

Subject card

Subject name and code	Construction and stability of a vessel II (Lecture), PG_00182384						
Field of study	Marine Hydrography						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2025/2026		
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		1.0		
Learning profile	practical		Assessment form		exam		
Conducting unit	Faculty of Oceanography and Geography -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Piotr Bekier				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	25.0	0.0	0.0	0.0	0.0	25
	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	25		1.0		4.0	30
Subject objectives	Familiarizing students with the concepts of buoyancy, ship stability, hull geometry and construction, performing calculations related to ship stability and strength.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[HML3-U04] use analytical, simulation and experimental methods to identify, formulate and solve engineering tasks	is able to: - Use methods for calculating buoyancy and coordinates of the ship's center of gravity - Use methods for calculating buoyancy and coordinates of the ship's center of gravity - Use the method for determining the influence of free liquid surfaces on the position of the ship's center of gravity and its stability - Apply the method of determining and checking overall strength - Determine emergency stability in the event of water ingress into the hull using the accepted mass method or the constant buoyancy method - Read and use ship stability documentation ; perform calculations related to ship stability; assess the ship's loading condition in terms of strength and stability	[SU4] test/exam - oral or written
	[HML3-W10] shipbuilding and construction of the ship and systems and equipment, including propulsion systems, as well as the rules of their operation and maintenance	knows: - Materials used in hull construction, their basic mechanical characteristics, ranges of application and joining technologies, basic hull connections and their classification, hull construction in the bottom area, sides, decks, bow, stern, foundations of machinery and equipment. - Concepts of hull equipment and its classification, types of selected hull equipment elements, types of steering and propulsion devices, including propellers, corrosion of materials used for hulls and methods of preventing it during ship operation. - Theoretical basics of ship stability; elements of documentation in the field of ship construction and stability.	[SW4] test/exam - oral or written
	[HML3-U05] when identifying, formulating and solving engineering tasks, integrate knowledge from various fields and disciplines and perceive their systemic and non-technical aspects, including ethical aspects	is able to: - Determine emergency stability in the event of water ingress into the hull using the assumed mass method or the constant buoyancy method - Determine the ship's draft in water of varying density using documentation - Accurately determine the displacement of the ship, the weight of the cargo loaded or unloaded during the operation of the ship, and plan the loading condition. - Read and use ship stability documentation ; perform calculations related to ship stability; assess the ship's loading condition in terms of strength and stability	[SU4] test/exam - oral or written

	Course outcome	Subject outcome	Method of verification
	[HML3-W11] rules, regulations and procedures related to the carriage of cargo by sea, in particular the physico-chemical characteristics of cargoes accepted on board and the rules for their handling	knows: - Theoretical foundations in the field of ship stability; elements of documentation in the field of ship construction and stability. - Methods for determining the angle of dynamic heel on the straightening arm curve and dynamic arm curve - The effect of water density on ship draft.	[SW4] test/exam - oral or written
	[HML3-W16] engineering standards and norms specific to the field of study, in particular those recommended by IHO and IMO	knows: - Theoretical basics in the field of ship stability; elements of documentation in the field of ship construction and stability. - Concepts of stability criteria, knows stability criteria according to IMO regulations for selected types of ships	[SW4] test/exam - oral or written

Subject contents	3. STABILITY AND UNSINKABILITY OF THE SHIP Conditions of ship equilibrium, displacement, and buoyancy. Mass and coordinates of the ship's center of mass, calculation methods. Center of buoyancy, buoyancy force. Shape stability arm, weight stability arm, righting arm. Hull geometry characteristics, hydrostatic data, shape arms. Change in buoyancy and coordinates of the ship's center of mass after loading, unloading, or shifting cargo. Effect of suspended loads, effect of icing on the change in the position of the ship's center of mass. Transverse metacenter, transverse initial metacentric height. Methods for calculating metacentric height. The effect of free liquid surfaces on stability, calculation methods. Calculation of the static angle of heel of a ship. Correction of static heel. Dynamic stability: dynamic arm, work of righting arms, physical interpretation. Ship heeling under the influence of an external dynamic heeling moment. Stability criteria for an undamaged ship, curve of permissible rises of the ship's center of gravity. Heeling test. Stability criteria. Longitudinal stability. Change in heel, trim, and draft during loading and ballasting operations. Influence of outboard water density on the ship's equilibrium position and stability. Methods of stability control during ship operation, determination of metacentric height based on the period of rolling. Stability information for the captain and its use. Ship unsinkability, classes
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Prerequisites and co-requisites	This subject is required by the Regulation of the Minister of Infrastructure and Development of 5 February 2014 on framework training programs and examination requirements for deck department seafarers (consolidated text: Journal of Laws of 2023, item 1566): attendance at all classes is mandatory. The Polish Naval Academy allows students to make up up to 20% of excused absences from these classes in a form that allows them to acquire missing knowledge and skills. Students who have passed the course but, due to absences exceeding 20% of classes or who did not make up the classes in a form that allows them to acquire missing knowledge and skills, will not receive an entry in the supplement confirming completion of studies recognized at the operational level in coastal navigation.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test	51.0%	100.0%
Recommended reading	Basic literature	Dudziak J.: Teoria okrętu. Oficyna morska., 2006	
	Supplementary literature	DERRETT D. R., BARRASS C. B.: Ship stability for Masters and Mates, 2012. DOKKUM VAN K.: Ship Stability. 2010.	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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