



Subject card

Subject name and code	Eco-energy, PG_00035156						
Field of study	Engineering and Technologies of Energy Carriers						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group			Obligatory subject group in the field of study Subject group related to practical vocational preparation		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			5.0		
Learning profile	practical profile	Assessment form			exam		
Conducting unit	Department of Energy Conversion and Storage -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. Ewa Klugmann-Radziemska					
	Teachers	prof. dr hab. Ewa Klugmann-Radziemska dr inż. Anna Kuczyńska-Łażewska					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	15.0	0.0	75
	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	75		5.0		45.0	125
Subject objectives	To familiarize students with the issues of energy generation in relation to the protection of the natural environment						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K7_U01	the student is able to plan and carry out experiments, interpret the results obtained and draw conclusions	[SU1] Assessment of task fulfilment
	K7_W05	student knows and understands the basic processes taking place in the apparatus and its components used for the production and conversion of electricity, knows and understands in an in-depth degree - selected issues of generating energy from conventional and renewable sources as well as their transmission and storage	[SW2] Assessment of knowledge contained in presentation
	K7_U04	student is able to assess the usefulness and the possibility of using new achievements when formulating and solving complex engineering tasks, including atypical tasks as well as simple research problems	[SU2] Assessment of ability to analyse information
	K7_W02	student knows and understands selected issues in the field of advanced detailed knowledge concerning the production, conversion and modification of performance and operation and transmission of energy and its carriers	[SW1] Assessment of factual knowledge
K7_W06	the student has structured and theoretically founded knowledge covering key issues and selected issues in the field of advanced detailed knowledge in the field of engineering and technology of energy carriers	[SW1] Assessment of factual knowledge	
Subject contents	1. Conventional energy. Natural fuels and their resources. 2. The impact of non-renewable fuels on the natural environment. 3. Renewable energy sources - introduction. 4. Solar radiation. 5. Solar collectors. 6. Photovoltaic cells. 7. Possibilities of using solar energy in Poland and in the world. 8. Biomass and biofuels. 9. Biogaz. 10. Water therapy. 11. Wind energy. 12. Geothermal energy. 13. Heat pumps. 14. Fuel cells. 15. Storage of energy. 16. Ecological and economic aspects of the use of renewable energy sources. 17. Project of heating installation / building supply with the use of environmentally friendly energy.		
Prerequisites and co-requisites	Completed courses in mathematics and physics at the level of first-cycle studies		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	exercises, project	70.0%	50.0%
	egzam	60.0%	50.0%
Recommended reading	Basic literature	<p>Ewa Klugmann-Radziemska, <i>Fotowoltaika w teorii i praktyce</i>, Warszawa-Legionowo: Wyd. BTC, 2010, s. 200: 123 rys., 39 tab. - bibliogr. 105 poz. - ISBN 978-83-60233-58-0</p> <p>Lewandowski Witold, Klugmann-Radziemska Ewa, <i>Proekologiczne odnawialne źródła energii. Kompendium</i>, Wydawnictwo Naukowe PWN, 2017, s. 488, ISBN:978-83-01-19067-5</p> <p>E.Klugmann-Radziemska <i>Odnawialne Źródła Energii - Przykłady obliczeniowe</i>, Wyd. Politechniki GdańskiejGdańsk 2009, 2010, s.1-100, wyd. III,IV</p> <p>E.Klugmann-Radziemska, <i>Fundamentals of Energy Generation</i>, Wyd. Politechniki Gdańskiej, Gdańsk 2009, s.189</p>	

	Supplementary literature	Photovoltaic Geographical Information System (PVGIS) Regulation of the Minister of Infrastructure and Construction regarding technical conditions which should be met by buildings and their location Polish Standardization Documents Catalogs of device manufacturers
	eResources addresses	Adresy na platformie eNauczanie: Ekoenergia - Moodle ID: 32172 https://enauzanie.pg.edu.pl/moodle/course/view.php?id=32172
Example issues/ example questions/ tasks being completed	1. Convert 500, 50 and 5 tons of CO ₂ equivalent to mass limits for refrigerant HFC-23 (GWP = 14,800). 2. Estimate what amount of energy can be obtained from PV modules in a single-family house, which has a floor area of 100 m ² , roof slope in the south direction is 45°, year-round efficiency of 12% PV cells, and total energy losses of 15%. H = 1150 kWh / m ² .	
Work placement	Not applicable	