

SDAŃSK UNIVERSITY 的 OF TECHNOLOGY

Subject card

Subject name and code	Wind Power Stations, PG_00042216							
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			2023/2024		
Education level	first-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	4		Language of instruction			Polish		
Semester of study	7		ECTS credits			2.0		
Learning profile	general academic profile		Assessment form			assessment		
Conducting unit	Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology							
Name and surname	Subject supervisor		dr inż. Marzena Banaszek					
of lecturer (lecturers)	Teachers		dr inż. Marzena Banaszek					
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	y Project		Seminar	SUM
of instruction	Number of study hours	15.0	0.0	8.0 0.0			0.0	23
	E-learning hours included: 0.0							
Learning activity and number of study hours	Learning activity	Participation in classes includ plan	n didactic ed in study	Participation in consultation hours		Self-study		SUM
	Number of study hours	23		3.0		24.0		50
Subject objectives	The objective of the subject is to supply the students with the basic theoretical knowledge and practical skills concerning technological and economic aspects of wind power, principles of operation of wind turbines and their applications in diverse climatic conditions.							
Learning outcomes	Course outcome		Subject outcome			Method of verification		
	K6_U08		The student is able to design the basic parameters of the selected technology related to energy conversion and select auxiliary devices and evaluate the project taking into account technical and economic aspects.			[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		
	K6_W10		The student knows the basic installations in the field of renewable energy sources and their impact on the environment.		[SW1] Assessment of factual knowledge			
Subject contents	 LECTURE: The current state and future prospects of wind power development in Poland and the world. The possibilities of using wind power in Poland. Types of winds and their structure. Wind energy aspects: speed, direction, power, energy and variability of wind. Wind measurement. The theory of a wind turbine. Wind turbines and the history of the development. Wind turbines with vertical and horizontal rotation axis. Controlling strategies. LABORATORY: 1. Flow past a sphere. Aerodynamic drag crisis. 2. Measurement of pressure distribution on a circular cylinder. Determination of the aerodynamic drag coefficient. 3. Flow around airfoil. Aerodynamic characteristics. Aerodynamic forces as a function of angle of attack. 							
Prerequisites and co-requisites	Fluid mechanics.							
	Thermodynamics.							

Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade			
and criteria	Lecture Written Test	50.0%	50.0%			
	Laboratory reports	100.0%	50.0%			
Recommended reading	Basic literature	 Boczar T.: Wykorzystanie energii wiatru, Wydawnictwo PAK, Warszawa 2010 Flaga A.: Inżynieria wiatrowa. Podstawy i zastosowania, Wydawnictwo Arkady 2008 Hau E.: Wind turbines, Springer 2006 Jagodziński W.: Silniki wiatrowe, PWT Warszawa 1959 Lewandowski W.: Proekologiczne odnawialne źródła energii, WNT Warszawa 2012 Lubośny Z.: Farmy wiatrowe w systemie elektroenergetycznym, WNT Warszawa 2009 Marecki J.: Podstawy przemian energetycznych, WNT Warszawa 2008 Maroński R.: Siłownie wiatrowe, Oficyna Wydawnicza Politechniki Warszawskiej Warszawa 2016 				
	Supplementary literature	 International Renewable Energy Agency <u>www.irena.org</u> GLOBAL WIND REPORT gwec.net Polityka energetyczna Polski do roku 2040. www.gov.pl Przyszłość morskiej energetyki wiatrowej w Polsce. Raport PSEW. Maj 2019 				
	eResources addresses	Adresy na platformie eNauczanie: Siłownie wiatrowe, W/L, Energetyka/PTE, sem.07, zima 23/24 (PG_00042216) - Moodle ID: 31944 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=31944				
Example issues/ example questions/ tasks being completed	 Prospects for the development of electricity production technology in Poland based on wind energy. The concept of wind, wind characteristics, wind measurement, wind variability and frequency, wind power and energy. Construction of HAWT wind turbines, selected designs of HAWT wind turbines. Types of wind turbines. Selected designs of VAWT wind turbines. Betz's law, power factor, wind turbine efficiency curve. 					
Work placement	Not applicable					