GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Water and Wind power stations (WOiO), PG_00042089						
Field of study	Power Engineering, Power Engineering						
Date of commencement of studies	October 2023		Academic year of realisation of subject	2025/2026			
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	English			
Semester of study	6		ECTS credits	4.0			
Learning profile	general academic profile		Assessment form	assessment			
Conducting unit	Institute Of Naval Architecture -> Faculty Of Mechanical Engineering And Ship Technology -> Wydziały Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Joanna Grzelak					
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	15.0	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	65.0	100	
Subject objectives	1) Familiarization with flow models, in particular incompressible, viscous flows in one-dimensional terms. 2) Formation of a boundary layer and generation of energy losses. 3) Familiarization with the construction of large onshore and offshore wind turbines. 4) Micro wind energy, construction of different types of windmills and their characteristics, innovative solutions 5) Construction of traditional water turbines 6) Construction and operation of innovative wave energy harvesting systems.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K04] is able to formulate opinions on technical and technological processes in energy and sanitary engineering		
[K6_W13] has basic knowledge of the operation of energy equipment in the field of thermal power plants, thermal and energy and heating systems, internal combustion engines, compressors and rotating machines, has basic knowledge of the regulation of energy equipment and methods of their selection depending on the needs		
[K6_W12] has basic knowledge of the life cycle and repairs of energy equipment in the field of thermal power stations, thermal and energy systems and heating systems, internal combustion engines and compressors as well as rotating machines		
[K6_W06] knows classic and developmental energy technologies, rules for the selection and operation of heat and energy devices and installations, basic principles of energy systems operation, basic issues regarding the reliability of energy devices and diagnostics, environmental effects of energy technologies used, methods of using renewable energy sources		

Subject contents

Characteristics of fluid - water, air; assumptions and consequences of a continuous medium. Basic equations of behavior and their application to the stationary and incompressible description. Real flow, special flow phenomena. Boundary layer. Wind energy. Horizontal axis windmills. Darrieus rotors.vSavonius rotors. Hydropower generation. Hydro turbines.

Prerequisites and co-requisites

Basic Fluid Mechanics Course

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
seminar - evaluation from the presentation	51.0%	50.0%
lecture - assessment test	51.0%	50.0%

Recommended reading

Basic literature

Puzyrewski, R., Fluid mechanics, Scientific Publishing House PWN, 1987;

Krzyżanowski, W., Water turbines. Construction and principles of regulation, Scientific and Technical Publishing Houses. Warsaw, 1971;

Douglas, J., Gasiorek, J., et al., Fluid Mechanics, Pearson Education, 2005;

Gryboś, R., A collection of tasks in fluid mechanics, Scientific Publishing House PWN, Warsaw, 2012;

Jeżowiecka-Kabsch, K., Szewczyk, H., Fluid Mechanics, Publishing House of Wrocław University of Technology, Wroclaw 2001, ISBN 83-7085-597-0;

	Supplementary literature	Łaski, A., Water power plants. Ed. Science and Technology, Warsaw, 1975; Hydropower. Introduction to Hydro Energy Systems, Kötter Manuela, Mathur Jyotirmay, ISBN 978-3-642-20709-9 Wind Turbines, Erich Hau, ISBN 978-3-540-29284-5; Rduch, J., Turbine selection for small water power plant, IX Forum of Renewable Energy Sources, Zakopane, 2003.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Describe the components of Bernoulli's equation State the components of the disposable height. State the characteristic features of a Savonius rotor. Describe the construction and operation of a Francis turbine. Which water turbine is appropriate for very high gradients?	
Work placement	Not applicable	

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