 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	3	Language of instruction			Polish		
Semester of study	6	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. Rafał Bray					
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	10.0	0.0	5.0	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		65.0	100
Subject objectives	Student will acquire the necessary knowledge on issues related to the purpose, construction and principle of operation used in water treatment plants.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U10] can design basic equipment for water treatment, wastewater treatment and sludge and waste management	Can design basic water treatment devices			[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		
	[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	The student has structured and theoretically founded knowledge necessary to understand the technological processes related to water treatment.			[SW1] Assessment of factual knowledge		
	[K6_U03] can prepare documentation regarding the implementation of an engineering task/project and prepare a text or presentation including a discussion of the results of the implementation	The student is able to prepare documentation on the implementation of an engineering task / project and prepare a text or presentation containing a discussion of the implementation results.			[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools		

Subject contents	LECTURE Basic notions, definitions, terminology. Quality of natural waters surface waters, groundwaters, infiltration waters, classification of pollutants. Requirements for drinking water WHO recommendations, law regulations in Poland and EU. Treating of surface- and groundwaters basic rules, technological lines. General rules of the WTP design. Preliminary treatment devices . Coagulation unit. Mixers, reaction tanks, settling tanks types, principles of operations, design directions. Filters fillings, types (slow, rapid, preassure, contact, dry), drainage, armature, design directions. Aeration tanks - types, principles of operations, design directions. Disinfection installations. Drinking water tanks. Sludge management in WTP mass and bulk balance of sludge and washwaters, toxic substances in sediments and washwaters principles and proceses of utilisation. TUTORIALS Examples of units calculations: reagents storages, hydraulic and mechanical mixers, reaction tanks (hydraulic and mechanical), vertical and horizontal settling tanks, rapid filters, drinking water tanks, distribution pipes. PROJECT Design of level map and level scheme. Calculations and selection of installations: reagents storages, hydraulic and mechanical mixers, reaction tanks (hydraulic and mechanical), vertical and horizontal settling tanks, rapid filters, drinking water tanks, distribution pipes.		
Prerequisites and co-requisites	Knoledge related to Water ant Wastewater Technology		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project	60.0%	50.0%
	Written exam	60.0%	50.0%
Recommended reading	Basic literature	[1] Heidrich Z.: Urządzenia w uzdatnianiu wody. Warszawa: Arkady 1987. [2] Kowal A., Świdorska-Bróz M.: Oczyszczanie wody. Warszawa-Wrocław: Wyd. Nauk. PWN 1996. [3] Nawrocki J., Biłozor S.: Uzdatnianie wody. Procesy chemiczne i biologiczne. Warszawa: PWN 2000. [4] Obarska-Pempkowiak H.: Technologia Wody. Gdańsk: Wyd. Politechniki Gdańskiej 1997.	
	Supplementary literature	[1] M. Sozański, P.M. Huck.: Badania doświadczalne w rozwoju technologii uzdatniania wody. Monografie PAN, vol.42, Lublin 2007. [2] A. Bauer, G. Dietze, W. Muller, K. J. Soine, D. Weideling.: Poradnik eksploatatora systemów zaopatrzenia w wodę. Wyd. Seidel-Przywecki, Warszawa 2005. [3] Z. Heidrich.: Wodociągi i Kanalizacja cz. 1. Wodociągi. Wyd. Szkolne i Pedagogiczne, Warszawa 1992.	
	eResources addresses	Adresy na platformie eNauczanie: Urządzenia do uzdatniania wody - lato 2023 - Moodle ID: 31053 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=31053	
Example issues/ example questions/ tasks being completed	Select and organize in the correct order equipment used for underground SUW (removing Fe)- Filters slow- Filters hasty- Sediment- Flocculation chambers- Reaction chambers- Mixer- Aerators- Grids		
Work placement	Not applicable		