GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Modelling of Laminate Structures, PG_00045105		
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	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	6	ECTS credits	2.0
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. Maciej Kahsin	
	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	4.0	16.0	50

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_W05] has an organized knowledge on design, construction and operation of ocean technology objects and systems	Student is aware of anisotropic nature of composite materials, and is able to use this knowledge during structural design.	[SW3] Assessment of knowledge contained in written work and projects
[K6_K03] understands non-technical aspects and effects of operation as an engineer, its influence on the environment and is aware of the responsibilities for the decisions taken	Student gains knowledge of composite laminate material characteristics.	[SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work
[K6_U05] can formulate a simple engineering task and its specification within the range of design, construction and operation of ocean technology objects and systems	Student is able to use numerical tools in problems concerning design of laminate composites.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
[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 uses FEA software in design process of laminated structures.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents

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

Prerequisites and co-requisites

Strength of Materials, Numerical Methods

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Reports assessment	51.0%	100.0%

Recommended reading	Basic literature	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.
	Supplementary literature	John D. Fenton, Numerical methods, Institute of Hydraulic Engineering and Water Resources Management Vienna University of Technology, 2019
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Reduction of twist-bending coupling in composite laminate. Determine stress pattern in composite laminate section. Determine maximum load in composite laminate structure.	
Work placement	Not applicable	