



Subject card

Subject name and code	, PG_00064625						
Field of study	Civil Engineering						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2024/2025		
Education level	first-cycle studies	Subject group					
Mode of study	Part-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			1.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Engineering Structures -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		mgr inż. Sławomir Dobrowolski				
	Teachers		mgr inż. Sławomir Dobrowolski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	10.0	0.0	0.0	0.0	20
	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	20		0.0		0.0	20
Subject objectives	To learn about the process of heat and mass transfer in building partitions, as well as methods of calculating the quantities criteria (technical requirements) in the field of thermal insulation of building partitions and energy efficiency of buildings						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W03] Demonstrate knowledge and understanding of the processes, established standards and design methods in the civil engineering subject area and of their limitations.		Knowledge at a basic level basic of the nature of the of heat and mass exchange process. Knowledge of methods of reducing building's demand for thermal energy. Knowledge of Renewable energy sources Methods of their use.		[SW2] Assessment of knowledge contained in presentation		
	[K6_U04] Reads and prepares construction documentation (including drawings, graphic documentation in the CAD environment), efficiently uses maps as well as architectural, construction and geodetic drawings.		The ability to analyze the design architectural design in terms of applied solutions concerning thermal insulation elements of the structure.		[SU1] Assessment of task fulfillment [SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_U03] Design engineering objects and details, processes and engineering systems by applying appropriate standards and methods of design.		Knowledge of the criteria thermal insulation and the ability to calculating the criterion quantities. Knowledge of the criterion energy efficiency and methods calculation of the magnitude of losses and gains of heat in a building. Knowledge of principles of designing the elements thermal insulation of the building.		[SU3] Assessment of ability to use knowledge gained from the subject		
Subject contents	The process of heat and mass exchange. Convective heat transfer. Radiative heat transfer. Thermal conductivity. General equation of thermal conductivity. Model of unidirectional and stationary heat conduction. Model of two-dimensional and stationary heat flow. Thermal bridges. Mechanisms of moisture flow in the building envelope. Relative humidity of the air. Condensation of water vapor in building partitions. Condensation of water vapor on the surfaces of elements of the building structure. Requirements for thermal protection of buildings in Poland. Methods of calculating thermal resistance, heat transfer coefficient, temperature field and dew point temperature. Energy certification. Energy performance of a building.						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		60.0%	50.0%
		60.0%	50.0%
Recommended reading	Basic literature	1. Bogosławski W.N.: Fizyka Budowli, Arkady, Warszawa 1975. 2. Pogorzelski J.A., : Fizyka budowli, podstawy wymiany ciepła i masy, Wydawnictwo Politechniki Białostockiej, Białystok, 1987. 3. Klemm P.: Budownictwo Ogólne. Fizyka Budowli, Tom 2, Arkady Warszawa, 2006.	
	Supplementary literature	1. Mikoś J.: Budownictwo Śląskiej, Gliwice, 1996 2. Staniszewski B.: Wymiana Warszawa, 1980.	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<p>Test:</p> <p>1. The solar air temperature value can be: a) Less than the air temperature value, measured with a dry thermometer, b) Greater than the value of the air temperature, measured with a dry thermometer, c) Equal to the value of the air temperature, measured with a dry thermometer.</p> <p>2. In heat transfer by the conduction path, the heat flux density is: a) Proportional to the temperature gradient, b) Proportional to the thermal conductivity coefficient, c) Does not depend on the temperature.</p> <p>3. The value of the heat flux density in a physical system in which heat transfer takes place by means of a stationary and unidirectional conduction phenomenon: a) Varies and depends on the temperature, b) Varies and depends on the position in space, c) Is constant throughout the physical system.</p>		
Work placement	Not applicable		

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