GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Modelling of Structures for Strength Analysis, PG_00046532		
Field of study	Ocean Engineering, Ocean Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2022/2023
Education level	first-cycle studies	Subject group	
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	6	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Ocean Engineering and Ship Technology -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Wojciech Puch	
	Teachers	dr inż. Maciej Kahsin	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	30.0	0.0	0.0	30

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	30	6.0	39.0	75

Subject objectives

Becoming familiar with the formulation of structural computational models of stress state, buckling and frequency of vibrations of structural elements of the hull of the ship; familiarizing themselves with the methods of preparing the data and perform calculations using specialized programs and commercial FEA system.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U06] in compliance with a formulated specification and with the aid of appropriate tools and methods, is able to complete a simple engineering task within the range of design, construction and operation of ocean technology objects and systems	Student analyzes the state of stress, buckling and natural vibrations in beam and rod-shell models of hull structure of the ship.	[SU4] Assessment of ability to use methods and tools
[K6_W05] has an organized knowledge on design, construction and operation of ocean technology objects and systems	Student identifies the strength phenomena endangering safety of the structure and defines the necessary scope of the structural calculations.	[SW1] Assessment of factual knowledge
[K6_W06] has an organized knowledge on engineering methods and design tools allowing the conducting of projects within the construction and operation of ocean technology objects and systems	Student identifies interactions between the elements hull structure of the ship and with enviroment and formulates boundary conditions.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents

Structural models of strength phenomena in loaded structure: elastic deformations and state of stress; yielding; buckling; fatigue; vibrations; ultimate limit state.
Analysis process: identifying of demands, data acquisition, modelling, calculations, displaying and interpreting results, report.
Finite Element model building: identyfication of strength phenomena and their parameters, assumptions and simplifications, geometric model, boundary conditions, meshing.
Solving the model: methods, interpretation of messages.
Results: visualization, quality inspection and verification.
Report: common rules, contents, demands of Classification Societes.
Exercises:
Stress analysis of shells and stiffened panels.
Buckling of panels.
Modal analysis of ship hull.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">Basic technical English.
Basics of Strength of Materials.
Basics of Finite Element Analysis.</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Test</td><td>0.0%</td><td>20.0%</td></tr>
<tr><td>Reports</td><td>56.0%</td><td>80.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">1. Introductions to exercises accesssible in student' computer network in folder "wspolny".
2. O.C.Zienkiewicz, R.L.Taylor, J.Z.Zhu: The Finite Element Method: Its Basis and Fundamentals. Elsevier, 2005.
3. P.M.Kurowski, Finite Element Analysis for Design Engineers, SAE International, 2004.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">1. R.D.Cook, Finite Element Modeling for Stress Analysis. Wiley, 1995.
2. V.Adams, A.Askenazi, Building Better Products with Finite Element Analysis. OnWord Press, 1999.</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">Stresses in double bottom primary supporting members, beam model.
Stresses in stiffeners and primary supporting members of stiffened panel, shell model.</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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