University of Gdańsk

Subject card

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| Subject name and code | Mineral Resources of Seas and Oceans - lecture, PG_00201160 | | |
| Field of study | Marine Hydrography | | |
| Date of commencement of studies | October 2026 | Academic year of realisation of subject | 2029/2030 |
| 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 | 4 | Language of instruction | Polish |
| Semester of study | 7 | ECTS credits | 2.0 |
| Learning profile | practical | 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 | 1.0 | 19.0 | 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. |
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## Learning outcomes

| Course outcome | Subject outcome | Method of verification |
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| [HML3-W04] knows and understands, at an advanced level, the issue of measurements related to the exploration of sea basins and inland waters and tools allowing to describe, interpret and present the results of measurements | characterizes methods of ocean floor and mineral deposit exploration and explains their application in resource identification and assessment | [SW4] test/exam - oral or written<br>[SW1] oral statement/ conversation/discussion |
| [HML3-W02] knows and understands, at an advanced level, selected phenomena and processes occurring in the hydrosphere, atmosphere, lithosphere and biosphere, their interconnections and relations, as well as practical applications of this knowledge in professional activities related to the field of study | identifies and characterizes areas of occurrence of mineral deposits in the marine environment and explains their genesis in the context of geological processes | [SW1] oral statement/ conversation/discussion<br>[SW3] text preparation/written work |
| [HML3-U14] is able to use the applicable terminology in presenting and discussing problems related to the field of study | uses terminology in the field of marine mineral deposit geology when presenting and discussing issues related to their genesis, occurrence, and exploitation | [SU1] oral statement/conversation/ discussion<br>[SU4] test/exam - oral or written |
| [HML3-U16] is able to prepare in Polish and foreign language a study of a problem in the field of study with documented conclusions, supported by a report and a multimedia presentation | is able to present, based on literature sources, selected issues related to the occurrence, exploitation, or environmental impacts of mineral resources in the marine environment | [SU1] oral statement/conversation/ discussion<br>[SU4] test/exam - oral or written |
| [HML3-U08] is able to independently use the professional literature available in traditional and electronic form, make an assessment, critical analysis and synthesis as well as the correct interpretation of the information obtained | analyzes and synthesizes information from scientific literature and presents selected issues related to the occurrence, exploitation, and environmental impacts of mineral resources in the marine environment | [SU1] oral statement/conversation/ discussion<br>[SU4] test/exam - oral or written |
| [HML3-W13] knows and understands global environmental problems resulting from the development of civilisation, in particular strong anthropopressure in the coastal regions of seas and oceans | explains the legal framework for the development and use of mineral deposits and analyzes the environmental impacts of their exploitation, with particular emphasis on marine areas | [SW4] test/exam - oral or written<br>[SW1] oral statement/ conversation/discussion |

## 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 |
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| written assessment | 51.0% | 100.0% |

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| Recommended reading | Basic literature | Depowski S., Kotliński R., Rühle E., Szamałek K., 1998.*Mineral resources of the seas and oceans*, Wyd. Naukowe Scholar, Warszawa.<br><br>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<br><br>Gurvich Evgeny G., 2006. *Metalliferous Sediments of the World Ocean*, Springer<br><br>Kotliński R., Mucha J., Wasilewska M., 2008. Problems of resource estimation of polymetallic nodule deposits in the Pacific. *Gospodarka surowcami mineralnymi*, 24 (2/4)<br><br>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<br><br>Sharma R., (ed.) 2018, *Deep-Sea Mining Resource Potential, Technical and Environmental Considerations*, Springer<br><br>*Marine Resources - Opportunities and Risks.* World Ocean Review 3. 2014.<br><br>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<br><br>Max Michael D., Johnson Arthur H., Dillon William P., 2006. *Economic Geology of Natural Gas Hydrate*, Springer<br><br>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<br><br>Piestrzyński A., 2011. Ocean Mineral Resources, *Mining and Geoengineering*, 35 (4/1) |
| | eResources addresses | Basic<br>https://isa.org.jm/publications/ - International Seabed Authority publications |
| Example issues/ example questions/ tasks being completed | Name the polimetallic minerals found on the ocean floor<br><br>Describe the effects of oil exploitation in the marine environment | |
| Work placement | Not applicable | |

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