University of Gdańsk

Subject card

Subject name and code	Hydrochemistry - lecture, PG_00199793		
Field of study	Oceanography		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	Bachelor's 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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	3.0
Learning profile	academic	Assessment form	exam
Conducting unit	Laboratory of the Biogeochemical Cycle of Elements -> Department of Chemical Oceanography and Marine Geology -> Faculty of Oceanography and Geography -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Aleksandra Brodecka-Goluch	
	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	2.0	43.0	75

Subject objectives

Presentation of basic concepts and terms in the field of hydrochemistry. Providing the ability to classify water based on chemical indicators of water quality. Presentation of occupational safety rules and basic practical skills of working in a water sample analysis laboratory. Presentation of basic analytical techniques (weighing, titration, potentiometric, spectrophotometric) and research tools used in hydrochemistry. Implementation of the rules for the correctness of chemical conversions and the rules for obtaining and recording the measurement result. Providing the ability to classify water based on chemical indicators of water quality.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[OCEANL3-U03] is able to process, describe, and present results, and draw conclusions	Is able to synthetically discuss the results of research and analysis of the physical and chemical properties of water and draw correct conclusions based on them.	[SU4] test/exam - oral or written
[OCEANL3-W01] has an advanced knowledge and understanding of the terminology used in oceanography and related exact and natural sciences (in Polish and a selected foreign language)	Knows the terminology appropriate in the sciences and natural sciences to an advanced degree (in Polish and English), with special emphasis put to phenomena and processes occurring in the aquatic environment.	[SW4] test/exam - oral or written

Subject contents	Topics of the lectures: 1. Units of measurement used in hydrochemistry, unit analysis, precision and accuracy, significant and certain figures; 2. Hydrogen and oxygen. Water and its structure and physical properties; 3. Collection programs, methods of collecting and testing the chemical composition of water samples; 4. Physical and chemical properties of water, physical and chemical indicators of water quality, ion balance; 5. Methods of presenting the chemical composition of water and hydrochemical classifications of water; 6. Inorganic substances in natural waters and their transformations. 7. Biogeochemical cycles of nitrogen, phosphorus, silicon and selected metals, e.g. Fe (forms of occurrence and processes occurring in the atmosphere, biosphere, sea water and sediments; influence of oxygen conditions on the course of cycles; changes in the cycling of elements caused by human activity); 8. Organic substances in natural waters; 9. Methods of assessing the trophic state of waters. 10. Carbonate balance, alkalinity. 11. Natural waters vs. processed waters.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written and oral exam with open questions	51.0%	30.0%
Written test exam	51.0%	40.0%
Written exam with calculation part	51.0%	30.0%

Recommended reading

Basic literature

- Dojlido J., 1995, Chemia wód powierzchniowych, Wyd. Ekonomia i środowisko, Białystok, 342 (in Polish)
- Korzeniewski K., 1986, Hydrochemia, WSP Słupsk, 225 (in Polish)
- Macioszczyk A., 1987, Hydrogeochemia, Wyd. Geologiczne, Warszawa, 475 (in Polish)

Supplementary literature

- Kajak Z., 1998, Hydrobiologia Limnologia, PWN, Warszawa, 336. (in Polish)
- Namieśnik J., Łukasiak J., Jamrógiewicz Z., 1995, Pobieranie próbek środowiskowych do analiz, PWN Warszawa, 280. (in Polish)
- Pazdro Z., Kozerski B., 1990, Hydrogeologia, Wyd. Geologiczne, Warszawa, 624. (in Polish)
- Books on analytical chemistry, e.g.: Kocjan R., 2002, Chemia analityczna t. II, PZWL; Minczenko J., Marczenko Z., 2011, Chemia analityczna. Chemiczne metody analizy ilościowej, T. 2, Wydawnictwo Naukowe PWN
- Brodecka-Goluch A. (red.), 2023, Fizykochemiczne badania wód naturalnych, Wyd. Uniwersytetu Gdańskiego, Gdańsk, 170 (in Polish)

eResources addresses

Example issues/ example questions/ tasks being completed

1. Give the structure of a water molecule and describe what physicochemical properties of water determine that living organisms can easily function in it.2. For what purposes are water samples taken for analysis, what rules should be followed when taking water samples and what should you pay attention to when taking them.3. Give examples of devices used to collect water samples for physicochemical analyzes from seas, lakes and rivers.4. What basic physicochemical parameters are most often measured/tested as part of standard monitoring programs.5. Discuss how water samples should be collected and preserved for analysis of nutrients, dissolved oxygen and pH.6. Provide examples of graphical representations of the chemical composition of natural waters.7. What is ion balance and what is it used for?8. Given the concentrations of the main ions in the selected water sample, classify this water, e.g. based on the Alekin classification.9.. Give examples of inorganic and organic substances found in natural waters. Which substances, depending on physicochemical conditions, can have a very harmful effect on living organisms?10. Discuss the nitrogen/ phosphorus/carbon biogeochemical cycle. How do oxygen conditions affect the course of these cycles?11. What determines the rate of inflow of organic matter to sediments in water reservoirs and what influences the rate of degradation of organic matter in water reservoirs?12. Discuss how pH affects carbonate balance. 13. What affects the alkalinity of water in a water reservoir.

Work placement	Not applicable