

Subject card

Subject name and code	Metals in the marine environment, PG_00121047						
Field of study	Oceanography						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2026/2027		
Education level	Master'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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		2.0		
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 Beldowska				
	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		7.0		25.0	62
Subject objectives	Learning about the circulation of metals in the marine environment, with particular emphasis on re-emission and remobilisation.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[OCEANMU2-W05] knows and understands the principles of planning and conducting field and laboratory research as well as advanced methods and tools of scientific research, especially in the field of the studied specialty		can explain the need for carry out research on the circulation of metals in the marine environment marine environment		[SW4] test/exam - oral or written		
	[OCEANMU2-W02] knows and understands complex processes and phenomena occurring in the marine environment, with particular emphasis on the coastal zone, as well as complex relationships between living and non-living elements of the aquatic environment		can explain the causes and effects of changes in the concentration of metals in different elements of the marine environment marine environment		[SW4] test/exam - oral or written		

Subject contents	1. Characteristics of metals (including toxicity), their sources and uses; 2. Metals in the atmosphere; 3. Metals in seawater; 4. Metals in marine organisms (including bioconcentration, bioaccumulation, biomagnification); 5. Metals in marine sediments; 6. Metals input to the sea (including remobilisation from land); 7. Impact of climate change on the environmental cycling of metals.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	written/oral exam	51.0%	100.0%
Recommended reading	Basic literature	Piotr Szefer, Metals, metalloids, and radionuclides in the Baltic Sea ecosystem, 2002 Elsevier Alina Kabata-Pendias, Arun B. Mukherjee. Trace Elements from Soil to Human, 2007 Springer	
	Supplementary literature	the latest scientific publications from renowned journals	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Describe how and why the concentration of metals in the water column changes using the Baltic Sea as an example. 2. List the biotic/abiotic factors affecting the bioaccumulation of metals in marine organisms. Describe the influence of several factors. 3. What parameters should be measured when studying changes in lead concentration in bottom sediments. Discuss briefly the influence of five of these. 4. What factors need to be taken into account when estimating metal inputs to the sea. 5. How does climate change affect the circulation of metals in the marine environment		
Work placement	Not applicable		

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