GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Alternative Energy Sources, PG_00048977						
Field of study	Green Technologies						
Date of commencement of studies	October 2022		Academic year of realisation of subject	2022/2023			
Education level	second-cycle studies		Subject group	Obligatory subject group in the field of study			
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	2.0			
Learning profile	general academic profile		Assessment form	assessment			
Conducting unit	Department of Energy Conversion and Storage -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Anna Dettlaff					
	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	15.0	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	5.0	15.0	50
Subject objectives	Introducing students to the renewable energy sources				

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W05] has an broader knowledge of the advanced concepts and problems of quality management, application of the principles of work organization and integrated management and the knowledge necessary to understand the social, economic, legal and other non-technical considerations engineering activities, knows the basic principles of health and safety in force in environmental	The student has knowledge of non-technical conditions related to renewable energy sources.	[SW1] Assessment of factual knowledge
[K7_U03] capable of formulating and solving design tasks in the field of environmental technology to recognize their non-technical aspects, including environmental, economic and legal. Applies the principles of occupational health and safety	Student is able to assess and rank the resources of various types of renewable energy sources available today and in the future.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
[K7_K03] can consciously and supported by the experience to present your work, provide information in a manner commonly understood, to communicate, to make self-assessment and constructive criticism of the work of others, the reasons for different points of view	Student is able to specify and describe the traditional and renewable energy sources, knows their drawbacks, advantages, and environmental impact.	[SK2] Assessment of progress of work
[K7_W03] will have a detailed knowledge of the theoretical basis of methods and types of apparatus used in chemical analysis of environmental pollutants and the technology of cleaning and neutralization of industrial waste and wastewater management and the design and supervision of environmentally friendly technologies	Student knows how to convert solar, wind, hydro, biomass, geothermal and other energy into useful form of energy, like heat or electricity.	[SW1] Assessment of factual knowledge

Subject contents

Characteristics and estimation of conventional energy resources and their impact on environmental contamination.Presentation of the types, resources and possibilities of using environmentally friendly renewable energy sources, such as: hydropower (energy of water flow, energy of water level differences, wave energy, tidal energy, energy of currents); solar energy (low-temperature and high-temperature solar energy systems, active and passive systems, decentralized systems, centralized systems, solar collectors, photovoltaic cells); wind energy (lifting force, onshore and offshore wind farms); geothermal energy (geothermal energy resources, geothermal plants, heat pumps); solid, liquid and gas biofuels (energy wood, straw, biodiesel, bioethanol, biomethanol, biohydrogen, biogas, wood gas).Energy storage as a way to make renewable energy sources independent of the weather (technologies of mechanical, electrochemical, electrical, chemical and thermal energy storage, hydrogen energy, galvanic cells, fuel cells, electrochemical capacitors).

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test	60.0%	100.0%

Recommended reading	Basic literature	W. M. Lewandowski, E. Klugmann-Radziemska Proekologiczne odnawialne źródła energii. Kompendium, Wydawnictwo Naukowe PWN, 2017 W. M. Lewandowski, M. Ryms Biopaliwa. Proekologiczne odnawialne źródła energii, WNT, 2013 M. Budziszewska, A. Kardaś, Z. Bohdanowicz Klimatyczne ABC. Interdyscyplinarne podstawy współczesnej wiedzy o zmianie klimatu, Wydawnictwa Uniwersytetu Warszawskiego, 2021 B.K. Hodge Alternative Energy systems and applications, Wiley, 2017 E.E. Michaelides Alternative Energy Sources, Springer, 2012 B. Viswanathan Energy Sources. Fundamentals of Chemical Conversion Process and Applications, Elsevier, 2017 I. Stober, K. Bucher Geothermal Energy: From Theoretical Models to Exploration and Development Springer-Verlag Berlin Heidelberg, 2013 T. Abbasi, S.M. Tauseef, S.A. Abbasi, Biogas Energy, Springer, 2012
	Supplementary literature	No recommendations
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	What are the differences between a solar collector and a photovoltaic cell? Describe how the heat pump works.	
Work placement	Not applicable	