University of Gdańsk

Subject card

Subject name and code	Mineral Resources of Seas and Oceans - lecture, PG_00205338		
Field of study	Oceanography		
Date of commencement of studies	October 2027	Academic year of realisation of subject	2029/2030
Education level	Bachelor'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	3	Language of instruction	Polish
Semester of study	5	ECTS credits	2.0
Learning profile	academic	Assessment form	credit
Conducting unit	Laboratory of Marine Geology -> Department of Chemical Oceanography and Marine Geology -> Faculty of Oceanography and Geography -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Ewa Szymczak	
	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

The aim of the course is to introduce students to the geological conditions governing the formation and occurrence of mineral resources in seas and oceans, as well as their global distribution. The course covers the main types of marine mineral resources (energy, metallic, chemical, and construction minerals), their genesis, resources, and economic significance. Students will become familiar with methods of ocean floor and mineral deposit exploration, the legal framework governing their prospecting and exploitation, as well as the environmental impacts of resource extraction from the seabed. Particular attention is given to current trends in the development of marine mineral resources and future prospects for their utilization.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[OCEANL3-W08] knows and understands concepts and principles related to industrial property protection, copyright law, and social responsibility, and is aware of the limitations arising from copyright protection	explains the legal basis for the exploitation of ocean minerals and the activities of the International Seabed Authority	[SW4] test/exam - oral or written
[OCEANL3-U01] is able to use the current scientific terminology in the field of oceanography in various forms of expression	uses scientific terminology related to marine mineral resources, their genesis and classification, in various forms of communication	[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)	defines and correctly uses terminology related to marine mineral resources, their genesis, and classification	[SW4] test/exam - oral or written
[OCEANL3-W02] has a broad knowledge and understanding of physical, biological, chemical, and geological processes and phenomena occurring in aquatic environments, with particular emphasis on the marine environment	identifies and interprets geological, chemical, biological, and physical processes occurring in the marine environment and explains their significance for the formation and distribution of mineral deposits	[SW4] test/exam - oral or written
[OCEANL3-W06] has an advanced understanding of the principles of managing the marine environment and its resources, as well as the consequences of disrupting the balance of marine ecosystems	characterizes the principles of marine environmental management and resource use, and analyzes the impacts and consequences of mineral resource extraction on the functioning of marine ecosystems	[SW4] test/exam - oral or written

Subject contents

1. Methods of ocean floor and mineral deposit exploration.
2. Legal framework for the prospecting and exploitation of marine mineral resources.
3. Genesis of marine and oceanic mineral deposits.
4. Distribution and resources of polymetallic deposits.
5. Distribution and resources of energy mineral deposits.
6. Distribution and resources of chemical mineral deposits.
7. Occurrence and exploitation of gemstones in the marine environment.
8. Distribution and resources of construction mineral deposits.
9. Prospects for the development of marine mineral resources.
10. Exploitation of seabed mineral resources and its impact on the natural environment.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test	51.0%	100.0%

Recommended reading	Basic literature	Depowski S., Kotliński R., Rühle E., Szamałek K., 1998.*Mineral resources of the seas and oceans*, Wyd. Naukowe Scholar, Warszawa. Guo, X., Fan, N., Liu, Y. et al., 2023. Deep seabed mining: Frontiers in engineering geology and environment. *Int J Coal Sci Technol* 10, 23. https://doi.org/10.1007/s40789-023-00580-x Gurvich Evgeny G., 2006. *Metalliferous Sediments of the World Ocean*, Springer Kotliński R., Mucha J., Wasilewska M., 2008. Problems of resource estimation of polymetallic nodule deposits in the Pacific. *Gospodarka surowcami mineralnymi*, 24 (2/4) Lamjahao S., Parthasarathi C., 2024. Comparing deep-sea polymetallic nodule mining technologies and evaluating their probable impacts on deep-sea pollution, *Marine Pollution Bulletin*, Volume 206, https://doi.org/10.1016/j.marpolbul.2024.116762 Sharma R., (ed.) 2018, *Deep-Sea Mining Resource Potential, Technical and Environmental Considerations*, Springer *Marine Resources - Opportunities and Risks.* World Ocean Review 3. 2014. Mizerski W., Szamałek K., 2009. *Geology and Mineral Resources of the Oceans*, Wyd. Naukowe PWN, Warszawa
	Supplementary literature	Kotliński R., 1999. Metallogenesis of the worlds ocean against the background of ocean crust evolution. *Polish Geological Institute Special Papers*, 4: 170 Max Michael D., Johnson Arthur H., Dillon William P., 2006. *Economic Geology of Natural Gas Hydrate*, Springer Mucha J. Kotliński R., Wasilewska-Błaszczyk M., 2011. Methodology for estimating resource parameters of polymetallic nodule deposits in the Pacific Interoceanmetal area. *Zeszyty Naukowe Instytutu Gospodarki Surowcami Mineralnymi i Energią Polskiej Akademii Nauk*, 81 Piestrzyński A., 2011. Ocean Mineral Resources, *Mining and Geoengineering*, 35 (4/1)
	eResources addresses	
Example issues/ example questions/ tasks being completed	Name the polimetallic minerals found on the ocean floor Describe the effects of oil exploitation in the marine environment	
Work placement	Not applicable	

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