



Subject card

Subject name and code	Wind and Hydraulic Power Systems, PG_00039903						
Field of study	Mechanical Engineering, Mechanical Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2022/2023		
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	3	Language of instruction			Polish		
Semester of study	6	ECTS credits			1.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Marzena Banaszek				
	Teachers		dr inż. Marzena Banaszek				
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	0.0	15
	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	15		3.0		7.0	25
Subject objectives	The aim of the course is to familiarize students with the technological and economic aspects of water and wind energy use, the principles of water and wind turbines and their applications in various working conditions.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W09] possesses basic knowledge within the range of thermodynamics and fluid mechanics, construction and operation of heat generating devices, process equipment, including renewable energy sources, cooling and air conditioning	The student has basic knowledge in the field of thermodynamics and fluid mechanics, construction and operation of thermal energy devices, process equipment, including renewable energy sources as well as refrigeration and air conditioning.			[SW1] Assessment of factual knowledge		
	[K6_U07] is able to design a typical construction of a mechanical device, component or a testing station using appropriate methods and tools, adhering to the set usage criteria	The student is able to design a typical structure, mechanical device, subassembly or test stand using appropriate methods and tools, taking into account the given performance criteria.			[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		
Subject contents	Hydropower in Poland and in the world. Hydropower evaluation of rivers resources. Water structures. Hydroelectric power stations. Water turbines - theoretical basis. Conventional water turbines. Unconventional water turbines. The current status and development trends for the wind energy in Poland and in the world. Structure and parameters of wind. Principles of wind energy conversion. HAWT wind turbines. VAWT wind turbines. Application of wind turbines. Operation of wind turbines. Wind and water energy - historical outline of development.						
Prerequisites and co-requisites	not applicable						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	term project		50.0%		100.0%		

Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Hoffman M.: Małe elektrownie wodne poradnik, Nabba Sp. z o.o. Warszawa 1991 2. Jackowski K.: Elektrownie wodne turbozespoły i wyposażenie, WNT Warszawa 1971 3. Krzyżanowski W.: Turbiny wodne. Konstrukcja i zasady regulacji, WNT Warszawa 1971 4. Łaski A.: Elektrownie wodne rozwiązania i dobór parametrów, WNT Warszawa 1977 5. Boczar T.: Wykorzystanie energii wiatru, Wydawnictwo PAK, Warszawa 2010 6. Flaga A.: Inżynieria wiatrowa. Podstawy i zastosowania, Wydawnictwo Arkady 2008 7. Jagodziński W.: Silniki wiatrowe, PWT Warszawa 1959 8. Renewable Power Generation Costs in 2017, IRENA www.irena.org 9. Polityka energetyczna Polski do roku 2040. Projekt. Ministerstwo Energii Warszawa 2019
	Supplementary literature	<ol style="list-style-type: none"> 1. Michałowski S., Plutecki J.: Energetyka Wodna, WNT Warszawa 1975 2. Hau E.: Wind turbines, Springer 2006 3. Lewandowski W.: Proekologiczne odnawialne źródła energii, WNT Warszawa 2012 4. Lubośny Z.: Farmy wiatrowe w systemie elektroenergetycznym, WNT Warszawa 2009 5. Marecki J.: Podstawy przemian energetycznych, WNT Warszawa 2008 6. Maroński R.: Siłownie wiatrowe, Oficyna Wydawnicza Politechniki Warszawskiej Warszawa 2016 7. GLOBAL WIND REPORT 2018. GWEC April 2019 8. Przyszłość morskiej energetyki wiatrowej w Polsce. Raport PSEW. Maj 2019
	eResources addresses	<p>Adresy na platformie eNauczanie:</p> <p>Energetyka wiatrowa i wodna - Moodle ID: 29127 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29127</p>
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Current status and development trends for the development of electricity production technology in Poland based on water and wind energy 2. Working parameters of a water turbine 3. Virtual walk around the hydroelectric power plant: characteristics of the hydro junction elements 4. Betz's law 5. Classification of wind turbines, discussion of a selected wind turbine structure 	
Work placement	Not applicable	