GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Strength of Ship Structures, PG_00060545		
Field of study	Naval Architecture and Offshore Structures		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
Education level	first-cycle studies	Subject group	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	7.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Zakład Mechaniki Konstrukcji Oceanotechnicznych -> 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 inż. Krzysztof Wołoszyk	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	45.0	0.0	0.0	45.0	0.0	90

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	90	9.0	76.0	175

Subject objectives

The aim of the subject is to acknowledge the students with the aspects of strength of marine structures. During lectures, basic computational model for strength verification as well as requiremetns of Classification Societies will be presented. During project, the students will perform the computations for verificiation of sturctural strength using the Finite Element Method.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U03] can use computer-aided design, production and operation tools for ocean technology objects and systems	Student use the Finite Element Method based software for verification of structural strength in the design stage	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
[K6_W03] has knowledge of hydromechanics, thermodynamics, machine design, ecology, materials science necessary to understand the principles of construction and operation of ocean engineering facilities and equipment	Student knows materials used in ship structures and rules of their modelling in FE software	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[K6_K02] can work in a team, assuming various roles, can act in a rational and ethical way	Student is able rationally and ethically to incorporate the structural changes that allow for the safe exploitation of structures	[SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice
[K6_W02] has knowledge in the field of technical mechanics, fluid mechanics, strength of materials, necessary to understand the basic physical phenomena occurring in ocean engineering	Student knows computational models and requirements of Classification Societies in terms of strength verification of marine structures	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>Course content – lecture
During lectures, the following topics will be covered:
- sea waves as stochastic process, shorterm and longterm prediction of loads acting on the ship hull;
- global strength of ship, vibrations;
- strength of Primary Supporting Members, FE models used in structural strength verification;
- the requirements of Classification Societies in terms of FE modelling;
- fatigue strength of welded connections - structural point of view;
- buckling of structural elements of the ship hull.

During project, the computational tasks with the use of FE software will be analysed. The tasks will consider strength verification of simple structural elements in view of cirteria discussed during lectures.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Student contains knowledge from general mechanics, strength of materials, material science and mechanics of ship structures.</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Exam</td><td>60.0%</td><td>40.0%</td></tr>
<tr><td>Reports from project tasks</td><td>50.0%</td><td>60.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>Faltinsen, Odd. Sea loads on ships and offshore structures. Vol. 1. Cambridge university press, 1993.

Mansour, A., Liu, D., Strength of Ships and Ocean Structures. The Society of Naval Architects and Marine Engineers, 2008

Polish Register of Shipping, Rules for classification and construction of sea-going ships, Part II Hull. 2019.

IACS, Common Structural Rules for Bulk Carriers and Oil Tankers, 2023.

DNV. Class Guideline DNVGL-CG-0127. Finite Element Analysis. 2015.</td></tr>
<tr><td>Supplementary literature</td><td>Bai, Y. Marine structural design. Elsevier. 2003.

Okumoto, Y., Takeda, Y., Mano, M., & Okada, T. Design of ship hull structures: a practical guide for engineers. Springer Science & Business Media. 2009.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Some example problems:

- longerm prediction of loads acting on the ship hull;

- strength of Primary Supporting Members;

- calculation of strength of grillage of double bottom with the use of FE software.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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