



## Subject card

Subject name and code	Renewable Energy Sources, PG_00053656						
Field of study	Mechanical Engineering						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2024/2025		
Education level	first-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		English		
Semester of study	5		ECTS credits		2.0		
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		prof. dr hab. inż. Janusz Cieśliński				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	15.0	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		0.0		0.0	45
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. Discussion of theoretical backgrounds of selected technologies.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_W12		The student has basic knowledge necessary to understand non-technical conditions of using various energy sources, including renewable and unconventional sources.		[SW1] Assessment of factual knowledge		
	K6_U01		The student is able to independently find information about the current state of knowledge in the field of renewable energy sources.		[SU1] Assessment of task fulfilment		
	K6_W09		Student knows basic characteristics of renewable resources.		[SW1] Assessment of factual knowledge		
	K6_U06		The student knows the value of CO2 emissions for each technology. Can determine the efficiency of appliances.		[SU1] Assessment of task fulfilment		
Subject contents	<p>Lecture: 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.</p> <p>Tutorial: 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.</p> <p>Laboratory: 1. Characteristics of solar collector 2. Characteristics of photovoltaic panel 3. Characteristics of micro-wind generator 4. Operation of hydropower plant.</p>						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Test	56.0%	90.0%
	Laboratory reports	100.0%	10.0%
Recommended reading	Basic literature	Michealides E.E.: Alternative Energy Sources. Springer-Verlag Berlin Heidelberg (2012).  Ghosh T.K., Prelas M.A.: Energy Resources and Systems. Springer Dordrecht Heidelberg London New York (2011).  Kaltschmitt M., Streicher W., Wiese A.: Renewable Energy: Technology Economics and Environment. Springer-Verlag Berlin Heidelberg (2007).	
	Supplementary literature	<a href="https://www.journals.elsevier.com/energy">https://www.journals.elsevier.com/energy</a>	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	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		