

Subject card

Subject name and code	Chemical Oceanography - lecture, PG_00205306						
Field of study	Oceanography						
Date of commencement of studies	October 2026	Academic year of realisation of subject			2027/2028		
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	2	Language of instruction			Polish		
Semester of study	3	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 hab. Katarzyna Łukawska-Matuszewska				
	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	To learn and understand the chemical processes occurring in the ocean in the context of the global circulation of water masses. To acquire knowledge of the exchange of substances of chemicals through the interfacial layers: the sea and the atmosphere, and overlying water and sediments, as well as between the land and the coastal zone. To learn about the interrelationships between physical, biological and chemical processes in the sea. To learn about the biogeochemical circulation of elements in the marine environment.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[OCEANL3-U01] is able to use the current scientific terminology in the field of oceanography in various forms of expression		Is able to use the scientific terminology in the field of chemical oceanography		[SU4] test/exam - oral or written		
	[OCEANL3-W03] has an advanced understanding of the relationships between living and non-living components of aquatic environments, and is aware of the complex nature, intricacy, and natural variability of these environments		Knows and understands the relationship between the various components of the marine environment, is aware of its complex nature and natural variability		[SW4] test/exam - oral or written		
	[OCEANL3-W04] has an advanced understanding of issues and research problems in oceanography, and recognizes their connection with other scientific disciplines		Knows the research problems in the field of chemical oceanography and is aware of their interrelationships with other disciplines of science		[SW4] test/exam - oral or written		

Subject contents	<ul style="list-style-type: none"> • Chemical composition of seawater, salinity, properties determining physical, biological and chemical processes. • Sources of elements and chemical compounds in the sea, division of elements in seawater, ionic equilibrium. • Division of ocean waters determined by chemistry and density stratification taking into account illumination (euphotic and aphotic layer), distance from land (estuaries, bays, open waters), salinity (brackish and saline waters). • Gases in seawater (oxygen, nitrogen, carbon dioxide, ammonia, nitrogen oxides, gaseous sulfur compounds). Solubility processes, diffusion in seawater and at the water-air interface. Physical and chemical aspects of the interaction between the sea and the atmosphere. The role of the sea surface microlayer in mass exchange processes. Regional and seasonal variability of fluxes of chemical emissions and immissions. • Carbonate equilibrium, seawater alkalinity, seawater pH. • Biogeochemical cycles of elements (e.g., oxygen, carbon, nitrogen, phosphorus, silicon, sulfur and selected metals, e.g., Fe, Hg), forms of occurrence and processes in the atmosphere, biosphere, seawater, sediments). Effect of oxygen conditions on the course of cycles. Changes in the cycling of elements in the sea caused by human activity. Organic matter (dissolved, suspended and volatile) chemical composition, formation, oxidation - the importance of assimilation and destruction processes in seasonal and diurnal cycles occurring with the participation of microorganisms. • The most important environmental problems in the Baltic Sea: eutrophication; pollution; water exchange with the North Sea; thermal-salinity stratification conditioning vertical exchange and diffusion of elements and chemical compounds. 								
Prerequisites and co-requisites									
Assessment methods and criteria	<table border="1" data-bbox="448 669 1487 741"> <thead> <tr> <th data-bbox="448 669 794 703">Subject passing criteria</th> <th data-bbox="794 669 1141 703">Passing threshold</th> <th data-bbox="1141 669 1487 703">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 703 794 741">Exam</td> <td data-bbox="794 703 1141 741">51.0%</td> <td data-bbox="1141 703 1487 741">100.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Exam	51.0%	100.0%
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Exam	51.0%	100.0%							
Recommended reading	Basic literature	<p>Millero F.J., 2002. Chemical Oceanography 2nd ed. CRC Press, Boca Raton, Boston, London, New York, Washington, DC, 490.</p> <p>Korzeniewski K., 1995, Podstawy oceanografii chemicznej, Wyd. UG, Gdańsk (in Polish)</p> <p>Falkowska L., Bolałek J., Łysiak-Pastuszek E., 1999, Analiza chemiczna wody morskiej, cz. 2., Wyd.UG, Gdansk (in Polish)</p> <p>Bolałek J., Falkowska L., 1999, Analiza chemiczna wody morskiej, cz. 1., Wyd. UG, Gdańsk (in Polish)</p> <p>Korzeniewski K., 1995, Podstawy oceanografii chemicznej, Wyd. UG, Gdańsk (in Polish)</p> <p>Horne R.A., 1969, Marine chemistry, Wiley, New York</p> <p>Riley J.P., Chester R., 1971, Introduction to marine chemistry, Academic Press, London</p> <p>Riley J.P., Skirrow G., 1975, Chemical oceanography, Wyd. Academic Press, London</p> <p>Millero F.J., 2002. Chemical Oceanography 2nd ed. CRC Press, Boca Raton, Boston, London, New York, Washington, DC, 490.</p> <p>Loon G.W., Duffy S.J., 2008, Chemia środowiska, PWN, Warszawa (in Polish)</p>							
	Supplementary literature	<p>Korzeniewski K., 1986, Hydrochemia, WSP, Stupsk, Skrypty i Monografie (in Polish)</p> <p>Stumm W., Morgan J.J., 1981, Aquatic chemistry, Wiley, New York</p> <p>Sienko M.J., Plane R.A., 1980, Chemia. Podstawy i własności, Wyd. PWN, Warszawa (in Polish)</p>							
	eResources addresses								
Example issues/ example questions/ tasks being completed									
Work placement	Not applicable								

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