



Subject card

Subject name and code	District Heating, PG_00048007						
Field of study	Environmental Engineering						
Date of commencement of studies	October 2020	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	Part-time studies	Mode of delivery			at the university		
Year of study	4	Language of instruction			Polish		
Semester of study	7	ECTS credits			8.0		
Learning profile	general academic profile	Assessment form			exam		
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	inż. Agata Kubryńska-Korczak dr hab. inż. Ewa Zaborowska					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	25.0	15.0	0.0	15.0	0.0	55
	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	55		10.0		135.0	200
Subject objectives	The aim of the subject is to acquaint students with detailed knowledge in the range of heating substations, current regulations and standards related to the subject, materials types and selection criteria, methods and tools supporting designing process, methods and technologies of installation, including other than technical conditions. The subject objective is to acquire skills in the range of utilising and converting different sources of information, application of calculation methodology and the principles of designing.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U03] can prepare documentation regarding the implementation of an engineering task/project and prepare a text or presentation including a discussion of the results of the implementation	Can prepare documentation on a realization of a project and a presentation	[SU1] Assessment of task fulfilment
	[K6_U13] knows the rules of application and can choose the materials of the sanitary industry	Knows the rules of use and can select materials for the installations	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject
	[K6_U11] can use selected computer programs to support design, including CAD graphics programs	Can use selected computer programs supporting design (e.g., heat exchangers selection)	[SU4] Assessment of ability to use methods and tools
	[K6_W09] has ordered, theoretically founded knowledge in the field of water supply, sewage, heating, ventilation and air conditioning, and the principles of shaping the microclimate of rooms; knows legal regulations, standardization issues and recommendations for the design of water supply, sewage, heating and gas networks and installations	Has an ordered and theoretically founded knowledge in the field of heating, knows design recommendations	[SW1] Assessment of factual knowledge
[K6_U12] can design installations, networks and facilities: water supply, sewage, heating and gas	Knows how to design a heating substation	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject	
Subject contents	<p>LECTURES: Heating substations classification. Direct and indirect heating substations. Hydraulic schematic diagrams. Heat exchange and heat exchangers. Functional modules of heating substations. Fittings, devices and piping. Automatic control system. Safety device. Filling and refilling water system. Heating substation rooms. Water and wastewater installations in heating substation room. Regulations, standards, technical requirements. Technical requirements and tests. Heating energy tariffs and costs. TUTORIALS/PROJECT: Calculations in the range of heating substations. Project of heating substation, joined to high-parameters district heating network. Schematic, technological diagrams. Hydraulic calculations of primary and secondary circuits. Fittings, devices and thermal insulation matching. Filling and refilling systems. Water, sewage and ventilation systems in a heating substation room. Presentation in the field of heating systems.</p>		
Prerequisites and co-requisites	<p>Basics of hydraulics and thermodynamics. Knowledge from the courses: Thermal engineering and heating, Fluid mechanics and hydraulics.</p>		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Presentation	50.0%	20.0%
	Project	50.0%	40.0%
	Written exam	50.0%	40.0%

Recommended reading	Basic literature	1. Zaborowska E., Zasady projektowania wodnych węzłówciepłowniczych. Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2010 ornext editions. 2. Żarski K.: Węzły ciepłne w miejskich systemachciepłowniczych. Poradnik. Wyd. 2. Wydawnictwo Instal, Warszawa2014. 3. Regulations, Polish and European Standards related to thesubject, COBRTI Instal technical requirements.
	Supplementary literature	1. Wolski A., Kaiser K., Legionella w instalacjach budynków. OśrodekInformacji Technika instalacyjna w budownictwie, Warszawa, 2009. 2. Wytyczne producentów, karty katalogowe armatury i urządzeń.
	eResources addresses	Adresy na platformie eNauczanie: Ogrzewnictwo-NST_2023/2024 (zima) - Moodle ID: 29486 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29486
Example issues/ example questions/ tasks being completed	1. Project of a heating substation.2. Presentation on a subject in the field of heating systems.	
Work placement	Not applicable	