



## Subject card

Subject name and code	Exploitation of Renewable Energy Sources, PG_00055966						
Field of study	Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject				2024/2025	
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	Department of Electrical Power Engineering -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Izabela Prażuch				
	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	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		1.0		9.0	25
Subject objectives	<p>To acquaint students with renewable energy technologies.</p> <p>To teach students how to calculate technical parameters of renewable energy sources</p>						
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	The student knows the basic issues concerning the operation of power equipment in systems using renewable energy resources			[SK5] Assessment of ability to solve problems that arise in practice		
	[K6_W03] knows the basics of automation and automatic regulation, knows the principles of the selection of electrical devices, drive systems and their control	The student knows the basic issues regarding the selection of devices in RES installations.			[SW1] Assessment of factual knowledge		
	[K6_W08] has basic knowledge in the field of intellectual property protection and patent law, knows and understands the basic processes of energy production and use, knows and understands the principles of modern heating and power systems	The student explains and develops ways of converting renewable energy into electricity and heat in a useful form. The student learns general information about energy consumption.			[SW1] Assessment of factual knowledge		
Subject contents	<p>Presentation of the overall situation of the national energy sector. Presentation of the shares and development trends in the domestic use of renewable energy. Discussion of the laws affecting the development and use of renewable energy sources cogeneration high economy. Presentation of the national potential of solar energy. Discussion of the types of solar collectors. A discussion of the different mounting methods. The use of solar collectors for hot water. Collectors cooperation systems with other sources. The possibility of using solar energy for heating purposes. Operational problems with solar collectors. The economics of solar collectors solutions. Types of photovoltaic cells (PV). Ways to use electricity from PV cells. Methods for assembly and construction of PV plants. The economics of small and large PV plants. Wind energy potential in the Polish market. The influence of terrain on wind energy potential. The types of power plants and wind turbines. The economics of a small wind turbine construction. The economics of the construction of the wind farm. Types of heat exchangers for heat pumps. Sizing of the heat exchanger for heating system with heat pump. Conditions for the effective heat pump operation. Cascade heat pump systems. Sources of biogas. The composition and quality of biogas. Ways to use. The economics of biogas production. Sources of biomass. Plant energy crops. Performance of energy crops. Biomass combustion plants. Biofuels in transport sector: types biofuels and methods of preparation.</p>						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test	50.0%	100.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. Witold M. Lewandowski, Proekologiczne odnawialne źródła energii. Wydawnictwo Naukowo-Techniczne, 2010.</li> <li>2. Bogdan Szymański, Instalacje fotowoltaiczne. GlobEnergia 2020.</li> </ol>	
	Supplementary literature	<ol style="list-style-type: none"> <li>1. Ewa Klugman-Radziszewska, Fotowoltaika w teorii i praktyce. BTC, 2010.</li> <li>2. Articles and websites devoted to renewable energy sources</li> </ol>	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<p>Selection of PV installations</p> <p>Design, construction and exploitation problems of renewable energy sources</p>		
Work placement	Not applicable		