



Subject card

Subject name and code	ENVIRONMENTAL POLLUTION PROCESSES, PG_00064415						
Field of study	Chemistry						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2027/2028		
Education level	first-cycle studies		Subject group		Optional subject group 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		6.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Bożena Zabiegała				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	60.0	0.0	0.0	90
	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	90		8.0		52.0	150
Subject objectives	The aim of the course is to familiarize students with the chemical and physicochemical processes occurring in the environment, as well as with the mechanisms of formation, transport, and transformation of pollutants present in air, water, and other environmental compartments. Students learn about natural and anthropogenic sources of pollutants, the impact of human activities on environmental quality, the chemical basis of climate change, and methods for environmental monitoring and assessment of pollution levels. The course also develops practical skills in performing laboratory analyses, identifying and determining selected pollutants, and interpreting research results in an environmental context.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U07] is able to undertake accurate and precise analytical measurements, to synthesise simple and large-molecular chemical compounds, to purify and analyse their composition and to determine their structure using classical and instrumental methods	Is able to determine pollutants present in the environment; is able to process and interpret the obtained research results and, based on them, assess the environmental quality and the degree of contamination with reference to applicable standards and regulations.	[SU3] Assessment of ability to use knowledge gained from the subject [SU5] Assessment of ability to present the results of task
	[K6_U09] is able to recognise hazards, counteract them and work with chemical reagents and basic technical apparatus in accordance with health and safety principles and the concept of sustainability	is able to identify hazards associated with working with chemical reagents and equipment used for the analysis of environmental pollution levels, and to select appropriate personal protective equipment, is able to properly classify chemical waste generated during laboratory experiments.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject
	[K6_K05] is aware of his/her social role as a graduate of a technical university, particularly in terms of communicating information and opinions to the public, and undertakes to communicate such information in an understandable way	is able to assess the significance of chemical processes occurring in the environment and present, in an understandable manner, their impact on environmental quality and human life.	[SK4] Assessment of communication skills, including language correctness
	[K6_W02] classifies acquired information, assessing its usefulness in solving the posed problems concerning the synthesis and analysis of selected groups of compounds, determining their physical and chemical properties, making measurements and determining the parameters of chemical reactions and processes	has the necessary knowledge to understand: - the impact of environmental pollution on human health and the functionality of ecosystems; the impact of human activities on the chemical composition and quality of specific environmental components and explains the chemical basis of contemporary climate change; the impact of environmental pollution on human health and the functionality of ecosystems.	[SW1] Assessment of factual knowledge
Subject contents	Course content – lecture Atmospheric chemistry; sources and characteristics of environmental pollutants; natural and anthropogenic emission sources. Chemical transformations of pollutants in the atmosphere, including photochemical reactions, hydrolysis, sorption, oxidation, and reduction. Air pollutants: particulate matter, sulfur, nitrogen, and carbon oxides, heavy metals, volatile organic compounds (VOCs), atmospheric aerosols (primary and secondary), their role in climate formation, and their impact on human health and ecosystems. Water pollutants: organic and inorganic substances, detergents, pesticides, heavy metals, and nutrients. Chemical transformations of pollutants in water, including photochemical reactions, hydrolysis, sorption, oxidation, and reduction. Methods for pollution control and mitigation.		
	Course content – laboratory Laboratory classes develop practical skills in environmental sampling (from individual environmental compartments, including air and water), preparation of samples for analysis taking into account the chemical properties of the determined pollutants and their concentration levels in the environment, determination of selected physicochemical parameters in environmental samples, and preparation of a report including the interpretation of measurement results in an environmental and health context.		
Prerequisites and co-requisites	Students should have knowledge of general chemistry, inorganic chemistry, organic chemistry, physical chemistry, analytical chemistry, and instrumental techniques. Students should be familiar with the basic laws and relationships describing chemical processes and possess the ability to perform basic chemical calculations, analyze experimental data, and process measurement results.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	60.0%	60.0%
	positive assessment of all individual laboratory exercises	60.0%	40.0%

Recommended reading	Basic literature	1. Manahan S.E., Environmental Chemistry, CRC Press. 2. Baird C., Cann M., Environmental Chemistry. 3. Alloway B.J., Heavy Metals in Soils 4. Seinfeld J.H., Pandis S.N., Atmospheric Chemistry and Physics 5. Stumm W., Morgan J.J., Aquatic Chemistry
	Supplementary literature	European Environment Agency (EEA) report, ISO standards for environmental testing, recent scientific publications from journals such as: Environmental Science & Technology, Water Research, and Atmospheric Environment.
	eResources addresses	
Example issues/ example questions/ tasks being completed	Chemical basis of climate change and the impact of pollutants on climate change, Primary and secondary atmospheric aerosols, measurement techniques, and assessment of exposure to aerosol, pollutants. Hydroxyl radical and its role in environmental purification and pollution processes, Pollution of individual environmental components.	
Practical activities within the subject	Not applicable	

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