

**Subject card**

<b>Subject name and code</b>	Green energy technologies, PG_00179539						
<b>Field of study</b>	Chemistry, Environmental Protection						
<b>Date of commencement of studies</b>	October 2026	<b>Academic year of realisation of subject</b>			2026/2027		
<b>Education level</b>	Master's studies	<b>Subject group</b>			Optional subject group		
<b>Mode of study</b>	full-time studies	<b>Mode of delivery</b>			at the university		
<b>Year of study</b>	1	<b>Language of instruction</b>			Polish		
<b>Semester of study</b>	2	<b>ECTS credits</b>			2.0		
<b>Learning profile</b>	academic	<b>Assessment form</b>			credit		
<b>Conducting unit</b>	Faculty of Chemistry -> Rector						
<b>Name and surname of lecturer (lecturers)</b>	<b>Subject supervisor</b>		dr inż. Aleksandra Pieczyńska				
	<b>Teachers</b>						
<b>Lesson types</b>	<b>Lesson type</b>	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	<b>Number of study hours</b>	0.0	0.0	30.0	0.0	0.0	30
	E-learning hours included: 0.0						
<b>Learning activity and number of study hours</b>	<b>Learning activity</b>	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	<b>Number of study hours</b>	30		10.0		20.0	60
<b>Subject objectives</b>	The aim of the course is to introduce students to modern technologies for generating, storing and using energy in a sustainable and environmentally friendly way.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[OŚMU2_K02] Recognises threats, creates safe work conditions and is responsible for the safety of own and other people's work.	Demonstrates responsibility for the proper conduct of the experiment	[SK8] observation of student's independent or team work
	[OŚMU2_U01] On the basis of the acquired knowledge, proposes to solve environmental problems.	in an understandable manner both in speech and writing, presents correct technological reasoning, performs the analysis of the selected parameter based on the procedure; predicts, verifies and submits to criticism the results of the conducted experiments	[SU2] presentation/project/paper/report
	[OŚMU2_W04] Chooses methods, techniques and research tools used in environmental protection.	lists and characterizes the basic ways of obtaining renewable energy applies the basic technological and chemical concepts describing the process of obtaining renewable energy discusses the advantages and disadvantages of producing and using energy from renewable sources	[SW3] text preparation/written work
	[OŚMU2_W08] Explains the mechanisms of unit processes used in environmental protection and waste management methods.	lists and characterizes the basic ways of obtaining renewable energy; classifies raw materials and appropriate technologies for the production of biofuels	[SW5] implementation of a problem task
[OŚMU2_W09] Applies safety and hygiene principles when working independently on a test or measurement stand in a laboratory or in the field.	Follows established procedures research;	[SW1] oral statement/conversation/discussion	
Subject contents	<p>Students will gain knowledge of renewable energy sources and innovative solutions to improve energy efficiency. Topics will include: renewable energy sources (RES) including solar energy (photovoltaics, solar panels), wind energy, hydropower (hydroelectric, tidal and wave power plants), solid biomass, liquid biomass and biogas (combustion and fermentation technologies), geothermal and energy storage technologies (batteries, hydrogen, heat storage).</p> <p>The problems of the exercises include the performance of exercises thematically related to the acquisition of energy from renewable sources and the production of biofuels.</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test	51.0%	60.0%
	raport	51.0%	30.0%
	activity at classes	50.0%	10.0%
Recommended reading	Basic literature	Proekologiczne odnawialne źródła energii, W.M. Lewandowski, WNT 2012 Biopaliwa, W.M. Lewandowski, M. Rymś, WNT 2013 Biopaliwa, technologie dla zrównoważonego rozwoju, E. Klimiuk, M. Pawłowska, T. Pokój, PWN 2012 Technologie energetyczne, Tadeusz Chmielak, PWN, 2018 Energetyka wodorowa, Tadeusz Chmielak, PWN, 2020	
	Supplementary literature	Pandey A., Handbook of plant-based biofuels, CRC Press Taylor & Francis Group, 2009 Fundamentals of Energy generation, Ewa Klugmann-Radziemska, Wydawnictwo PG, 2009	
	eResources addresses		
Example issues/ example questions/ tasks being completed	charakterystyka ogniw fotowoltaicznych  Budowa i zasada działania turbiny wiatrowej		

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