University of Gdańsk

Subject card

Subject name and code	Selected Topics in Sea Dynamics - lecture, PG_00201148		
Field of study	Marine Hydrography		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
Education level	Bachelor's studies	Subject group	Obligatory subject group in the field of study Optional subject group
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	5	ECTS credits	2.0
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 hab. Witold Cieślikiewicz	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	0.0	0.0	30

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	30	1.0	21.0	52

Subject objectives

To introduce students to the phenomena of sea waves, sea currents - an in-depth discussion of selected issues.To explain to students selected elements of marine dynamics in analytical terms.To prepare students for the practical application of basic issues related to modern marine dynamics.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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, at an advanced level, marine hydrodynamics and its mathematical description; its connection to the laws of physics and its relationship to natural processes; knows and understands the theoretical foundations of other scientific fields necessary for formulating and solving typical problems related to marine dynamics	[SW4] test/exam - oral or written
[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 phenomena and processes occurring in the hydrosphere and atmosphere, as well as their interrelationships	[SW4] test/exam - oral or written
[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 correctly set priorities in their professional work in order to carry out tasks set by themselves or others	[SK4] test/exam - oral or written

Subject contents

Lectures: Forces acting on a moving fluid element. Basic equations of fluid dynamics - equations of conservation of mass and momentum. Large-scale circulation of water masses in the oceans - geostrophic currents - fundamentals, atmospheric and oceanic boundary layers, Ekman spiral and Ekman pumping, western intensification. Wind pile-ups. Basic equations and simplifications for regular waves. Waves - sine waves, Stokes waves, knoidal waves, solitary waves. Refraction, transformation and refraction of waves in the coastal zone - basics. Statistical characteristics of wind waves. Wave prediction methods.

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	MASSEL S. R.: Procesy hydrodynamiczne w ekosystemach morskich. Wyd. UG, Gdańsk 2010. (in Polish)
Supplementary literature	DRUET C., Kowalik Z.: Dynamika morza. Wyd. Morskie, Gdańsk 1970. (in Polish) DRUET C.: Dynamika stratyfikowanego oceanu. Wyd. PWN, Warszawa 1994 (in Polish) DRUET C.: Elementy hydrodynamiki geofizycznej. Wyd. PWN, Warszawa 1995. (in Polish) KNAUSS J. A.: Introduction to physical oceanography. Prentice Hall, 1996. LISICKI A.: Pływy na morzach i oceanach. Wyd. GTN, Gdańsk 1996. (in Polish) MASSEL S. R.: Fluid Mechanics for Marine Ecologists. Springer, 1999 MASSEL S.: Poradnik hydrotechnika. Wyd. Morskie, Gdańsk 1992. (in Polish) MELLOR G. L.: Introduction to physical oceanography. Wyd. AIP Press, 1996.
eResources addresses	

Example issues/ example questions/ tasks being completed

Work placement	Not applicable

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