



Subject card

Subject name and code	, PG_00059110						
Field of study	Environmental Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2024/2025		
Education level	first-cycle studies	Subject group			Obligatory subject group in the field of study		
Mode of study	Part-time studies	Mode of delivery			at the university		
Year of study	3	Language of instruction			Polish		
Semester of study	6	ECTS credits			4.0		
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 inż. Nicole Nawrot					
	Teachers	dr inż. Nicole Nawrot					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	15.0	0.0	20.0	0.0	35
	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	35	6.0		60.0	101	
Subject objectives	The course's goal is to provide the knowledge in the field of thermal technology and heating required to design a heating installation, such as knowledge of the principles of hydraulic calculations of central heating installations, familiarity with current legal regulations and standards related to the topic, installation operation and equipment principles, and use of specialized nomenclature.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U11] can use selected computer programs to support design, including CAD graphics programs	The student creates drawings for technical documentation using CAD applications.			[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment		
	[K6_U12] can design installations, networks and facilities: water supply, sewage, heating and gas	Prepares a design for a central heating installation in a multi-family residential building.			[SU3] Assessment of ability to use knowledge gained from the subject [SU5] Assessment of ability to present the results of task		
	[K6_U02] can work individually and in a team; knows how to estimate the time needed to complete the task ordered; is able to develop and implement a work schedule that ensures deadlines	When working alone on a project, the Student must stick to the timeline, yet when working in a group, the Student must follow collaboration guidelines.			[SU1] Assessment of task fulfilment		

Subject contents	<p>Auditorium classes:</p> <p>Thermal resistance. Thermal resistance of homogeneous and heterogeneous layers. Heat transfer resistance. Thermal resistance of air layers (unventilated, poorly ventilated, well ventilated). Thermal resistance of unheated spaces (roof spaces, other spaces). Total thermal resistance of partitions composed of homogeneous and heterogeneous layers. Heat transfer coefficient. Heat transfer coefficient of homogeneous and heterogeneous layers. Calculation of the heat transfer coefficient of components with variable thickness. Calculation of the heat transfer coefficient of partitions, taking into account linear thermal bridges. Thermal resistance of the ground and heat transfer coefficient of partitions adjacent to the ground. Calculation of design heat loss through penetration of heated rooms. Heat demand for ventilation. Calculation of the total design heat loss of rooms and the design load of the entire building. Principles of hydraulic calculations of central heating installations.</p> <p>Project:</p> <p>Calculations of an individual design task consisting in determining the detailed demand for thermal power and thermal energy (heat) for a multi-family residential building. Designs of building partitions, thermal resistance of the air layer and ground. Heat demand of individual rooms according to the architectural background. Selection of ventilation air streams and calculation of heat demand for heating the ventilation air. Central heating installation design: Selection and arrangement of radiators. Settings of thermostatic radiator valves. Development of the central heating installation Line losses and local losses. Gravitational pressure and active gravity. Selection of the central heating circulation pump Central heating installation markings in the drawings. Discussion of the requirements for the technical description in the central heating installation design. Method of acceptance testing of installations.</p>											
Prerequisites and co-requisites	Drawing skills in AutoCAD. Knowledge of the subject Thermal technology of buildings and heating I.											
Assessment methods and criteria	<table border="1" data-bbox="448 943 1487 1048"> <thead> <tr> <th data-bbox="448 943 798 987">Subject passing criteria</th> <th data-bbox="802 943 1141 987">Passing threshold</th> <th data-bbox="1145 943 1487 987">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 994 798 1016"></td> <td data-bbox="802 994 1141 1016">100.0%</td> <td data-bbox="1145 994 1487 1016">75.0%</td> </tr> <tr> <td data-bbox="448 1023 798 1046"></td> <td data-bbox="802 1023 1141 1046">60.0%</td> <td data-bbox="1145 1023 1487 1046">25.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade		100.0%	75.0%		60.0%	25.0%
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Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Krygier K., Klinke T., Sewerynik J., Ogrzewnictwo, Wentylacja i Klimatyzacja. Wydawnictwa Szkolne i Pedagogiczne, Warszawa 1997. 2. Ogrzewnictwo. Podstawy projektowania ciepłego i termomodernizacji budynków pod redakcją Haliny Koczyk. Wydawnictwo Politechniki Poznańskiej. Poznań 2000. 3. Ogrzewnictwo praktyczne. Projektowanie, montaż, eksploatacja. Praca zbiorowa pod redakcją prof. dr hab. inż. Haliny Koczyk. Systherm Serwis, Poznań 2005. 4. J.Albers, R.Dommel, H.Montaldo-Ventsam, H.Nedo, E.Uebelacker, J.Wagner, Systemy centralnego ogrzewania i wentylacji, Poradnik dla projektantów i instalatorów, Wyd. Naukowo- Techniczne, Warszawa 2007 5. Norma PN-EN ISO 6946: 2008 Komponenty budowlane i elementy budynku. Opór cieplny i współczynnik przenikania ciepła. Metoda obliczania 6. Norma PN-EN 12831: 2006 Instalacje ogrzewcze w budynkach. Metoda obliczania projektowego obciążenia cieplnego 7. Rozporządzenie Ministra Infrastruktury z dnia 12 kwietnia 2002 r. w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie z późniejszymi zmianami 										
	Supplementary literature	Wymagania techniczne COBRTI INSTAL Zeszyt 2 Wytyczne projektowania instalacji centralnego ogrzewania Warszawa 2001										
	eResources addresses	Adresy na platformie eNauczanie: Ochrona Ciepła Budynków i Ogrzewnictwo II - inż. niest. sem. VI - Moodle ID: 45377 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=45377										

Example issues/ example questions/ tasks being completed	Oblicz opór cieplny elementu/ komponentu budowlanego. Podaj wartość ciśnienia roboczego w instalacji c.o. Podaj procedurę obliczania obciążenia cieplnego budynku.
Work placement	Not applicable

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