



Subject card

Subject name and code	Computational Fluid Dynamics, PG_00057228						
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			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Hydromechanics and Hydroacoustics -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Michał Krężelewski					
	Teachers	dr inż. Michał Krężelewski mgr inż. Hanna Pruszeko					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	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	5.0		15.0	50	
Subject objectives	learning methods for the integration of partial differential equations and their application to the self-selected examples						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_W05] has an organized, widened knowledge on design, construction and operation of ocean technology objects and systems	Student: knows the general principles of initiating and developing forms of entrepreneurship, including an individual based on knowledge in the field of construction and operation of ocean engineering facilities and equipment.			[SW3] Assessment of knowledge contained in written work and projects		
	[K7_U04] can apply mathematical methods and models and computer simulations to analyse, design, and assess the functioning of ocean technology objects and systems and their elements	Student: is able to analyze the technical and economic aspects of engineering tasks in the field of design, construction and manufacturing of ocean engineering facilities.			[SU4] Assessment of ability to use methods and tools		
	[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: is able to formulate an engineering task and its specification in the field of design, construction and manufacturing of ocean engineering facilities.			[SW1] Assessment of factual knowledge		

Subject contents	<p>L: A review of numerical fluid dynamics (CFD). The equations governing fluid flow and boundary conditions. Turbulence and its models. The method of finite volume. Algorithms coupling pressure and velocity fields in flows established. Methods of solving equations governing the flow. The methods take into account the boundary conditions. Differential schemes for partial differential equations and their stability. Computational methods to take account of flows with free surface at high speeds. Grids for the differential patterns and their generation. Computational methods for no viscous flow potential. Methods for interpreting the results of CFD calculations. Lab.: Solving above mentioned questions through their algorithmization and then writing of computer programmes. Moreover practical solving the problems CFD using professional codes CFD: PHOENICS and / or Fluent , and as the examples of special uses SHIPFLOW, HESS-SMITH / BOSS for conventional ship and marine platform.</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	independently solved the problem 50% 100%	50.0%	100.0%
Recommended reading	Basic literature	<p>1.Versteeg H. K.,Malalasekera W., An introduction to Computational Fluid Dynamic, Longman 1995-98. 2. Gryboś R.: Podstawy mechaniki płynów, t.1,2, PWN W-a 1998r.;</p>	
	Supplementary literature	<p>[1] Journee J.M.J.: Offshore Hydromechanics, Delft University of Technology, January 2001r.;; [2] Sedov L.I.: Mechanika splosznoj sredy,Moskva 1984 t. II,wyd. IV; [3] Instrukcje do ćwiczeń laboratoryjnych;</p>	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		