GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Thermal Engineering and Central Heating II, PG_00042693		
Field of study	Environmental Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2022/2023
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	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. Joanna Majtacz	

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	5.0	60.0	100

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, familiarisation with current legal regulations and standards related to the subject, principles of installation operation and equipment, and use of specialist nomenclature.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U12] can design installations, networks and facilities: water supply, sewage, heating and gas	A student works on a project to install central heating in a multi-family residential structure.	[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
[K6_U11] can use selected computer programs to support design, including CAD graphics programs	The student uses CAD programs to prepare the drawing part of the technical documentation.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
[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	The student can put the applicable regulations into practise. The student can solve the design problem on his or her own.	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation
[K6_W08] has elementary knowledge of construction: including building materials, their strength, construction mechanics and building physics, moisture migration in buildings, heat transfer through building partitions	The student is able to properly design building partitions that meet the requirements of the applicable Technical Conditions.	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation
[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 on a project on their own, students must adhere to a timetable, whereas when working on a group project, students must submit to teamwork.	[SU1] Assessment of task fulfilment

Subject contents

Auditorium classes:

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. Ground thermal resistance and heat transfer coefficient of partitions adjacent to the ground. Calculation of design heat loss by 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

Design classes:

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 air and soil layers. 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 system design: Selection and arrangement of radiators. Settings of thermostatic radiator valves. Development of the central heating installation Line losses and local losses. Gravitational and active gravitational pressure. Selection of the central heating circulation pump Central heating installation markings in the drawings. Discussion of the requirements for the technical description in the design of the central heating installation Method of acceptance tests of the installation.

Prerequisites and co-requisites

Ability to draw in AutoCAD. Knowledge of the subject Thermal engineering and heating I.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
	100.0%	75.0%
	60.0%	25.0%

Recommended reading	Basic literature	1.Krygier K., Klinke T., Sewerynik J., Ogrzewnictwo, Wentylacja i Klimatyzacja. Wydawnictwa Szkolne i Pedagogiczne, Warszawa 1997. 2. Ogrzewnictwo. Podstawy projektowania cieplnego 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: Technika Cieplna i Ogrzewnictwo - sem. VI INŻ. Inżynieria Środowiska - niestacjonarne 2022/2023 - Moodle ID: 20054 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=20054
Example issues/ example questions/ tasks being completed	1. Calculate the total thermal resistance R of the partition (external wall) and the heat transfer coefficient U for the partition. Specify the units for R and U. 2. What is the recommended (optimal) value of the heating medium flow rate in the horizontal distribution ducts of the central heating system? (what is she addicted to)? 3. What will be the temperature on the surface of the radiator in the bathroom if the supply and return temperature of the central heating installation is equal to 75/55 °C ?	
Work placement	Not applicable	