



## Subject card

Subject name and code	Renewable Energy Sources, PG_00053656						
Field of study	Mechanical Engineering, Mechanical Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2022/2023		
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		dr hab. inż. Jacek Kropiwnicki				
	Teachers		mgr inż. Stanisław Gluch dr hab. inż. Jacek Kropiwnicki				
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 Address on the e-learning platform: <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=8101">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=8101</a>						
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	<table border="1" data-bbox="450 548 1489 651"> <thead> <tr> <th data-bbox="450 548 794 584">Subject passing criteria</th> <th data-bbox="794 548 1139 584">Passing threshold</th> <th data-bbox="1139 548 1489 584">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="450 584 794 620">Test</td> <td data-bbox="794 584 1139 620">56.0%</td> <td data-bbox="1139 584 1489 620">90.0%</td> </tr> <tr> <td data-bbox="450 620 794 651">Laboratory reports</td> <td data-bbox="794 620 1139 651">100.0%</td> <td data-bbox="1139 620 1489 651">10.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Test	56.0%	90.0%	Laboratory reports	100.0%	10.0%
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Example issues/ example questions/ tasks being completed	<ol data-bbox="450 1131 1489 1606" style="list-style-type: none"> <li>1. Physical properties of renewable sources</li> <li>2. OTEC system</li> <li>3. Classification of hydro power plants and their advantages</li> <li>4. Types of geothermal sources and scheme of the binary power plant</li> <li>5. Features of wind/electricity generating systems</li> <li>6. Solar constant</li> </ol>											
Work placement	Not applicable											