



Subject card

Subject name and code	, PG_00058648									
Field of study	Power Engineering, Power Engineering, Power Engineering									
Date of commencement of studies	February 2022	Academic year of realisation of subject				2022/2023				
Education level	second-cycle studies	Subject group								
Mode of study	Full-time studies	Mode of delivery				at the university				
Year of study	1	Language of instruction				Polish				
Semester of study	2	ECTS credits				3.0				
Learning profile	general academic profile	Assessment form				assessment				
Conducting unit	Department of Sanitary Engineering -> Faculty of Civil and Environmental Engineering									
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Ewa Zaborowska								
	Teachers									
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM			
	Number of study hours	30.0	0.0	0.0	15.0	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	The aim of the course is to familiarize students with knowledge in the field of installations related to heat sources (renewable and non-renewable), design principles, methods and technologies for the implementation of the installations in question, the choice of energy, environmentally and economically efficient solutions.									
Learning outcomes	Course outcome	Subject outcome			Method of verification					
	[K7_U02] is able to use known mathematical and numerical methods to analyze and design elements, systems and power transmission networks and internal installations	Can apply calculation procedures to design heat source installations and analyze selected solutions.			[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools					
	[K7_W07] knows the environmental effects of energy technologies used; is familiar with the issues of effective energy management and use of renewable energy sources, has a broad and well-established knowledge of the processes of energy production and use	Knows the principles of design and is able to choose heat source solutions characterized by energy efficiency; can assess their impact on the environment.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects					
Subject contents	Technology and installation equipment for renewable and non-renewable heat sources: boiler houses for solid, liquid and gaseous fuels, central units equipped with heat pumps and others. Hydraulic systems. Control systems. Devices and fittings. Requirements for boiler houses depending on the type of fuel used. Distribution and storage of fuels. Installations supplying fuel to boilers. Accompanying installations in heat sources: ventilation, combustion, water and wastewater. Designing the installation of heat sources. Analysis of selected solutions, taking into account energy, economic and environmental criteria.									
Prerequisites and co-requisites	Basics of hydraulics and thermodynamics.									
Assessment methods and criteria	Subject passing criteria	Passing threshold			Percentage of the final grade					
	Project	50.0%			50.0%					
	Written test	50.0%			50.0%					
Recommended reading	Basic literature	1. Lewandowski W.M.: Proekologiczne źródła energii odnawialnej, WNT, Warszawa 2007. 2. Zaborowska E.: Projektowanie kotłowni wodnych na paliwa ciekłe i gazowe. Wyd. PG, Gdańsk 2012; 2013 itd. 3. Pisarev V.: Projektowanie instalacji grzewczych z pompami ciepła. Politechnika Rzeszowska 2013. 4. Regulations and standards related to the subject, technical requirements of COBRTI Instal.								

	Supplementary literature	<ol style="list-style-type: none"> 1. Nowak W. i in.: Zastosowanie odnawialnych źródeł energii. Wydawnictwo Uczelniane PSz., Szczecin 2008. 2. Skorek J., Kalina J.: Gazowe układy kogeneracyjne. WNT, Warszawa 2005. 3. Design guidelines and manufacturer's data sheets. 4. Technical journals and websites of manufacturers/suppliers of equipment and fittings.
	eResources addresses	
Example issues/ example questions/ tasks being completed	Design of the installation of heat sources along with the analysis of selected solutions, taking into account energy, economic and environmental criteria.	
Work placement	Not applicable	