



Subject card

Subject name and code	Problems of renewable energy sources, PG_00050170						
Field of study	Mechanical Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
Education level	first-cycle studies	Subject group			Optional subject group Subject group related to scientific research in the field of study		
Mode of study	Part-time studies	Mode of delivery			at the university		
Year of study	3	Language of instruction			Polish		
Semester of study	5	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Energy and Industrial Apparatus -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Bartosz Dawidowicz				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	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		8.0		62.0	100
Subject objectives	Presentation of the modern achievements and tendencies in the area of renewable energy resources utilization. Classification of renewable energy resources. Possibilities of renewable energy resources utilization in Polish conditions. Discussion of theoretical backgrounds of selected technologies.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K6_U07] is able to design a typical construction of a mechanical device, component or a testing station using appropriate methods and tools, adhering to the set usage criteria		The student knows the basic physical phenomena used in renewable energy. He can design a system for energy conversion.			[SU1] Assessment of task fulfilment	
	[K6_W09] possesses basic knowledge within the range of thermodynamics and fluid mechanics, construction and operation of heat generating devices, process equipment, including renewable energy sources, cooling and air conditioning		The student is able to make basic calculations in the field of energy conversion and interpret the results.			[SW1] Assessment of factual knowledge	
Subject contents	Energy resources. Ocean and sea resources. Tidal energy. Wave energy. Osmotic energy. Ocean thermal energy conversion. Wind energy. Betz criterion. Aerogenerators. Hydro-power. Water turbines. Hydropower stations - types and characteristics. Geothermal energy. Dry rock and aquifer resources. Geothermal power stations and heat-generating plants. Solar energy. Solar collectors. Solar ponds. Solar "power tower". Solar "thermal tower". Photovoltaics. Exercises - estimation of the power of tidal-, wave- and osmotic power plant as well as OTEC cycle, - wind power, rotor diameter of aerogenerator, - calculation of the power of hydropower plant, - efficiency of geothermal power plant, - surface area and efficiency of solar collector Laboratory 1. Characteristics of solar collector 2. Characteristics of photovoltaic panel 3. Characteristics of micro-wind generator						
Prerequisites and co-requisites	Thermodynamics, fluid mechanics, heat transfer						
Assessment methods and criteria	Subject passing criteria		Passing threshold			Percentage of the final grade	
	Lecture - test		56.0%			60.0%	
	Laboratory - report, test		56.0%			40.0%	

Recommended reading	Basic literature	1. Mikielwicz J., Cieśliński J.T.: Niekonwencjonalne urządzenia i systemy konwersji energii. Maszyny Przepływowe pod red. E.S. Burki. Tom 24. IMP PAN, Ossolineum Wrocław 1999. 2. Cieśliński J.T.: Niekonwencjonalne urządzenia i układy energetyczne. Przykłady obliczeń. Wyd. PG 1997. 3. Lewandowski W.M.: Proekologiczne źródła energii odnawialnej. WNT W-wa, 2001. 4. Twidell J.W., A.D Weir: Renewable energy sources. London: Chapman and Hall 1990
	Supplementary literature	Journal: Czysta Energia
	eResources addresses	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Physical properties of renewable sources 2. OTEC system 3. Classification of hydro power plants and their advantages 4. Types of geothermal sources and scheme of the binary power plant 5. Features of wind/electricity generating systems 6. Solar constant 	
Work placement	Not applicable	