



Subject card

Subject name and code	Geothermic, Geothermal and Solar Systems for Heat and Electricity Production, PG_00042214						
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			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	Full-time studies	Mode of delivery			at the university		
Year of study	4	Language of instruction			Polish		
Semester of study	7	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Zakład Ogrzewnictwa, Wentylacji, Klimatyzacji i Chłodnictwa -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jan Wajs					
	Teachers	dr hab. inż. Jan Wajs mgr inż. Piotr Jasiukiewicz					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	8.0	0.0	0.0	23
	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	23		3.0		24.0	50
Subject objectives	Discussion on the power engineering technology applied to the energy from geothermal and solar resources conversion processes.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_W13	Student is able to perform thermodynamic calculations of the geothermal/solar energy conversion system.			[SW1] Assessment of factual knowledge		
	K6_U08	Student is able to design the system for geothermal/solar energy conversion, select the auxiliary devices, estimate the profitability of the investment.			[SU4] Assessment of ability to use methods and tools		
Subject contents	<p>LECTURE: Origin of geothermal energy and its characteristics and place in Europe and in the World, the basic concepts of geothermal energy. Selection of geothermal energy in Poland. Shallow geothermal energy and its use in heating. Systems supported by geothermic energy and geothermal energy. Solar radiation and evaluation of its resources, solar conditions in Poland. Thermal conversion of solar energy (solar collectors). Photoelectric conversion of solar energy (photovoltaic collectors). Energy systems supported by the solar energy.</p> <p>LABORATORIES: Study trip to chosen company that use geothermal energy (cooperation with Geotermia Mazowiecka company plant in Mszczonow). Determination of energy efficiency of solar collector.</p>						
Prerequisites and co-requisites	knowledge from course of Applied thermodynamics and Heat transfer						
Assessment methods and criteria	Subject passing criteria	Passing threshold			Percentage of the final grade		
	laboratory reports	100.0%			20.0%		
	written test	56.0%			80.0%		

Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. I. Stober, K. Bucher, Geothermal energy - from theoretical models to exploration and development. Springer, Berlin, 2013. 2. G.N. Tiwari, A.S. Tiwari, Handbook of solar energy - theory, analysis and applications. Springer, Berlin 2016. 3. A. Mcevoy, T. Markvart, L. Castaner, Practical handbook of photovoltaics. Academic Press, Cambridge, 2011.
	Supplementary literature	no requirements
	eResources addresses	Adresy na platformie eNauczenie:
Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none"> • The term of geothermal energy • Discuss the operational principle of the evacuated tube solar collector • Discuss the operational principle of flat-plate solar collector • Design and use of the solar collectors • Discuss the operational principle of photovoltaic cell • Design and use of the photovoltaic modules 	
Work placement	Not applicable	