



## Subject card

Subject name and code	, PG_00060036						
Field of study	Environmental Engineering						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group			Optional 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	dr hab. inż. Ewa Zaborowska					
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	5.0		30.0		80
Subject objectives	The aim of the course is to provide knowledge about installations related to heat sources (heating water circuits, fuel and exhaust installations, ventilation and water and sewage installations in the heat source room), legal regulations and standards, installation materials and criteria for their selection, basics of design, methods and technologies for implementing the installations in question.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K7_U10	Can design a cplex heat source			[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject		
	K7_W06	Has in-depth, structured and theoretically based knowledge related to the flow of media in heat systems			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	K7_U12	Can analyze and evaluate solutions and functioning of installations related with heat sources			[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information		
	[K7_W11] has knowledge to analyze, evaluate and optimize processes, objects and systems of environmental engineering and knows the principles of rational energy management and resources	Has the knowledge to analyze, evaluate and optimize heat sources, knows principles of rational energy management			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		

Subject contents	Fuels, fuel installations/storage and combustion processes, boilers and boiler rooms, heat pumps, heating water circuits, combustion installations, accompanying installations in heat source rooms - ventilation, water and sewage.		
Prerequisites and co-requisites	Basics of hydraulics and thermodynamics. Knowledge in the range of heating and tap hot water systems. Drawing skills in AutoCAD.  Knowledge from the subjects related to heating systems at the engineering level.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project	50.0%	50.0%
	Test	50.0%	50.0%
Recommended reading	Basic literature	1. Lewandowski W.M.: Proekologiczne źródła energii odnawialnej, WNT, Warszawa 2006. 2. Zaborowska E.: Projektowanie kotłowni wodnych na paliwa ciekłe i gazowe. Wydawnictwo PG, Gdańsk 2012/2013 etc. 3. Zalewski W.: Pompy ciepła sprężarkowe, sorpcyjne i termoelektryczne. IPPU Masta, Gdańsk 2001. 4. Przepisy prawne i Polskie Normy związane z tematem, warunki techniczne COBRTI Instal.	
	Supplementary literature	1. Nantka M.: Ogrzewnictwo i ciepłownictwo. Wydawnictwo Politechniki Śląskiej, Gliwice 2006. 2. Rubik M.: Pompy ciepła w systemach geotermii niskotemperaturowej. MULTICO Oficyna Wydawnicza, Warszawa 2011. 3. Skorek J., Kalina J.: Gazowe układy kogeneracyjne. WNT, Warszawa 2005. 4. Wiśniewski G. i in.: Kolektory słoneczne. Energia słoneczna w mieszkalnictwie, hotelarstwie i drobnym przemyśle. Dom Wydawniczy MEDIUM, Warszawa 2008. 5. Żarski K.: Obiegi wodne i parowe w kotłowniach. Poradnik projektanta. Ośrodek Informacji Technika instalacyjna w budownictwie, Warszawa 2000. 6. Wytyczne projektowania i karty katalogowe producentów.	
	eResources addresses	Adresy na platformie eNauczenie: Instalacje źródeł ciepła-ST_2023/2024 (zima) - Moodle ID: 29485 <a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=29485">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=29485</a>	
Example issues/ example questions/ tasks being completed	Design of a complex heat source, including the use of renewable or hybrid energy sources.		
Work placement	Not applicable		