GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Physics of Building Structures, PG_00044003
Field of study	Civil Engineering

Date of commencement of studies	October 2021	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	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment

Conducting unit	Department of Building Structures and Material Engineering -> Faculty of Civil and Environmental Engineering

Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Marek Krzaczek
	Teachers	dr inż. Jarosław Florczuk
		mgr inż. Sławomir Dobrowolski
		dr hab. inż. Marek Krzaczek

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	0.0	0.0	30
	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	30	5.0	15.0	50

Subject objectives	Buildings thermal protection. Moisture transport. Energy efficiency of buildings. Building acoustics.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U12] knows rules of manufacturing and application of building materials, is able to properly choose tchem; is able to make simple laboratory experiments for judging quality of building materials	Ability to select building materials for construction building partitions with high thermal insulation	
	[K6_U08] can calculate the energy balance of a building	Ability to prepare the building's energy balance and calculate the building's energy demand	
	[K6_W01] has knowledge of selected branches of mathematics, physics and chemistry, which is a base of construction subjects, such as construction theory and material technology and id needed to formulate and solve typical problems of civil engineering	The ability to apply the basics of thermodynamics to assess the course of the heat transfer process in buildings	
	[K6_W12] Has basic knowledge on building physics, including heat and moisture migration in buildings, acoustics and energy demand	Understanding and mastering at the basic level the concepts and nature of the process of heat and mass transfer. Knowledge of thermal insulation criteria and the ability to calculate criteria values.	

Subject contents	The process of heat and mass exchange. Convective heat exchange. Radiation heat exchange. Thermal conductivity. General equation of thermal conductivity. Model of unidirectional and stationary heat conduction. Model of two-dimensional and stationary heat flow. Thermal bridges. Theoretical basis and a model of building energy balance. Moisture flow mechanisms in building partitions. Relative air humidity. Water vapor condensation in building partitions. Water vapor condensation on the surfaces of building structure elements. Air exchange in the building. Air flow through the building envelope elements. The conditions of thermal and humidity comfort in the building. Renewable heat sources and methods of their use. Thermal insulation criteria. Methods of calculating thermal resistance, heat transfer coefficient, temperature distribution field and dew point temperature. Energy efficiency criterion. Methods for calculating the building thermal energy demand indicator: simplified method.
Prerequisites and co-requisites	No requirements

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
	60.0%	45.0%
	60.0%	55.0%

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 ekologiczne. Wydawnictwo PolitechnikiŚląskiej, Gliwice, 1996. 2. Staniszewski B.: Wymiana ciepła. Podstawyteoretyczne. PWN, Warszawa, 1980.
	eResources addresses	Adresy na platformie eNauczanie: Fizyka Budowli (Budownictwo) - Rok akademicki 2022/2023 - Moodle ID: 25676 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=25676

Example issues/ example questions/ tasks being completed	1. The temperature equalization coefficient in heat conduction is:a) The product of the thermal conductivity coefficient and thermal accumulation,b) The quotient of the thermal conductivity coefficient and thermal accumulation,c) The sum of the thermal conductivity and thermal accumulation coefficient.2. The value of the heat flux density in the physical system in which heat exchange takes place by means of a stationary and unidirectional conduction phenomenon:a) It varies and depends on the temperature,b) It changes and depends on the position in space,c) It is constant throughout the physical system.
Work placement	Not applicable