



Subject card

Subject name and code	Wastewater and water quality control, PG_00048793							
Field of study	Green Technologies							
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024			
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	6	ECTS credits			4.0			
Learning profile	general academic profile	Assessment form			exam			
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry							
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Agata Kot-Wasik						
	Teachers							
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM	
	Number of study hours	30.0	0.0	15.0	0.0	15.0	60	
	E-learning hours included: 0.0							
	Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=22800							
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		5.0		35.0		100
Subject objectives	The main aim of this subject is to present a comprehensive view of water as a vital natural resource: how water moves; how it becomes contaminated in nature and by the activities of people; how it is purified in nature and by people; and how to recognize, monitor and analyse common pollutants, test, correct, or prevent water pollution problems.							

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W03] has a basic knowledge of soil, air and water pollutants, design and supervision of environmentally friendly technologies and technologies which do not produce waste, knows technology of cleaning and neutralization of industrial waste and wastewater management, has a basic understanding of the theoretical basis of methods and types of apparatus used in chemical analysis of environmental pollutants	student understands a basic knowledge of soil, air and water pollutants, design and supervision of environmentally friendly technologies and technologies which do not produce waste, knows technology of cleaning and neutralization of industrial waste and wastewater	[SW1] Assessment of factual knowledge
	[K6_U05] can formulate and solve engineering tasks analytical methods, simulation as well as experimental, able to apply knowledge of basic physics and mathematics to analyze the results of experiments, is able to analyze and assess existing technical solutions	student is able to apply knowledge of basic physics and mathematics to analyze the results of experiments, is able to analyze and assess existing technical solutions	[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
	[K6_K03] turns the attention to the prestige associated with the profession and professional solidarity properly understood, shows respect for others and concern for their welfare	The student understands the importance of prestige associated with their skills and profession	[SK5] Assessment of ability to solve problems that arise in practice
	[K6_W04] is aware of the importance of environmental protection and has a basic knowledge of chemical and biological threats to the environment, with particular emphasis on anthropogenic factors, has a basic knowledge of knowledge of the principles of sustainable development as well as national and European environmental management conditions.	The student learns the importance of environmental protection and has a basic knowledge of chemical and biological hazards for the environment, with particular emphasis on the aquatic environment and anthropogenic factors	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
Subject contents	<p>1. Introduction to water quality control. The hydrological cycle. Composition of natural waters. Sea water environment. Baltic Sea.</p> <p>2. Parameters of natural waters : organoleptic parameters, physical and chemical parameters, microbiological parameters, toxic compounds. Natural water quality classification.</p> <p>3. Water treatment technology - part 1 (mechanical & physical treatment) and part 2 (chemical treatment and disinfection).</p> <p>4. Introduction to waste water (wastewater characteristic). Waste water treatment : mechanical, biological, chemical, hydrobotanical. Constructed wetlands for waste water treatment.</p> <p>5. Human impact on water resources (eutrophication, acidification, organic pollution, metal speciation). Global POPs cycling and fractionation.</p> <p>6. Methods of evaluation of water quality : sampling, storage and sample pre-treatment. Methods of evaluation of water quality : analytical techniques.</p>		
Prerequisites and co-requisites	<p>1. Basic knowledge of environmental chemistry.</p> <p>2. Basic knowledge of physico-chemical properties of water.</p>		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written examination	60.0%	60.0%
	Midterm colloquium and presentatins	60.0%	20.0%
	Practical exercise	60.0%	20.0%
Recommended reading	Basic literature	<p>1. Unicef Handbook on Water Quality, 2008, available at : http://www.unicef.org/wash/files/WQ_Handbook_final_signed_16_April_2008.pdf</p> <p>2. Lectures (presentations and comments) available at: http://www.pg.gda.pl/chem/Dydaktyka/Analityczna/</p> <p>3. Water quality monitoring: A practical guide to the design and implementation of freshwater quality studies and monitoring programmes, Edited by J. Bartram and R. Ballance, available at: http://www.who.int/water_sanitation_health/resourcesquality/wqmonitor/en/index.html</p>	
	Supplementary literature	<p>4. Guidelines for drinking-water quality, third edition, incorporating first and second addenda. Volume 1 - Recommendations. Edited by WHO. Available at: http://www.who.int/water_sanitation_health/dwq/gdwq3rev/en/</p>	

	eResources addresses	Adresy na platformie eNauczenie:
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. List at least 5 mechanisms of water selfpurification and describe two of them, the most important for river waters. 2. Why and how to remove temporary hardness of water. Present at least three methods. 3. What do you know about removal of phosphorus pollutants from wastewater. Describe chemical or biological method. 4. Explain in details 2 advantages and 2 disadvantages of ozonation used for disinfection of drinking water. 5. What types of processes are observe during water sample storage. Point them out and explain. Give also examples of compounds which undergo these processes. 6. Eutrophication explain: why, when, give 4 negatives and 2 positives coming up from eutrophication. 	
Work placement	Not applicable	