University of Gdańsk

Subject card

Subject name and code	Water Ingineering and Coastal Protection - lecture, PG_00201421		
Field of study	Water Management and Protection of Water Resources		
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	2.0
Learning profile	practical	Assessment form	exam
Conducting unit	Department of Hydrology -> Faculty of Oceanography and Geography -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Piotr Szmytkiewicz	
	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	19.0	50

Subject objectives

Acquire basic knowledge: - about hydro- and lithodynamic processes (waves, currents, sediment transport) occurring in the coastal zone of the sea, - On the functioning of seaports, basic hydro-engineering infrastructure, ensuring navigational safety, - about natural and engineering methods of sea shore protection. This subject is intended to prepare the student for the ability to assess the impact of any hydrotechnical structures on the seashore.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[GWOZWL3-W06] The student has advanced knowledge of issues relating to hydraulic engineering and water treatment and wastewater treatment processes.	K_W06 - knows the basic technical infrastructure found in the coastal zone and the types of forms of coastal protection, their advantages and disadvantages	[SW4] test/exam - oral or written
	[GWOZWL3-W01] The student knows and understands in advanced basic biological, physical and chemical processes and phenomena, as well as analyzes their mutual relations and course in relation to natural environment and socio-ecological systems.	K_W01 - knows and understands to an advanced degree the basic hydro and lithodynamic processes occurring in the coastal zone of the sea and their consequences	[SW4] test/exam - oral or written
	[GWOZWL3-U06] The student has the ability assess the impact of planned investments on value and quality of water resources and propose options for solutions to protect and restore water resources, recognize their weaknesses and strengths as well as opportunities and threats.	K_U06 - can make an informed and reliable assessment of the impact of human activities on the water environment	[SU4] test/exam - oral or written
	[GWOZWL3-U05] The student can formulate opinions on basic environmental engineering issues, and explain and justify the necessity of land reclamation and construction of hydrotechnical facilities.	K_U05 - is able to formulate opinions on the use and impact of hydraulic engineering structures on the seashore	[SU4] test/exam - oral or written
	[GWOZWL3-U03] The student has the ability observe and describe the changes taking place in water management and predict further directions of its development as well as conduct a critical analysis of case studies of problems of water management and protection of water resources in terms of impact on ecological, social and economic systems; natural valorization and assessment of quality of the environment.	K_U03 - is able to observe and describe the changes occurring in water construction and coastal protection and predict further directions of its development and carry out a critical analysis, is able to carry out a case study in the aspect of water construction and coastal protection in terms of impact on the systems: ecological, social and economic, is able to perform natural valorization and environmental quality assessment	[SU4] test/exam - oral or written
	[GWOZWL3-K06] The student has the ability an informed and reliable assessment of the impact of humans on the aquatic environment.	K_K06 - is ready to consciously and reliably assess the impact of human activities on the coastal zone of the sea	[SK4] test/exam - oral or written

Subject contents	1 Waving in the marine coastal zone (Definition of the marine coastal zone. Wave generation, basic wave parameters, orbital velocities, wave energy, refraction, diffraction and reflection of waves).2. wind wave (Forecasting wind wave parameters. Statistical and stochastic analysis. Wave transformation in the coastal zone. Wave measurements.)3. design wave (Representative wave - determination of wave parameters with a given probability of occurrence. Recurrence period, lifetime of structures and risk of failure. Methods for determining design wave parameters in marine construction.)4. currents in the coastal zone of the sea (Types of currents. Dominant currents. Return and longshore currents - generation mechanisms, effects of action. Accidental water flows. Basics of methods of calculating longshore currents. Measurements.)5. transport of marine sediments (Drag and suspended transport. Longshore and transverse-to-shore transport. Calculation of sediment transport volumes. Global and detailed models. Accidental annual sediment transport along the Polish coast).6. marine structures (Port as a link in the transport system, transshipment regions. Basic port structures: breakwaters and quays. Special marine structures: dhows, locks, lighthouses, wind farms, submarine pipelines. Navigational safety.)7. Dredging works (Objectives, tasks and types of dredging works performed. Natural causes of changes in the depth of marine areas. Dredging rolling stock (production and auxiliary) - basic information. Typical dredging schemes - selection of equipment, organization of works, examples of solutions depending on the investor's requirements, type of soil, scope of works, etc.).8 Impact of harbor breakwaters on seashores (Approach tracks. Relationship between the length of breakwaters and intensification of shore erosion processes. Methods of minimizing harmful impacts. An example of the impact of breakwaters in Wladyslawowo on erosion processes occurring on the Hel Peninsula).9. coastal protection - introduction (Definition of shoreline. Safe shoreline profile. Standards of shore safety. Long-term program of coastal protection in Poland - strategy of coastal protection).10. Methods of coastal protection (Natural methods of strengthening dunes and cliff slopes. Engineering methods of shore protection - their advantages and disadvantages. Criteria for planning shore reinforcement and method selection.)11. artificial shore recharge (Methods of implementation. Advantages and disadvantages. Examples of solutions.).12. shore banding and lining (Types of banding. Advantages and disadvantages. Review of existing solutions. Impact of banding on shoreline changes.)13. Edge spurs (Principles of operation, advantages and disadvantages. Types of spurs, efficiency of operation. Examples of solutions.) 14. shore breakwaters and underwater thresholds (Scheme of operation. Advantages and disadvantages, effectiveness, Impact on the seashore). 15. evaluation of the effectiveness of coastal protection (Evaluation of the effectiveness of coastal protection systems implemented during the period of the multi-year Program for the Protection of Sea Shores)iej
Prerequisites and co-requisites	knowledge of mathematics and physics, especially fluid mechanics at the high school level
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
test	51.0%	100.0%

Recommended reading	Basic literature	1. Basiński T., Pruszak Z., Tarnowska M., Zeidler R.: Ochrona brzegów morskich. Wydawnictwo: Instytut Budownictwa Wodnego PAN, Gdańsk 1993. 2. Pruszak Z. Akweny Morskie. Zarys procesów fizycznych i inżynierii środowiska. Wydawnictwo IBW PAN Gdańsk, 2003.
	Supplementary literature	1. Poradnik Hydrotechnika Praca zbiorowa pod red. S. Massela. Wydawnictwo Morskie Gdańsk 1992. 2. B. Mazurkiewicz 2009 Encyklopedia Inżynierii Morskiej. Wydawnictwo Fundacja Przemysłu Okrętowego i Gospodarki Morskiej. Gdańsk.
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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