



Subject card

Subject name and code	Alternative Energy Sources, PG_00065960						
Field of study	Green Technologies						
Date of commencement of studies	February 2027		Academic year of realisation of subject		2026/2027		
Education level	second-cycle studies		Subject group		Optional subject group		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Energy Conversion and Storage -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Anna Dettlaff				
	Teachers						
Lesson types	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_K03] understands non-technical aspects and effects of graduates' activities, including the impact on the environment		Students will be able to identify and characterise conventional and non-conventional energy sources, know their advantages, disadvantages and environmental impact.		[SK5] Assessment of ability to solve problems that arise in practice		
	[K7_U06] conducts a critical analysis of the functioning of existing technical solutions in the field of environmental protection technology, and a preliminary economic analysis of the engineering activities undertaken		The student is able to estimate and rank the resources of the different types of energy sources available now and in the future.		[SU3] Assessment of ability to use knowledge gained from the subject		
	[K7_W06] defines the principles of sustainable development, national and European conditions for environmental management, in the field of intellectual property protection and patent law		The student knows how to convert the energy of the sun, wind, water, biomass, biogas, geothermal and others into useful thermal or electrical energy.		[SW1] Assessment of factual knowledge		

Subject contents	Course content – lecture		
	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		
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.		
Practical activites within the subject	Not applicable		

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