



Subject card

Subject name and code	Renewable Energy Sources, PG_00042100						
Field of study	Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2022/2023		
Education level	first-cycle studies	Subject group			Optional subject group 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	mgr inż. Stanisław Głuch 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							
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_W10	Student zna podstawowe charakterystyki odnawialnych źródeł energii.					
	K6_W06	The student knows the value of CO2 emissions for each technology. Can determine the efficiency of appliances.					
Subject contents	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.						
	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.						
	Laboratory: 1. Characteristics of solar collector 2. Characteristics of photovoltaic panel 3. Characteristics of micro-wind generator 4. Operation of hydropower plant.						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria	Passing threshold			Percentage of the final grade		
	Laboratory reports	90.0%			10.0%		
	Test	56.0%			90.0%		

Recommended reading	Basic literature	<p>Michealides E.E.: Alternative Energy Sources. Springer-Verlag Berlin Heidelberg (2012).</p> <p>Ghosh T.K., Prelas M.A.: Energy Resources and Systems. Springer Dordrecht Heidelberg London New York (2011).</p> <p>Kaltschmitt M., Streicher W., Wiese A.: Renewable Energy: Technology Economics and Environment. Springer-Verlag Berlin Heidelberg (2007).</p>
	Supplementary literature	https://www.journals.elsevier.com/energy
	eResources addresses	<p>Adresy na platformie eNauczenie:</p> <p>Renewable Energy Sources - W/C/L, E+MiBM, sem.05, (PG_00042100) - Nowy - Moodle ID: 19940</p> <p>https://enauczenie.pg.edu.pl/moodle/course/view.php?id=19940</p>
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	