



Subject card

Subject name and code	PHYSICAL AND CHEMICAL METHODS OF ENERGY GENERATION, PG_00064334						
Field of study	Chemical Technology						
Date of commencement of studies	February 2025	Academic year of realisation of subject			2024/2025		
Education level	second-cycle studies	Subject group			Optional subject group Specialty subject group Subject group related to scientific research 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	1	ECTS credits			3.0		
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 hab. inż. Katarzyna Januszewicz				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	0.0	0.0	45
	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	45		3.0		27.0	75
Subject objectives	The aim of the classes is to familiarize students with aspects of physical and chemical methods of generating energy, as well as to discuss their advantages, disadvantages and challenges associated with them.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W03] selects methods of data analysis, including statistical and modelling, useful for solving scientific and technological problems		The student is able to explain the physical and chemical processes related to the production, conversion and storage of energy. Understands the processes involved in the production and movement of pollutants associated with the energy industry		[SW2] Assessment of knowledge contained in presentation		
	[K7_U05] uses instrumental methods applied in technology and related fields		The student is able to calculate the costs of producing energy from various sources and the environmental costs related to the generation, conversion and transmission of energy.		[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject		
	[K7_U04] predicts the properties of the materials obtained and the course of processes involving them, based on knowledge of technology and related fields and computer methods of data analysis, modelling and simulation		The student is able to explain the physical and chemical processes related to the production, conversion and storage of energy. Understands the processes involved in the production and movement of pollutants associated with the energy industry		[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment		

Subject contents	<p>LECTURE:1. Global and Polish energy market.2. Sustainability.3. Conventional energy sources: coal, natural gas, crude oil: resources, amount of energy generated, construction of power plants. Nuclear energy: resources, construction and principles of operation of power plants.4. Chemical and physical methods of energy conversion.5. Obtaining energy from renewable sources.6. Waste as a new potential energy source. 7. Processes of extraction, processing and use of raw materials.LABORATORIES: Work in groups using research stations. Familiarization with the principles of operation, laws and calculations in the field of physical and chemical methods of energy conversion.1. Low-temperature solar energy systems.2. Wind energy.3. Biomass recycling (biodiesel, combustion, pyrolysis)4. Fuel cells.5. Heat pump.</p>		
Prerequisites and co-requisites	None		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory tests	60.0%	50.0%
	Exam	60.0%	50.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Klugmann-Radziemska E., Lewandowski W., Wilamowska-Zawłocka M., Dettlaff A., Januszewicz K., Ryms M., Kuczyńska-Łażewska A., Energetyka i ochrona środowiska. Generowanie i magazynowanie energii. Odpady energetyczne. Analiza cyklu życia, PWN, 2023 2. W. M. Lewandowski, E. Klugmann-Radziemska Proekologiczne odnawialne źródła energii. Kompendium, Wydawnictwo Naukowe PWN, 2017 3. W. M. Lewandowski, M. Ryms Biopaliwa. Proekologiczne odnawialne źródła energii, WNT, 2013 	
	Supplementary literature	<ol style="list-style-type: none"> 1. E. Klugmann-Radziemska. Fundamentals of Energy Generation. Wyd. P.G. Gdańsk 2009 2. B. Viswanathan Energy Sources. Fundamentals of Chemical Conversion Process and Applications, Elsevier, 2017 	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<p>Discuss the principle of operation of a nuclear power plant,</p> <p>What determines the efficiency of a solar collector or wind farm?</p> <p>What methods can be used to obtain energy from waste?</p> <p>Describe the process of obtaining biofuel.</p>		
Work placement	Not applicable		

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