

Subject card

Subject name and code	Non-invasive methods of seabed surveys - exercises, PG_00091123						
Field of study	Geology						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2027/2028		
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	3		Language of instruction		Polish		
Semester of study	6		ECTS credits		2.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Department of Geophysics -> Faculty of Oceanography and Geography -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Jarosław Tęgowski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	15.0	0.0	0.0	15
	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	15		15.0		20.0	50
Subject objectives	To learn and understand the mechanism of interaction of acoustic waves with the seabed and methods of investigating the seabed using hydroacoustic, laser, gravimetric and magnetometric equipment.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[GEOLL3_W02] knows and understands the terminology appropriate in science and natural sciences		knows and understands the terminology specific to non-invasive seabed surveying methods		[SW4] test/exam - oral or written		
	[GEOLL3_U06] is able to identify geological objects and combine them with geological processes and anthropogenic environmental transformations		can identify geological objects on the seabed and connect them to geological processes and anthropogenic environmental transformations		[SU4] test/exam - oral or written		
	[GEOLL3_W04] knows and understands phenomena and processes occurring in the past and today in the interior of the Earth and on its surface, defines the methods of how to study them		knows and understands the phenomena and processes occurring in the past and today on the seabed, defines the methods of their study		[SW4] test/exam - oral or written		
	[GEOLL3_W03] knows and identifies paleontological, mineralogical, petrographic and structural objects using appropriate methods		Knows and identifies structures in the structure of the seabed using appropriate methods		[SW4] test/exam - oral or written		
	[GEOLL3_U04] is able to use specialized computer software and mathematical and statistical methods in the analysis of geological data		is able to use dedicated computer software in the analysis of data obtained by non-invasive methods of seabed researchg		[SU4] test/exam - oral or written		

Subject contents	Geophysical properties of bottom sediments. Theoretical basis of acoustic wave propagation in the bottom. Sources and receivers of acoustic signals. Hydroacoustic equipment for bottom exploration. Introduction to acoustic signal processing. Acoustic classification of sediments. Non-invasive seabed survey techniques (gravimetry, magnetometry, 3D laser scanner, underwater photography). Organisation of non-invasive seabed surveys.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	colloquium	51.0%	100.0%
Recommended reading	Basic literature	Lurton X., 2002. An introduction to Underwater Acoustics. Principles and applications, Wyd. Springer Stepnowski, A., 2001. Systemy Akustycznego Monitoringu Środowiska Morskiego, GTN, Gdańsk Śliwiński A., 2001. Ultradźwięki i ich zastosowania, Wyd. Nauk.-Tech., Warszawa Tęgowski J., 2006. Akustyczna Klasyfikacja Osadów Denny, Wyd. Rozprawy i Monografie IO PAN Blondel P., 2009. The Handbook of Sidescan Sonar, Springer MacLennan D. N., Simmonds E. J., 2005. Fisheries Acoustics Theory and Practice, Blackwell Publishing Limited; 2 edition (September 1)	
	Supplementary literature	Medwin H., Clay C. S., 1998. Fundamentals of Acoustical Oceanography, Academic Press, Boston Medwin H., 2005. Sounds in the Sea. From Ocean Acoustics to Acoustical Oceanography, Cambridge University Press, New York Urlick R. J., 1975. Principles of underwater sound, McGraw-Hill	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Geophysical properties of bottom sediments. Theoretical basis of acoustic wave propagation in the bottom. Sources and receivers of acoustic signals. Hydroacoustic equipment for bottom exploration. Introduction to acoustic signal processing. Acoustic classification of sediments. Non-invasive seabed survey techniques (gravimetry, magnetometry, 3D laser scanner, underwater photography). Organisation of non-invasive seabed surveys.		
Work placement	Not applicable		

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