

**Subject card**

|  |   |  |                 |                                     |  |            |     |
|--|---|--|-----------------|-------------------------------------|--|------------|-----|
| <b>Subject name and code</b>                       | Introduction to Marine Acoustics - lecture, PG_00205340   |  |                 |                                     |  |            |     |
| <b>Field of study</b>                              | Oceanography  |  |                 |                                     |  |            |     |
| <b>Date of commencement of studies</b>             | October 2026  | <b>Academic year of realisation of subject</b>           |                 |                                     | 2028/2029  |            |     |
| <b>Education level</b>                             | Bachelor's studies  | <b>Subject group</b>                                     |                 |                                     | Obligatory subject group in the field of study<br>Optional subject group<br>Subject group related to scientific research in the field of study |            |     |
| <b>Mode of study</b>                               | full-time studies   | <b>Mode of delivery</b>                                  |                 |                                     | at the university  |            |     |
| <b>Year of study</b>                               | 3   | <b>Language of instruction</b>                           |                 |                                     | Polish   |            |     |
| <b>Semester of study</b>                           | 5   | <b>ECTS credits</b>                                      |                 |                                     | 2.0  |            |     |
| <b>Learning profile</b>                            | academic  | <b>Assessment form</b>                                   |                 |                                     | credit   |            |     |
| <b>Conducting unit</b>                             | Department of Physical Oceanography and Climate Research -> Faculty of Oceanography and Geography -> Rector                                   |  |                 |                                     |  |            |     |
| <b>Name and surname of lecturer (lecturers)</b>    | <b>Subject supervisor</b>   |  | dr Jakub Idczak |                                     |  |            |     |
|  | Teachers  |  |                 |                                     |  |            |     |
| <b>Lesson types</b>                                | <b>Lesson type</b>  | Lecture  | Tutorial        | Laboratory                          | Project  | Seminar    | SUM |
|  | Number of study hours   | 25.0   | 0.0             | 0.0                                 | 0.0  | 0.0        | 25  |
|  | E-learning hours included: 0.0  |  |                 |                                     |  |            |     |
| <b>Learning activity and number of study hours</b> | <b>Learning activity</b>  | Participation in didactic classes included in study plan |                 | Participation in consultation hours |  | Self-study | SUM |
|  | Number of study hours   | 25   |                 | 2.0                                 |  | 23.0       | 50  |
| <b>Subject objectives</b>                          | To familiarize students with the basic phenomena relating to the propagation of acoustic waves in the sea and their generation and reception. |  |                 |                                     |  |            |     |

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|--|--|--|-----------------------------------|
| Learning outcomes  | Course outcome   | Subject outcome  | Method of verification            |
|  | [OCEANL3-U01] is able to use the current scientific terminology in the field of oceanography in various forms of expression  | Is able to correctly use current scientific terminology in various forms of expression in the field of marine acoustics  | [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)   | Has an advanced knowledge and understanding of the terminology used in hydroacoustics  | [SW4] test/exam - oral or written |
|  | [OCEANL3-W04] has an advanced understanding of issues and research problems in oceanography, and recognizes their connection with other scientific disciplines   | Knows and understands the most important research problems in the field of marine acoustics and their connections with other fields of oceanography  | [SW4] test/exam - oral or written |
|  | [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 and understands the importance of innovative remote hydroacoustic techniques used in interdisciplinary research and monitoring of the marine environment   | [SW4] test/exam - oral or written |
| [OCEANL3-U04] is able to independently search for information in Polish and foreign specialist literature, as well as on the Internet and in databases | Is able to independently search for information on marine acoustics in Polish and English specialist literature, as well as on the Internet and databases  | [SU4] test/exam - oral or written  |                                   |
| Subject contents   | 1 Acoustic wave: definition, parameters characterizing an acoustic wave (spatial and temporal changes). 2 Acoustic wave propagation: geometric propagation (traveling waves: plane, cylindrical, spherical waves), sound absorption in sea water. 3 Wave phenomena: wave interference phenomenon, reflection and transmission of waves at the boundary of two media, refraction of acoustic waves, scattering of acoustic waves. 4 Acoustic transducers. 5 Principle of operation of selected acoustic devices and their application (single- and multi-beam echosounder, ADCP). 6 Acoustic data processing. 7 Selected applications of acoustic methods for studying marine ecosystems. |  |                                   |
| Prerequisites and co-requisites  |  |  |                                   |
| Assessment methods and criteria  | Subject passing criteria   | Passing threshold  | Percentage of the final grade     |
|  | exam   | 51.0%  | 100.0%                            |
| Recommended reading  | Basic literature   | 1. Clay C. S. and Medwin H., 1977. Acoustical Oceanography: Principles and Applications. Wiley, New York, 544.<br>2. Medwin H. and Clay C. S., 1998. Fundamentals of Acoustical Oceanography. Academic Press, Boston, 712.<br>3. Medwin H., 2005. Sounds in the Sea. From Ocean Acoustics to Acoustical Oceanography. Cambridge University Press, New York, 643.<br>4. Śliwiński A., 2001. Ultradźwięki i ich zastosowania. Wyd. Nauk.-Tech., Warszawa (in Polish) |                                   |
|  | Supplementary literature   | 1. Tolstoy I., Clay C. S., 1966. Ocean acoustics: Theory and experiments in underwater sound. McGraw-Hill.<br>2. MacLennan D. N., Simmonds E. John, 2005. Fishery Acoustics. Blackwell Science   |                                   |
|  | eResources addresses   |  |                                   |
| Example issues/<br>example questions/<br>tasks being completed   |  |  |                                   |
| Work placement   | Not applicable   |  |                                   |

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