

Subject card

Subject name and code	Introduction to sea dynamics - lecture, PG_00159315						
Field of study	Oceanography						
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 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	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		3.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Department of Physical Oceanography and Climate Research -> Faculty of Oceanography and Geography -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Gabriela Gic-Grusza				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	35.0	0.0	0.0	0.0	0.0	35
	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	35		10.0		30.0	75
Subject objectives	• Introduction of students to marine wave phenomena, ocean currents, and tides. • Explanation to students of the basics of ocean dynamics in an analytical approach. • Preparation of students for continuation of the subject in more advanced courses on ocean dynamics. • Preparation of students for practical solving of basic problems related to contemporary ocean dynamics.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	OCEANL3-U12	Is able to systematically expand and update knowledge in the field of hydrodynamics and enhance professional qualifications.	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU3] text preparation/written work [SU4] test/exam - oral or written [SU5] implementation of a problem task [SU8] observation of student's independent or team work
	OCEANL3-W04	Has an advanced understanding of issues and research problems in the field of marine dynamics, recognizing their connection to other scientific disciplines.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW2] presentation/project/paper/report [SW3] text preparation/written work [SW5] implementation of a problem task
	[OCEANL3-K03] is ready to exercise caution and criticism in accepting information from scientific literature, the Internet and other media relating to natural sciences	Is ready to exercise caution and skepticism when receiving information from scientific literature, the internet, and other media related to natural sciences.	[SK1] oral statement/conversation/discussion [SK2] presentation/project/paper/report [SK3] text preparation/written work [SK4] test/exam - oral or written [SK5] implementation of a problem task [SK8] observation of student's independent or team work
	OCEANL3-U05	Is able to apply mathematical and statistical methods in data analysis and presentation of results.	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU3] text preparation/written work [SU4] test/exam - oral or written [SU5] implementation of a problem task [SU8] observation of student's independent or team work
	[OCEANL3-K04] is willing to constantly deepen knowledge in the field of oceanography and improve professional qualifications, supported by the knowledge of experts	Understands basic hydrodynamic processes in the sea and is prepared to deepen knowledge in this area.	[SK1] oral statement/conversation/discussion [SK2] presentation/project/paper/report [SK3] text preparation/written work [SK4] test/exam - oral or written [SK5] implementation of a problem task [SK8] observation of student's independent or team work
	OCEANL3-U01	Understands basic hydrodynamic processes in the sea and discusses them using appropriate terminology in this field.	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU3] text preparation/written work [SU4] test/exam - oral or written [SU5] implementation of a problem task [SU8] observation of student's independent or team work
	OCEANL3-W05	Has advanced knowledge of techniques, research methods, and tools (mathematical, statistical, computational) used in the work of an oceanographer for describing and interpreting processes and phenomena occurring in the marine environment.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW2] presentation/project/paper/report [SW3] text preparation/written work [SW5] implementation of a problem task
	OCEANL3-W01	Has an advanced understanding of and familiarity with terminology used in describing marine dynamics and related natural and exact sciences (in Polish and English).	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW2] presentation/project/paper/report [SW3] text preparation/written work [SW5] implementation of a problem task

Subject contents	- Fundamentals of fluid kinematics, description of fluid particle motion in Lagrangian and Eulerian frameworks. - Forces acting on moving fluid elements. - Basic equations of fluid dynamics conservation equations of mass and momentum. - Laminar and turbulent flow Reynolds equations, Boussinesq approximation. - Hydrostatic and hydrodynamic stability of water masses. - Energy exchange between the ocean and atmosphere. - Currents in homogeneous and non-homogeneous water bodies Ekman model, baroclinic interaction effect, density currents fundamentals. - Large-scale circulation of water masses in oceans western intensification, velocity field divergence, upwelling and downwelling, geostrophic currents fundamentals. - Wind-driven currents. - Basic equations and simplifications for regular waves. - Waves sinusoidal, Stokes, cnoidal, solitary waves. - Refraction, transformation, and breaking of waves in the coastal zone fundamentals. Long waves Kelvin, Rossby, seiches, tides basic concepts. Statistical characteristics of wind waves. - Processes of wave generation, propagation, and decay basic concepts. - Methods of wave forecasting. - Internal waves in a two-layered medium basic concepts.											
Prerequisites and co-requisites												
Assessment methods and criteria	<table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Egzam</td><td>51.0%</td><td>50.0%</td></tr><tr><td>Presentation / oral report</td><td>51.0%</td><td>50.0%</td></tr></table>	Subject passing criteria	Passing threshold	Percentage of the final grade	Egzam	51.0%	50.0%	Presentation / oral report	51.0%	50.0%		
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Egzam	51.0%	50.0%										
Presentation / oral report	51.0%	50.0%										
Recommended reading	Basic literature	- Druet C., 2000, Dynamika morza, Wyd. UG, Gdańsk - Mellor G.L., 1996, Introduction to physical oceanography, Wyd. AIP Press										
	Supplementary literature	- Massel S.R., 2010, Procesy hydrodynamiczne w ekosystemach morskich, Wyd. UG, Gdańsk - Lisicki A., 1996, Pływy na morzach i oceanach, Wyd. GTN, Gdańsk - Massel S., 1992, Poradnik hydrotechnika, Wyd. Morskie, Gdańsk - Druet C., 1994, Dynamika stratyfikowanego oceanu, Wyd. PWN, Warszawa - Druet C., 1995, Elementy hydrodynamiki geofizycznej, Wyd. PWN, Warszawa										
	eResources addresses											
Example issues/ example questions/ tasks being completed	Describe methods for forecasting wind waves.											
Work placement	Not applicable											

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