



## Subject card

Subject name and code	Modern Sources of Electric Energy, PG_00038484						
Field of study	Electrical Engineering						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2023/2024		
Education level	second-cycle studies		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	2		ECTS credits		1.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Electrical Power Engineering -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Marcin Jaskólski				
	Teachers		dr inż. Marcin Jaskólski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15		2.0		8.0	25
Subject objectives	The purpose of the course is to provide general information about modern energy sources.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K7_W12		Students know the economic indicators of selected energy generation systems and how to use them to calculate costs.		[SW1] Assessment of factual knowledge		
	K7_U11		Students are able to calculate selected technical and economic indicators for the electricity generation system.		[SU1] Assessment of task fulfilment		
	K7_U09		Students are able to calculate selected technical and economic indicators for the electricity generation system.		[SU1] Assessment of task fulfilment		
	K7_W12		Students know the economic indicators of selected energy generation systems and how to use them to calculate costs.		[SW1] Assessment of factual knowledge		
	K7_W08		Students know the structures of selected electricity generation systems and understand the principles of their operation.		[SW1] Assessment of factual knowledge		
	K7_K03		Students are able to determine the quantities characterizing electricity generation systems based on fossil fuels, nuclear fuels and renewable energy resources.		[SK5] Assessment of ability to solve problems that arise in practice		
	K7_K02		Students know the impact on the natural environment of electricity generation systems based on fossil fuels, nuclear fuels and renewable energy resources.		[SK5] Assessment of ability to solve problems that arise in practice		

Subject contents	General data concerning the large part and importance of new energy sources for national power system. Different kinds of the sources especially the planed energy sources in Poland. Balancing principles of energy objects on the examples of: conventional steam power plants, especially the ultra supercritical plants and also these which are equiped with the hybrid systems with coal gasification and the boilers with fluidised bed combustion chamber and also with combined gas and steam blocks. Nuclear power stations with reactors of the latest generation. Small hybrid systems with biomass-fired plants, wind plants, solar stations and installations equiped with fuel cells. Small combined heat and power systems based on Diesellengine-sets plants or gas turbine plants. Solutions of plants based on different kinds of nonconventional energy sources (geothermal, sea and ocean water energy, stations with MHD-generators). Calculations of technical and operating coefficients of above-mentioned sources. Importance of environmental protection problems.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Knowledge test	60.0%	100.0%
Recommended reading	Basic literature	1. Kubowski J.: <i>Nowoczesne elektrownie jądrowe</i> . WNT, Warszawa 2010 2. Pawlik M., Strzelczyk F.: <i>Elektrownie</i> . WNT, Warszawa 2009 3. Chmielniak T.: <i>Technologie energetyczne</i> . WNT, Warszawa 2008	
	Supplementary literature	1. Praca zbiorowa: <i>Poradnik inżyniera elektryka. Tom III</i> . WNT, Warszawa 2007 2. Cieśliński J., Mikieliewicz J.: <i>Niekonwencjonalne źródła energii</i> . Wydawnictwo Politechniki Gdańskiej, Gdańsk 1996 3. Szargut J., Ziębik A.: <i>Podstawy energetyki cieplnej</i> . WNP, Warszawa 2000 4. Lewandowski W.: <i>Proekologiczne odnawialne źródła energii</i> . WNT, Warszawa 2007.	
	eResources addresses	Adresy na platformie eNauczanie: NOWOCZESNE ŹRÓDŁA ENERGII ELEKTRYCZNEJ [2023/24] - Moodle ID: 32212 <a href="https://enauzanie.pg.edu.pl/moodle/course/view.php?id=32212">https://enauzanie.pg.edu.pl/moodle/course/view.php?id=32212</a>	
Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none"><li>• What moisture content is accepted in steam turbine? What might be the effect of too low steam quality?</li><li>• Show feedwater heating on an h-s graph and a schematic diagram of turbine system.</li><li>• What is the role of mixing system in a biogas plant?</li><li>• What are the advantages and disadvantages of fuel cells?</li></ul>		
Work placement	Not applicable		