

GDAŃSK UNIVERSITY

Subject card

Subject name and code	Hydro and Wind Power Plants, PG_00033730							
Field of study	Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power 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	5		ECTS credits			4.0		
Learning profile	general academic profile		Assessment form			exam		
Conducting unit	Institute of Ocean Engineering and Ship Technology -> Faculty of Mechanical Engineering and Ship Technology							
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Piotr Doerffer					
	Teachers		prof. dr hab. inż. Piotr Doerffer					
			dr inż. Joanna Grzelak					
			dr inż. Krzysztof Doerffer					
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Lesson types and methods	Lesson type	Lecture		Laboratory		t	Seminar	45
	hours	50.0	0.0	10.0	0.0		0.0	
	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		50.0		100
Subject objectives	1) Flow modeling, incompressible, viscous in one dimensional approach.							
	2) Formation of boundary layer and generation of losses.							
	3) Large wind turbines on-land and off-shore.							
	4) Micro-wind energy, different types of wind turbines and their characteristics, innovative concepts.							
	5) Construction of traditional water turbines							
	6) Innovative concepts of waves energy harvesting.							

Learning outcomes	Course outcome	Subject outcome	Method of verification				
	K6_W06	 Knowledge of physical laws adequate for wind and water power plans. Knowledge of power plants types and understanding of positive and negative aspects of technical solution Environmental aspects of wind and water energy systems application. 	[SW1] Assessment of factual knowledge				
	K6_U04	Ability of critical analysis of wind and water turbines offers for prosumer market. Ability to design devices extraction power from wind and water. Ability to analyse economic aspects of wind and water energy extraction.	[SU3] Assessment of ability to use knowledge gained from the subject				
Subject contents	Characteristics of the medium - water and air, assumption and consequences of medium continuity						
	Basic equations of state, implementation for stationary and incompressible flows						
	Real flows, special flow phenomena						
	Boundary layers						
	Wind energy						
	Horizontal axis wind turbine rotors						
	Darrieus rotors						
	Savonius rotors						
	Water energy						
	Water turbines						
Prerequisites and co-requisites	Basic knowledge of fluid mechanics						
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade				
	egzam	50.0%	50.0%				
Recommended reading	Basic literature Fluid Mechanincs (in Polish) Mechanika Płynów; Krystyna Jeżow Kabsch, Henryk Szewczyk; Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2001, ISBN 83-7085-597-0						
		Fluid Mechanincs (in Polish); Mechanika Płynów; Romulad Puzyrewski, Wydawnictwo Naukowe PWN, 1987					
	Introduction to Hydro Energy Systems, Kötter Manuela, Mathur Jyotirmay, ISBN 978-3-64						
		Wind Turbines; Erich Hau, ISBN 978-3-540-29284-5,					

	Supplementary literature	Fluid Mechanincs (in Polish); Mechanika Płynów; Włodzimierz Prosnak, Wydawnictwo PWN, 1970 Water Turbines (in Polish);Turbiny Wodne; Władysław Krzyżanowski, Wydawnictwo Naukowo Techniczne 1971				
	eResources addresses	Adresy na platformie eNauczanie: Siłownie wodne i wiatrowe,W/L, Energetyka sem. 5 zima 22/23 PG_00033730 - Moodle ID: 23044 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=23044				
Example issues/ example questions/ tasks being completed	For which flows the trace of flow article coincides with streamline?					
	Give the components of disposable height					
	Explain the characteristic features of Savonius rotor					
	Explain the characteristic features of Darrieus rotor					
	Which water turbine is adequate for extreme large dips.					
Work placement	Not applicable					