



Subject card

Subject name and code	District Heating, PG_00043392						
Field of study	Environmental Engineering						
Date of commencement of studies	October 2021	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	Full-time studies	Mode of delivery			at the university		
Year of study	3	Language of instruction			Polish		
Semester of study	6	ECTS credits			5.0		
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 inż. Arkadiusz Ostojki					
	Teachers	dr hab. inż. Ewa Zaborowska dr inż. Arkadiusz Ostojki					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	30.0	0.0	60
	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	60	8.0		60.0	128	
Subject objectives	The aim of the subject is to acquaint students with the basic knowledge in the range of heating, current regulations and standards related to the subject, the systems performance and fittings. The subject objective is to acquire skills in the range of professional nomenclature, utilising and converting different sources of information and data bases, application of calculation methodology and the principles of designing.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U12] can design installations, networks and facilities: water supply, sewage, heating and gas	Student prepares a project of a heating system with a gas boiler in a multi-family residential building.			[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject		
	[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	Student knows basic types of heating systems and tap hot water systems. Classifies heating substations. Specifies elements, describes and explains principles of automatic control systems in heating systems and heating substations.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
[K6_U11] can use selected computer programs to support design, including CAD graphics programs	Student uses CAD software for the preparation of drawings in technical documentation.			[SU4] Assessment of ability to use methods and tools			

Subject contents	<p>Lecture:</p> <p>Types of low-temperature heating systems (gravitational - pumping, with a lower or upper distribution pipings, single and double-pipe system, floor system). Safety devices for open and closed heating systems. Controlling and balancing of heating installations. Domestic hot water heating systems. Regulations and standards. 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.</p> <p>Project:</p> <p>Principles of hydraulic calculations of heating installation. Central heating project: Selection and location of radiators. Setting of thermostatic radiator valves. Developed view of heating systems. Linear and local pressure losses. Gravitational and active pressure. Selection of circulating pump. Symbols of heating systems elements on the drawings. Selection of boiler and circulating pump. Safety devices of closed, water heating system with a diaphragm expansion tank. Safety valves. Discussion of the requirements for the technical description of the heating system project. Method of final testing of the installation.</p>														
Prerequisites and co-requisites	Fundamental knowledge in the range of thermal engineering. Drawing skills in AutoCAD. Knowledge from the courses: Basics of thermal engineering (PG_00043370).														
Assessment methods and criteria	<table border="1" data-bbox="448 741 1487 902"> <thead> <tr> <th data-bbox="448 741 794 779">Subject passing criteria</th> <th data-bbox="794 741 1141 779">Passing threshold</th> <th data-bbox="1141 741 1487 779">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 779 794 817">Project</td> <td data-bbox="794 779 1141 817">100.0%</td> <td data-bbox="1141 779 1487 817">30.0%</td> </tr> <tr> <td data-bbox="448 817 794 855">Written exam - heating substations</td> <td data-bbox="794 817 1141 855">50.0%</td> <td data-bbox="1141 817 1487 855">30.0%</td> </tr> <tr> <td data-bbox="448 855 794 902">Written exam - heat protection of the building + heating installation</td> <td data-bbox="794 855 1141 902">50.0%</td> <td data-bbox="1141 855 1487 902">40.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Project	100.0%	30.0%	Written exam - heating substations	50.0%	30.0%	Written exam - heat protection of the building + heating installation	50.0%	40.0%
Subject passing criteria	Passing threshold	Percentage of the final grade													
Project	100.0%	30.0%													
Written exam - heating substations	50.0%	30.0%													
Written exam - heat protection of the building + heating installation	50.0%	40.0%													
Recommended reading	Basic literature	1) Koczyk H. (red.): Ogrzewnictwo. Podstawy projektowania ciepłego i termomodernizacji budynków. Poznań: Wydawnictwo Politechniki Poznańskiej 2000 2) Krygier K., Klinke T., Sewerynik J.: Ogrzewnictwo, wentylacja i klimatyzacja. Warszawa: Wydawnictwa Szkolne i Pedagogiczne 1997. 3) Pierkowski K., Krawczyk D., Tumul W.: Ogrzewnictwo. T. 1. Białystok: Rozprawy Naukowe nr 63, 1999.													
	Supplementary literature	1) Koczyk H. (red.): Ogrzewnictwo praktyczne. Projektowanie, montaż, eksploatacja. Poznań: Systherm Serwis 2005.													
	eResources addresses	Adresy na platformie eNauczanie: Ogrzewnictwo 2023/2024 IŚ studia stacjonarne sem. VI lato - Moodle ID: 38343 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38343													
Example issues/ example questions/ tasks being completed															
Work placement	Not applicable														