University of Gdańsk

Subject card

Subject name and code	Marine and Atmospheric Chemistry - laboratory, PG_00206137						
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			
Mode of study	full-time studies		Mode of delivery	at the university			
Year of study	2		Language of instruction	Polish			
Semester of study	4		ECTS credits	4.0			
Learning profile	academic		Assessment form	credit			
Conducting unit	Laboratory of Toxic Substances Transformation -> Department of Chemical Oceanography and Marine Geology -> Faculty of Oceanography and Geography -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Magdalena Bełdowska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	45.0	0.0	0.0	45
	E-learning hours included: 0.0						
	Additional information: Laboratory exercises with elements of a conversation class,						
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	45		3.0	52.0	100	
Subject objectives	Familiarization with the procedure before collecting samples of seawater, aerosols and precipitation and before chemical analysis of basic ionic components, carbon compounds and metals at trace levels. Familiarization with methods of collecting samples of microlayers, aerosols, gases and atmospheric precipitation. Introduction to chemical analysis of the sea surface microlayer, aerosols, gases and atmospheric precipitation.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[OCEANL3-K01] is willing to plan and implement, individually or as a team, the subsequent stages of the entrusted task, is willing to take responsibility for the results of these works, effectively cooperates in the team and performs various roles in it	Is ready individually or in a team to use the acquired knowledge in planning and designing activities related to the collection, storage and chemical analysis of seawater and air samples, is ready to cooperate effectively in a team when preparing a debate on climate change.	[SK1] oral statement/conversation/ discussion [SK6] demonstration of practical skills
[OCEANL3-U02] is able to independently and collaboratively conduct observations and perform measurements in the field or laboratory using appropriately selected techniques, tailored to the research problem	Is able to individually and collectively collect water samples (incl microlayers), aerosols, gases and atmospheric precipitation and prepare them for the analysis of ionic components, carbon compounds and trace substances	[SU6] demonstration of practical skills [SU8] observation of student's independent or team work
[OCEANL3-W05] has an advanced knowledge of techniques, research methods, and tools (mathematical, statistical, and computational) used by oceanographers to describe and interpret processes and phenomena occurring in the marine environment	knows at an advanced level the basic techniques of collecting water samples (including microlayers) and aerosols, gases and atmospheric precipitation, with particular emphasis on trace elements, ionic components and carbon compounds. Understands how appropriate tools (including meteorological data) are used to describe and interpret phenomena and processes occurring in seawater and the atmosphere	[SW4] test/exam - oral or written [SW5] implementation of a problem task
[OCEANL3-U03] is able to process, describe, and present results, and draw conclusions	Is able to interpret the results of chemical and additional analyses parameters using source information in Polish and English and is able to formulate conclusions based on them	[SU2] presentation/project/paper/ report
[OCEANL3-K06] is willing to use the acquired knowledge in planning and designing professional activities as well as thinking and acting in an entrepreneurial way, also in the field of social activities undertaken	Is ready to use the acquired knowledge in planning and designing professional activities related to the collection, storage and chemical analysis of sea water and air samples, also in the field of social activities undertaken	[SK6] demonstration of practical skills [SK8] observation of student's independent or team work
[OCEANL3-U05] is able to use general-purpose and specialized software, as well as mathematical and statistical methods, in data analysis and the presentation of results	Is able to use specialized and utility software and mathematical and statistical methods in data analysis and in the presentation of results describing phenomena and processes occurring in the marine environment and atmosphere	[SU2] presentation/project/paper/ report

Subject contents

1. Discussion of methods for collecting samples of the sea surface microlayer, aerosols, gases and atmospheric precipitation (Garetto nett, glass plate, Teflon plate, filter packages, denuders, PMx collectors, on-line analyzers, precipitation collectors);
2. Discussion of errors made when collecting, storing and preparing samples (including a blank sample) for chemical analysis of trace elements in sea water and air as well as basic components of aerosols and atmospheric precipitation. The influence of interfering substances on the final result of the analysis of trace elements in seawater and air;
3. Review of methods used to analyze the chemical composition of aerosols and atmospheric precipitation. Introduction to ion exchange chromatography. Discussion of the thermo-optical method for determining organic and elemental carbon in sea surface and atmospheric microlayer samples;
4. Statistical analysis of the results of chemical and meteorological parameters (basic estimators, development of air mass movement trajectories according to the NOAA model, wind direction roses, determination of the load of selected chemical compounds into water and emission streams of elements from water to air).
5. Presentation of a selected problem in the field of marine and atmospheric chemistry based on Polish and English-language scientific publications and Internet sources or Writing a scientific abstract based on English-language literature from Internet sources or Oxford debate on a selected topic in the field of marine and atmospheric chemistry.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
project/abstract/debate/film production	51.0%	30.0%
reports/presentation of own results	51.0%	30.0%
entrance tests	51.0%	30.0%
assessment of work in classes	51.0%	10.0%

Recommended reading	Basic literature	• Falkowska L., 1996, Sea surface microlayer: properties and processes. University of Gdańsk Publishing House, Gdańsk -183; • Falkowska L., A. Lewandowska, Aerosols and gases in the atmosphere - global changes, 2009. Publishing House of the University of Gdańsk, Gdańsk, - 505; • Lewandowska A., L. Falkowska, 2009, Aerosols and gases in the atmosphere, methodological guide for exercises. University of Gdańsk Publishing House, Gdańsk, -258; • Stepnowski P., Synak E., Szafranek B., Kaczyński Z., 2010, Monitoring and analysis of environmental pollution, University of Gdańsk Publishing House, ISBN 978-83- 7326-712-1, -283
	Supplementary literature	• Juda-Rezler K., 2006, Oddziaływanie zanieczyszczeń powietrza na środowisko, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa; • Sainfeld J.H., Pandis S.N., 2016, Atmospheric Chemistry and Physics: From Air Pollution to Climate Change, 3rd Edition. John Wiley & Sons, Inc., New York, Chichester, Weinheim, Brisbane, Singapore, Toronto, -1152.; • Baltic Sea Environment Proceedings No 120B, 2010, Hazardous substances in the Baltic Sea, Helsinki Commission
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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