University of Gdańsk

Subject card

Subject name and code	Metals in the Marine Environment - lecture, PG_00205019		
Field of study	Oceanography		
Date of commencement of studies	October 2027	Academic year of realisation of subject	2028/2029
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 Bełdowska	
	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	18.0	50

Subject objectives

To introduce the circulation of metals in the marine environment, with particular emphasis on re-emission and remobilisation. Presentation of the toxicity of metals in the marine environment.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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	In details can explain the causes and effects of changes in metal concentrations in various elements of the marine environment	[SW4] test/exam - oral or written
[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	In an advanced manner can explain the necessity of research on the circulation of metals in the marine environment	[SW4] test/exam - oral or written

<table>
<tr><td>Subject contents</td><td>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 inputs to the sea (including remobilisation from land).
7. Impact of climate change on the cycling of metals in the environment</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>written/oral examination</td><td>51.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>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</td></tr><tr><td>Supplementary literature</td><td>the latest scientific publications from renowned journals</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>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.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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