



Subject card

Subject name and code	FEM in the Mechanics of thin-walled shell structure, PG_00057226						
Field of study	Ocean Engineering						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2023/2024		
Education level	second-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	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Theory and Ship Design -> 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	15.0	0.0	30.0	0.0	0.0	45
	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	45	5.0		25.0	75	
Subject objectives	The aim of subject is to provide student with the essential knowledge of CAE approach to analysis of thin-walled structures.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_U07] in compliance with a formulated specification and with the aid of appropriate tools and methods, is able to complete an advanced engineering task within the range of design, construction and operation of ocean technology objects and systems	Student understands differences emerging from choice of discretization method, student is able to appropriately assign type of analysis to specific problem.			[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information		
	[K7_W05] has an organized, widened knowledge on design, construction and operation of ocean technology objects and systems	Student is able to prepare computational model, prepare data, and execute analyses concerning: structural strength, buckling, modal analysis with use of 1D and 2D elements.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	[K7_W06] has an organized, widened knowledge on engineering methods and design tools allowing the conducting of advanced projects within the construction and operation of ocean technology objects and systems	Student understands mathematical formulation of FEM.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
Subject contents	FE stiffness matrix's formulation basing on load/deformation relations. Introduction to residual methods. FE's equilibrium equations. Rayleigh – Ritz metod. General FE stiffness matrix formulation. Derivation of interpolating function. FE approach in modelling plain stress/strain state. Geometry discretization. Typical 2D finite elements survey. FE's thick vs. tin plate formulation.						
Prerequisites and co-requisites	Mechanics, Strength of Materials, Mathematics, Numerical Methods.						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Raports		50.0%		25.0%		
	Project		70.0%		75.0%		

Recommended reading	Basic literature	1) J. Reddy: An Introduction to The Finite Element Method, McGraw-Hill, New York, 2005 2) D. Chapelle, K. Bathe: The Finite Element Analysis of Shells – Fundamentals, Springer-Verlag Berlin Heidelberg 2011
	Supplementary literature	1) J. Blaauwendraad: Plates and FEM Surprises and Pitfalls, Springer 2010
	eResources addresses	
Example issues/ example questions/ tasks being completed	Structural study of offshore platform in case of: stresses, strains, buckling, free vibrations analyses.	
Work placement	Not applicable	