University of Gdańsk

Subject card

Subject name and code	Physical Oceanography - laboratory classes , PG_00201104		
Field of study	Marine Hydrography		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
Education level	Bachelor's studies	Subject group	Obligatory subject group in the field of study Subject group related to practical vocational preparation
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	practical	Assessment form	credit
Conducting unit	Laboratory of Physical Oceanography -> 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						

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	27.0	75

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
[HML3-U14] is able to use the applicable terminology in presenting and discussing problems related to the field of study	is able to use the applicable terminology in presenting and discussing problems in physical oceanography	[SU3] text preparation/written work
[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	is able to independently use the professional literature on physical oceanography available in traditional and electronic forms, evaluate, critically analyze and synthesize, and correctly interpret the acquired information	[SU5] implementation of a problem task
[HML3-K01] is ready to correctly identify and resolve professional dilemmas, especially in the aspects of security and entrusted property	is able to plan and complete tasks in a timely manner during individual and team work; is able to correctly identify and resolve dilemmas related to exercise performance	[SK5] implementation of a problem task
[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	knows and understands at an advanced level the methods, techniques and research tools used in the physical study of the seas and oceans	[SW5] implementation of a problem task

Subject contents

1. Visualization of oceanographic data (Ocean data VIew 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, Väisäla-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, colloquium	51.0%	100.0%

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

Using data from World Ocean Atlas 2018:

1. Prepare vertical graphs of temperature T(z) and salinity S(z) for three selected stations (A, B, C) located along a given longitude in a given season (or month). Label the profiles of individual stations with the letters: A, B and C.

2. Prepare contour maps of temperature T and salinity S at the sea surface (z = 0) in a given area in a given season (or month).

Work placement

Not applicable

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