GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Strength of Composite Structures, PG_00060611		
Field of study	Wytrzymałość konstrukcji kompozytowych		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	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. Maciej Kahsin	
	Teachers	dr inż. Maciej Kahsin	

Lesson types

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	8.0	92.0	175

Subject objectives

Lectures scope is to present methods of laminated composites structural analysis with use of classical laminate theory and numerical tools.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W06] has well-organised knowledge of engineering methods and design tools enabling the conducting of projects in the field of construction and operation of yachts	Student is able to select appropriate physical simplifications of the problem and apply suitable tools to solve it.	[SW1] Ocena wiedzy faktograficznej [SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym
[K6_U06] able to perform basic engineering tasks in the field of yacht design, construction and operation according to the formulated specification, using appropriate methods and tools	Student is able to use Classical Laminate Theory (CLT) in problems concerning yacht design.	[SU1] Ocena realizacji zadania [SU2] Ocena umiejętności analizy informacji [SU4] Ocena umiejętności korzystania z metod i narzędzi [SU5] Ocena umiejętności zaprezentowania wyników realizacji zadania
[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 understands the mathematical fundamentals of analyses performed using discrete methods.	[SW1] Ocena wiedzy faktograficznej [SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym

Subject contents

Course content – lecture
Introduction to FEM, basic characteristics of laminates, constitutive equations of laminates, stress and strain in laminate, coupling load/deformation (ABD matrix), strength of laminate composites.

Course content – project
Getting acquainted with functionality of the available software for laminated structures design. Completing a group project containing proposed design solutions for a selected composite structure of a yacht.

Prerequisites and co-requisites

Strength of Materials, Numerical Methods

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Project</td><td>100.0%</td><td>80.0%</td></tr>
<tr><td>Exam</td><td>50.0%</td><td>20.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>Carlsson, L. A., Gillespie, J. W., (eds.), Delaware Composites Design Encyclopedia, TechnomicPublishing Company, Lancaster, PA

Hull, D., An Introduction to Composite Materials, Cambridge University Press, 1981

Gere, J. M., Timoshenko, S. P., Mechanics of Materials, II ed., PWS Kent Publishing Company, Boston, 1984</td></tr>
<tr><td>Supplementary literature</td><td>John D. Fenton, Numerical methods, Institute of Hydraulic Engineering and Water Resources Management Vienna University of Technology, 2019</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">Reduction of twist-bending coupling in composite laminate.

Determine stress pattern in composite laminate section.

Determine maximum load in composite laminate structure.</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
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