GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Eco-energy, PG_00066044		
Field of study	Engineering and Technologies of Energy Carriers		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
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	4.0
Learning profile	practical profile	Assessment form	exam
Conducting unit	Department of Energy Conversion and Storage -> Faculty of Chemistry -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. Ewa Klugmann-Radziemska	
	Teachers	dr inż. Anna Kuczyńska-Łażewska prof. dr hab. Ewa Klugmann-Radziemska	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	20.0	0.0	30.0	15.0	0.0	65

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	65	10.0	25.0	100

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_U04] prepares a critical analysis of existing technical solutions and is able to propose their improvements (improvements).	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] identifies the problems of modern chemical engineering including the properties of energy carriers, lists the types of these carriers and outlines the prospects for their development	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] defines the techniques of designing technological processes; describes the methods of selecting the right technological process; the resistance of materials to degradation, degradation mechanisms and methods of improving corrosion resistance	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
[K7_U01] is integrates and interprets information from literature, databases and other sources	the student is able to plan and carry out experiments, interpret the results obtained and draw conclusions	[SU1] Assessment of task fulfilment

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
egzam	60.0%	50.0%
exercises, project	70.0%	50.0%

Recommended reading

Basic literature	Ewa Klugmann-Radziemska, *Fotowoltaika w teorii i praktyce*, Warszawa-Legionowo: Wyd. BTC, 2010, s. 200: 123 rys., 39 tab. - bibliogr. 105 poz. - ISBN 978-83-60233-58-0 Lewandowski Witold, Klugmann-Radziemska Ewa, *Proekologiczne odnawialne źródła energii. Kompendium,* Wydawnictwo Naukowe PWN, 2017, s. 488, ISBN:978-83-01-19067-5 E.Klugmann-Radziemska *Odnawialne Źródła Energii - Przykłady obliczeniowe*, Wyd. Politechniki GdańskiejGdańsk 2009, 2010, s.1-100, wyd. III,IV E.Klugmann-Radziemska, *Fundamentals of Energy Generation,* Wyd. Politechniki Gdańskiej, Gdańsk 2009, s.189
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	

Example issues/ example questions/ tasks being completed	1. Convert 500, 50 and 5 tons of CO2 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 m2, roof slope in the south direction is 45o, year-round efficiency of 12% PV cells, and total energy losses of 15%. H = 1150 kWh / m2.
Work placement	Not applicable

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