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, 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	English
Semester of study	6	ECTS credits	4.0
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. Joanna Grzelak	
	Teachers	dr inż. Joanna Grzelak	

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

Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=21640#section-19

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_U01	The student distinguishes between types of facilities and pieces of equipment in hydroelectric and wind power plants, evaluate their suitability for specific conditions both inland and offshore.	[SU2] Assessment of ability to analyse information [SU5] Assessment of ability to present the results of task
K6_W06	1) Knowledge of physical laws applicable to wind and hydroelectric power plants 2) Knowledge of types of power plants and principles of their operation, understanding of positive and negative aspects of technical solutions 3) Environmental aspects of wind and hydroelectric power applications.	[SW1] Assessment of factual knowledge
K6_U05	Identifies and obtains available information necessary to determine the type of facility and equipment for the most beneficial energy extraction.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information

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	