University of Gdańsk

Subject card

Subject name and code	Principles of Marine Physics - laboratory classes , PG_00198826						
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	4		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 Jordan Badur				
	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		2.0	28.0	75	
Subject objectives	To acquire knowledge and understanding of the basic laws governing physical phenomena in the sea						

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 correctly use the relevant terminology when presenting and discussing issues in the physical sciences	[SU1] oral statement/conversation/ discussion
[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 professional literature on marine physics available in both print and electronic formats, and to evaluate, critically analyze, synthesize, and correctly interpret the information obtained	[SU1] oral statement/conversation/ discussion [SU3] text preparation/written work [SU5] implementation of a problem task
[HML3-U02] is able to select and apply basic research techniques and tools in the field of aquatic environment research, as well as plan and carry out measurements, develop the obtained results and interpret them correctly	is able to apply basic mathematical and statistical methods to analyze data and describe phenomena and processes occurring in the marine environment	[SU1] oral statement/conversation/ discussion [SU3] text preparation/written work [SU5] implementation of a problem task
[HML3-K02] is ready to correctly determine the priorities in professional work for the implementation of a task specified by himself/ herself or others	is ready to complete tasks on time, whether working individually or as part of a team	[SK3] text preparation/written work
[HML3-W03] knows and understands, at an advanced level, directions of development and the latest discoveries in the field of scientific disciplines forming the theoretical basis appropriate to the field of study	knows and understands, at an advanced level, the concepts and terminology used in the natural sciences, as well as concepts related to marine sciences, including the development of oceanographic research	[SW1] oral statement/ conversation/discussion [SW3] text preparation/written work [SW5] implementation of a problem task
[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	knows and understands, at an advanced level, the physical phenomena and natural processes occurring in aquatic environments, with a particular focus on the marine environment, as well as the practical applications of this knowledge	[SW1] oral statement/ conversation/discussion [SW3] text preparation/written work [SW5] implementation of a problem task
[HML3-W01] knows and understands, at an advanced level, selected facts, phenomena and processes, as well as methods and theories concerning them, explaining the complex relationships between them, constituting basic general knowledge in the field of scientific disciplines forming the theoretical foundations specific to the field of study	knows and understands selected facts, phenomena, and processes in physics, as well as the methods and theories that explain the complex relationships between them, which are essential for understanding the fundamental phenomena and processes occurring in aquatic environments	[SW1] oral statement/ conversation/discussion [SW3] text preparation/written work [SW5] implementation of a problem task

Subject contents

Radiation of the sun as a source of energy and its distribution on the earth (based on black body radiation laws). Molecular structure and physical properties of seawater. Elements of thermodynamics: the first low of thermodynamics, specific heat, adiabatic process, seawater equation of state. Forces acting in the ocean. Equilibrium and water movement - sea currents, wave and convection. Molecular and turbulent exchange of mass, heat and momentum. - transport equations. Acoustic waves in the sea. Elements of marine optics - optical properties of seawater and downward irradiance transport.

Prerequisites and co-requisites

Differential and integral calculus at elementary level

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
written tests	51.0%	50.0%
activity	0.0%	25.0%
short written tests	51.0%	25.0%

Recommended reading

Basic literature	Dera J.: Marine Physics. Wyd. PWN, Warszawa, 1983, 2003. Druet, Kowalik, 1970, Marine dynamics, Wyd. Morskie Gdańsk
Supplementary literature	Massel S.R., 2010. Hydrodynamical processes in marine ecosytems. Wyd. Uniwersytetu Gdańskiego.
eResources addresses	

Example issues/ example questions/ tasks being completed	Prove that Coriolis acceleration is perpendicular to the horizontal water current
Work placement	Not applicable

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