



Subject card

Subject name and code	Ecological Technologies of Renewable Energy Sources and Energy Storage, PG_00042169						
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	Department of Electrical Power Engineering -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Tomasz Minkiewicz				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	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		3.0		17.0	50
Subject objectives	The aim of the subject is to present selected technologies for generating and storing electrical and heat energy using renewable energy sources.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_W05		The student has knowledge of the construction and selection of equipment and installations of renewable energy sources and energy storage systems.		[SW1] Assessment of factual knowledge		
	K6_U04		The student performs calculations related to energy conversion based on knowledge of thermodynamics, physics and fluid mechanics and is able to carry out a preliminary technical and economic analysis of a sample investment.		[SU1] Assessment of task fulfilment		
Subject contents	Lecture: energy resources; wind, water, solar, geothermal energy; biomass.						
	Laboratory: calculations concerning wind, hydro and solar energy.						
Prerequisites and co-requisites	Thermodynamics, fluid mechanics, heat transfer						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Laboratory reports		60.0%		50.0%		
	Lecture test		60.0%		50.0%		

Recommended reading	Basic literature	<p>1. Mikielwicz J., Cieśliński J.T.: Niekonwencjonalne urządzenia i systemy konwersji energii. Maszyny Przepływowe pod red. E.S. Burki. Tom 24. IMP PAN, Ossolineum Wrocław 1999.</p> <p>2. Cieśliński J.T.: Niekonwencjonalne urządzenia i układy energetyczne. Przykłady obliczeń. Wyd. PG 1997.</p> <p>3. Lewandowski W.M.: Proekologiczne źródła energii odnawialnej. WNT W-wa, 2001.</p> <p>4. Jaworski M., Chwieduk D.: Energetyka odnawialna w budownictwie. Wydawnictwo Naukowe PWN, Warszawa 2018</p> <p>5. Kamrat W.: Gospodarka energetyczna w warunkach rynkowych. Red. Wydawnictwo Naukowe PWN, Warszawa 2022</p>
	Supplementary literature	Journal Czysta Energia
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<p>1. Classification of hydro power plants and their advantages</p> <p>2. Types of geothermal sources and scheme of the binary power plant</p> <p>3. Construction and operation principle of a wind turbine.</p> <p>4. Describe the selected method of heat storage using sensible heat.</p>	
Work placement	Not applicable	