GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Contemporary Topics in Ship Theory, PG_00070355		
Field of study	Naval Architecture and Offshore Structures		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	Specialty 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	1	Language of instruction	English
Semester of study	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Division of Hydromechanics and Ship Design -> Institute of Naval Architecture -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Przemysław Krata	
	Teachers	dr inż. Tomasz Hinz dr hab. inż. Przemysław Krata mgr inż. Zbigniew Macikowski dr inż. Maciej Reichel	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	15.0	30.0	0.0	75

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	75	5.0	20.0	100

Subject objectives

The aim of the course is to familiarize students with contemporary advances in ship theory, primarily regarding intact ship stability, including dynamic phenomena. A key objective is to introduce the latest Second Generation Intact Stability Criteria recently released as a toll for stability assessment.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W04] demonstrates knowledge encompassing selected issues in the field of advanced knowledge, particularly in the scope of methods, techniques, tools, and algorithms specific to Naval Architecture and Ocean Engineering	The student understands the phenomena covered by the Second Generation Intact Stability Criteria.	[SW1] Assessment of factual knowledge
[K7_U01] applies acquired analytical, simulation, and experimental methods, as well as mathematical models for analysis and evaluation of shipborne and offshore systems and processes	The student correctly identifies the phenomena covered by the Second Generation Intact Stability Criteria and assesses the hazards associated with their occurrence.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject
[K7_W01] explains and describes, based on general knowledge in the field of scientific disciplines forming the theoretical foundations of Naval Architecture and Ocean Engineering, the construction and principles of operation of marine systems, processes and their components, as well as methods and means of their design and operation	The student describes the correct methods for preventing hazards associated with the phenomena concerning ship stability discussed during the classes.	[SW1] Assessment of factual knowledge

Subject contents

Course content – lecture

A discussion of contemporary issues in ship theory, particularly regarding ship stability, taking into account dynamic phenomena.

Course content – laboratory

Demonstrations and experiments carried out in a towing tank in the field of dynamic phenomena occurring on a ship, in particular in the context of phenomena covered by the Second Generation Intact Stability Criteria.

Course content – project

Ship stability assessment calculations adopting Second Generation Intact Stability Criteria, performed with the NAPA software.

Prerequisites and co-requisites

1. Engineering-level knowledge and skills regarding ship hydrostatics.
2. Engineering-level knowledge and skills regarding intact ship stability, including measures of static and dynamic stability and stability criteria.
3. Engineering-level knowledge and skills regarding damaged ship stability.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Assessment of the student's final assignment	50.0%	100.0%

Recommended reading

Basic literature	International Maritime Organization. Interim Guidelines on the Second Generation Intact Stability Criteria. 2020, IMO Circular MSC.1/Circ. 1627. International Maritime Organization. MSC.1/Circ.1652: Explanatory Notes to the Interim Guidelines on the Second Generation Intact Stability Criteria. 2022, IMO Circular MSC.1/Circ.1652, Adopted on 25 May 2022. International Maritime Organization. Revised Guidance to the Master for Avoid-ing Dangerous Situations in Adverse Weather and Sea Conditions. 2007, IMO Circular MSC.1/Circ.1228.
Supplementary literature	Petacco N, Gualeni P. IMO second generation intact stability criteria: General overview and focus on operational measures. J Mar Sci Eng 2020;8(7):494. http://dx.doi.org/10.3390/jmse8070494. Szozda Z, Krata P. Towards evaluation of the second generation intact stability criteria – Examination of a fishing vessel vulnerability to surf-riding, based on historical capsizing. Ocean Eng 2022;248:110796. http://dx.doi.org/10.1016/j.oceaneng.2022.110796. Krata P, Wawrzyński W. Prediction of ship resonant rolling-related dangerous zones with regard to the equivalent metacentric height governing natural frequency of roll. TransNav: Int J Mar Navig Saf Sea Transp 2017;11(4):607–14. http://dx.doi.org/10.12716/1001.11.04.04. Wawrzyński W, Krata P. On ship roll resonance frequency. Ocean Eng 2016;126:92–114. http://dx.doi.org/10.1016/j.oceaneng.2016.08.026, URL: https://www.sciencedirect.com/science/article/pii/S0029801816303602.
eResources addresses	

Example issues/ example questions/ tasks being completed	Describe synchronous rolling of a ship and discuss design and operational measures to mitigate it. Describe parametric rolling of a ship and discuss design and operational measures to mitigate it. Describe pure loss of stability of a ship and discuss design and operational measures to mitigate it. Describe surf-riding of a ship and discuss design and operational measures to mitigate it. Describe excessive acceleration stability failure mode and discuss design and operational measures to mitigate it. Describe dead ship stability failure mode and discuss design and operational measures to mitigate it.
Practical activites within the subject	Not applicable

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