

Subject card

Subject name and code	Environmental chemistry, PG_00082033						
Field of study	Chemistry						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2027/2028		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study 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	5		ECTS credits		2.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Department of Environmental Analysis -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Anna Białk-Bielińska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	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		15.0	50
Subject objectives	• To familiarize with the basic issues of environmental chemistry, including chemical processes occurring in its various components; • To develop the ability to independently assess factors relevant to chemical processes occurring in the environment; • To familiarize with the main environmental pollutants; • To develop the ability to assess the exposure of various components of the environment to the presence of chemical compounds and their effects; • To familiarize with methods of preventing the harmful effects of chemical compounds in the environment; • To familiarize with basic environmental problems.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEML3_W09] Describes the practical applications of IT tools (computer programmes) for chemical calculations and data analysis.	Able to assess the exposure of individual environmental components to the presence of chemical compounds depending on the manner and scale of their use, using appropriate information tools as well as literature data.	[SW4] test/exam - oral or written
	[CHEML3_U06] Uses basic application software packages to solve problems from the field of science.	Can indicate and describe the effects associated with the presence of a chemical compound in the environment, using experimental results and data from the literature.	[SU4] test/exam - oral or written
	[CHEML3_W11] Defines the basic principles of occupational health and safety and ergonomics necessary for the proper organization of learning.	Identifies preventive measures for the harmful effects of selected chemical compounds on various components of the environment.	[SW4] test/exam - oral or written
	[CHEML3_K01] Identifies the level of her/his own knowledge and skills and the need for continuous learning and personal development.	The student is able to define gaps in his/her knowledge and fill them by searching and citing the literature on the subject, thereby understanding the need for further education.	[SK1] oral statement/conversation/discussion
	[CHEML3_W06] Chooses higher mathematics techniques to the extent necessary to understand and describe the physical processes important for understanding chemistry.	Understands the relationships associated with the ecotoxicity of selected environmental pollutants and characterizes the methods used to assess it.	[SW4] test/exam - oral or written
	[CHEML3_U03] Selects the appropriate equipment and laboratory apparatus for conducting uncomplicated chemical experiments.	Demonstrates the ability to plan and carry out basic physical and chemical measurements and experiments, relevant to chemical processes occurring in the environment.	[SU2] presentation/project/paper/report [SU8] observation of student's independent or team work
	[CHEML3_K02] Works individually demonstrating initiative and independence of activity and cooperates in a team fulfilling various roles in it.	The student organizes his own work and that of the team members both in class and in the preparation of the report on the exercise.	[SK8] observation of student's independent or team work
	[CHEML3_W13] Enumerates and describes the basic legal and ethical aspects related to scientific, research and didactic work.	The student is able to recognize and name the sources of legal and ethical problems in modern environmental chemistry.	[SW1] oral statement/conversation/discussion
Subject contents	Lecture topics: chemistry of the lithosphere, hydrosphere and atmosphere, including: the cycle of matter and biogeochemical cycles (C, N, O, P, S); basic environmental problems (acid rain, greenhouse effect, smog, ozone hole); environmental pollutants (sources and their fate, effects of presence); selected physicochemical properties of chemicals vs. predicting their environmental fate; the concept of environmental risk; ecotoxicological studies in assessing the effects of the presence of chemicals in the environment.		
Prerequisites and co-requisites	Knowledge of the basics of general, inorganic, organic and analytical chemistry, including: the structure and physicochemical properties of the basic groups of organic and inorganic compounds, knowledge of chemical nomenclature, ability to apply the basic formulas of stoichiometry, calculation of concentrations of solutions.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam (test and open questions)	51.0%	100.0%
Recommended reading	Basic literature	J. Naumczyk, Environmetnal chemistry, Wydawnictwo Naukowe PWN, 2017. - G.W. vanLoon, S.J. Duffy, Environmetnal chemistry, Wydawnictwo Naukowe PWN, 2008.	

	Supplementary literature	B. Główniak, E. Kempa, T. Winnicki: Podstawy ochrony środowiska, PWN, Warszawa, 1985. S.F. Zakrzewski, Podstawy toksykologii środowiska, Wydawnictwo naukowe PWN B. Dobrzański, S. Zawadzki; Gleboznawstwo, Państwowe Wydawnictwo Rolnicze i Leśne U. Pokojńska "Przewodnik metodyczny do analizy wód" Wydawnictwo UMK w Toruniu, Toruń 1999 W. Szczepaniak "Metody instrumentalne w analizie chemicznej" PWN 2005 B. Gomołka, E. Gomołka., "Ćwiczenia laboratoryjne z chemii wody" Wydawnictwo Politechniki Wrocławskiej, Wrocław 1992 I. Hermanowicz, K. Dojlido, "Fizyczno-chemiczne badanie wody i ścieków", Wyd. Arkady, Warszawa 1999 W. Łoginow, W. Cwojdzinski, J. Andrzejewski, Chemia rolna przewodnik do ćwiczeń dla studentów wydziału rolniczego i zootechnicznego, Akademia Techniczno-Rolnicza im. Jana i Jędrzeja Śniadeckich, Bydgoszcz 1996 L. Wachowski, P. Kirszenstejn; Ćwiczenia z Podstaw Chemii Środowiska, Uniwersytet im. Adama Mickiewicza w Poznaniu, Poznań 1999
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Example issues/ example questions/ tasks being completed	1. Soil consists of (multiple choice test): a) about 45% organic fraction, about 25% air, about 25% water and 5% mineral fraction b) about 45% mineral fraction, about 25% air, about 25% water and 5% organic matter c) fulvic acids, humic acids and humins are counted among the humus compounds found in the soil organic fraction. d) the mineral fraction includes clay minerals such as kaolinite, montmorillonite, illite, among others. 2) Name two types of smog and explain how they differ, under what conditions they occur. 3. Two chemicals are given: A with $\log P=7$ and B with $\log P=0.5$. Please choose the correct answers (multiple choice test): (a) A is a more lipophilic compound (b) B is more lipophilic (c) B is a more hydrophilic compound (d) B chemical can be assumed to exist mainly in an aqueous environment with very poor sorption or bioaccumulation potential	
Work placement	Not applicable	

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