

Subject card

Subject name and code	Physical oceanography - laboratory exercises, PG_00159303						
Field of study	Oceanography						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2026/2027		
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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		3.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Department of Physical Oceanography and Climate Research -> Faculty of Oceanography and Geography -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Marek Kowalewski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	45.0	0.0	0.0	45
	E-learning hours included: 0.0						
	Additional information: In exceptional cases, one lecture may be held remotely (online).						
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	45		3.0		30.0	78
Subject objectives	To know and understand: • spatial and temporal variation of temperature, salinity and density of seawater and the processes that shape this variation • basic dynamic processes in the sea (forces acting on water masses in the sea, geostrophic currents, Ekman theory, mixing, wind waves) • fundamentals of marine acoustics (sound propagation and refraction in the sea; sound channel)						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[OCEANL3-K03] is ready to exercise caution and criticism in accepting information from scientific literature, the Internet and other media relating to natural sciences	Student is willing to exercise caution and criticism in accepting information from scientific literature, the Internet and other media relating to physical oceanography	[SK3] text preparation/written work
	OCEANL3-U01	Student is able to use current scientific terminology in presenting and discussing problems in physical oceanography	[SU4] test/exam - oral or written
	[OCEANL3-K04] is willing to constantly deepen knowledge in the field of oceanography and improve professional qualifications, supported by the knowledge of experts	Student is ready to continuously improve his/her knowledge of physical oceanography	[SK5] implementation of a problem task
	OCEANL3-W01	To an advanced degree, student knows and understands the basic terminology used in physical oceanography; knows and understands the basic research issues/problems in physical oceanography physical oceanography and the complexity of physical processes in the sea.	[SW3] text preparation/written work
	OCEANL3-U03	Student is able to develop, describe and report on the results of the analyses carried out during the exercises and formulate conclusions based on the results of these analyses.	[SU3] text preparation/written work
	OCEANL3-W03	Student knows and understands the basic issues/problems of research in physical oceanography: the relationships between the elements of the aquatic environment, is aware of the complex nature of aquatic environments, their complexity and natural variability	[SW5] implementation of a problem task
Subject contents	1. Visualization of oceanographic data (Ocean data Vlew program). 2. Spatial and temporal variability of salinity, temperature and density of seawater. Thermocline and halocline. 3. T-S diagrams. Water masses. 4. Vertical stability of water masses, Väisälä-Brunta parameter. 5. Mixing, differential diffusion of heat and salt, salt fingers. Turner's angle. 6. Sound propagation in the sea. Sound channel. Wind currents, Ekman theory, upwelling and downwelling. 7. Geostrophic currents. Dynamic method. 8. Wind waves.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	reports from exercises	51.0%	50.0%
	colloquium	51.0%	50.0%
Recommended reading	Basic literature	1. Talley i in., 1996, Descriptive Physical Oceanography. An Introduction, Elsevier, https://booksite.elsevier.com/DPO/. 2. Stewart, R.H., 2008, Introduction to physical oceanography; https://open.umn.edu/opentextbooks/textbooks/20. 3. Duxbury, A.B. Duxbury A.C., Sverdrup, K.A., 2002, Oceany świata, PWN, 636s.	
	Supplementary literature	1. Lisicki A., 1996, Pływy na morza i oceanach, GTN, 129s. 2. Mellor G., 1996, Introduction to physical oceanography, Am. Inst. Phys., 258s. 3. Massel S., 2010, Procesy hydrodynamiczne w ekosystemach morskich, Wyd. Univ. Gda., 495s.	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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