



Subject card

Subject name and code	Advanced Problems of Structural Mechanics, PG_00062685						
Field of study	Naval Architecture and Offshore Structures						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2024/2025		
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			5.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Zakład Mechaniki i Konstrukcji Morskich -> Institute of Ocean Engineering and Ship Technology -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Krzysztof Wołoszyk					
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	45.0	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		10.0		40.0	125
Subject objectives	The purpose of the course is to familiarize students with advanced problems in structural mechanics with special emphasis on ships and marine structures. As part of the project, students will pursue a selected issue related to the mechanics of structures to be agreed with the teachers.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_W03] Demonstrates advanced skills in applying analytical methods and problem-solving techniques related to ocean engineering, using appropriate tools	The student presents the result of his project work	[SW2] Assessment of knowledge contained in presentation
	[K7_K01] Understands the need for lifelong learning, critically evaluate acquired knowledge, and comprehend the significance of knowledge in addressing cognitive and practical problems	The student understands that as an engineer he must constantly improve and acquire new knowledge	[SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work
	[K7_W06] Capable of finding and utilizing credible sources of information crucial for analyzing issues within the field of study	The student knows how to use sources in project work	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects
	[K7_W02] Explains the essence and relationships of key components describing systems and processes in ocean engineering, utilizing current knowledge from major scientific fields related to the field of study	The student understands advanced problems in structural mechanics	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	[K7_U01] Develops innovative strategies to solve complex and dynamic problems by synthesizing information from various sources and utilizing analytical, simulation, and experimental methods, considering environmental variability	The student tackles an advanced problem in structural mechanics as part of the project work	[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
[K7_U02] Presents convincing and logically justified arguments regarding outcomes through critical analysis of information in diverse technical contexts and an approach to their interpretation	The student presents the results of design work on a selected issue of structural mechanics	[SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task [SU1] Assessment of task fulfilment	
Subject contents	<p>The lecture will cover the following topics in the context of ships and marine structures:</p> <ul style="list-style-type: none"> - ultimate capacity of structural elements; - Fluid-Structure-Interaction type analyses; - Dynamic analyses (e.g., collisions); - fundamentals of reliability analysis of engineering structures; - fundamentals of fracture mechanics; - use of FEM for advanced engineering calculations. 		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project report	50.0%	60.0%
	Presentation of project	50.0%	20.0%
	Test	50.0%	20.0%

Recommended reading	Basic literature	<p>Mansour, A., Liu, D., Strength of Ships and Ocean Structures. The Society of Naval Architects and Marine Engineers, 2008</p> <p>Yao, Tetsuya, and Masahiko Fujikubo. <i>Buckling and ultimate strength of ship and ship-like floating structures</i>. Butterworth-Heinemann, 2016.</p> <p>Der Kiureghian, Armen. <i>Structural and system reliability</i>. Cambridge University Press, 2022.</p>
	Supplementary literature	Richter, Thomas. <i>Fluid-structure interactions: models, analysis and finite elements</i> . Vol. 118. Springer, 2017.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	1. Describe the problem of the limit load capacity of the ship's hull.2. To what problems are FSI methods applied to.3. Describe the problem of uncertainty in strength modeling.	
Work placement	Not applicable	