



Subject card

Subject name and code	Renewable Energy Sources, PG_00042100						
Field of study	Power Engineering, Power Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject				2023/2024	
Education level	first-cycle studies	Subject group				Obligatory subject group in the field of study 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	3	Language of instruction				English	
Semester of study	5	ECTS credits				3.0	
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						
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	5.0		25.0		75
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_W11] has knowledge of known technologies and non-technical aspects to solve simple engineering tasks in the field of energy systems and devices						
	[K6_W10] knows the basic installations in the field of renewable energy sources and their impact on the environment		Student zna podstawowe charakterystyki odnawialnych źródeł energii.				
	[K6_W06] knows classic and developmental energy technologies, rules for the selection and operation of heat and energy devices and installations, basic principles of energy systems operation, basic issues regarding the reliability of energy devices and diagnostics, environmental effects of energy technologies used, methods of using renewable energy sources		The student knows the value of CO2 emissions for each technology. Can determine the efficiency of appliances.				

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="450 542 1489 645"> <thead> <tr> <th data-bbox="450 542 794 577">Subject passing criteria</th> <th data-bbox="794 542 1139 577">Passing threshold</th> <th data-bbox="1139 542 1489 577">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="450 577 794 613">Laboratory reports</td> <td data-bbox="794 577 1139 613">90.0%</td> <td data-bbox="1139 577 1489 613">10.0%</td> </tr> <tr> <td data-bbox="450 613 794 645">Test</td> <td data-bbox="794 613 1139 645">56.0%</td> <td data-bbox="1139 613 1489 645">90.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Laboratory reports	90.0%	10.0%	Test	56.0%	90.0%
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Example issues/ example questions/ tasks being completed	<ol data-bbox="450 1034 1489 1518" 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											