



## Subject card

Subject name and code	, PG_00058802						
Field of study	Environmental Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2023/2024		
Education level	first-cycle studies	Subject group			Obligatory subject group in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			Polish		
Semester of study	4	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 inż. Arkadiusz Ostojki				
	Teachers		dr inż. Arkadiusz Ostojki				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	30.0	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		33.0	83
Subject objectives	The aim of the course is to provide knowledge about the current requirements of thermal protection of buildings, building envelope design principles, heat losses in buildings with gaining the skills of its use in the design.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[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		students individually or in a group calculate the heat load of a multi-family residential building - part 1 of the heating system design; part 2 and 3 in semester VI - as part of the Heating course			[SU1] Assessment of task fulfilment	
[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		student has elementary knowledge of building physics, moisture migration in buildings, thermal protection, heat transfer through windows and non-transparent partitions			[SW3] Assessment of knowledge contained in written work and projects		
Subject contents	Lecture:Basics of heat transfer (conduction, convection, radiation). Heat transfer resistances. Thermal conductivity of building materials. Thermal resistance of homogeneous and heterogeneous partitions. Thermal resistance of air layers (unventilated, poorly ventilated, well ventilated). Thermal transmittance. Calculation of the value of the heat transfer coefficient of building partitions. Temperature distribution in a partition. Thermal bridges in partitions. Current requirements for thermal protection of buildings - Regulation on technical conditions to be met by buildings and their location. Heat losses through building partitions. Heat losses to the ground. Design values for air temperature. Air infiltration. Design ventilation loss. Total design heat loss of rooms and design load of the whole building. Energy performance certificates for buildings. Workmanship errors in building insulation. Testing of buildings with a thermal imaging camera, building airtightness testing.Design classes:Calculation of an individual design task to determine detailed thermal power and thermal energy (heat) requirements for a multi-family residential building. Design of building partitions, thermal resistance of air layer, ground. Heat demand of individual rooms according to architectural background. Selection of ventilation air flows and calculation of heat demand for heating of ventilation air.						
Prerequisites and co-requisites	Students must demonstrate a basic understanding of thermodynamics.						
Assessment methods and criteria	Subject passing criteria		Passing threshold			Percentage of the final grade	
	Project		100.0%			100.0%	

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) Pieńkowski K., Krawczyk D., Tumeł 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: Ochrona cieplna budynków sem. IV IŚ stacjonarne 2023/24 lato - Moodle ID: 38264 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38264">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38264</a>
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	