GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Physics of Building Structures II , PG_00041242		
Field of study	Civil Engineering		
Date of commencement of studies	February 2023	Academic year of realisation of subject	2023/2024
Education level	second-cycle studies	Subject group	Optional subject group 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	1	Language of instruction	Polish
Semester of study	2	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	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	0.0	15.0	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

- Modeling of unsteady heat exchange process in 2D and 3D systems.
- Basics of coupled heat and mass transfer problem.
- Energy modeling of buildings.
- Acoustic insulation of buildings components.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U11] is able to plan and execute laboratory experiments to evaluate quality of construction materials and to determine strength of construction elements	Ability to test the thermal conductivity.	[SU4] Assessment of ability to use methods and tools
[K7_U12] can calculate and analyse the energy balance of a building	Ability to perform the energy performance of the building	[SU5] Assessment of ability to present the results of task
[K7_W09] knows advanced methods of building physics with applications in heat and moisture migration in buildings, energy demand for buildings and its acoustics	Ability to use software for simulating the heat transfer process in thermal bridges. The ability to build an algorithm for calculating the building's heat demand indicator in a spread sheet	[SW2] Assessment of knowledge contained in presentation
[K7_W10] knows modern building materials as well as technologies and methods of its manufacturing and production of construction elements	Knowledge of building thermal insulation materials, their structure and thermal, humidity and mechanical properties	[SW1] Assessment of factual knowledge
[K7_U02] can design and dimension complex steel, concrete (including reinforced), wood and masonry construtions and its details	Not up to date	[SU3] Assessment of ability to use knowledge gained from the subject

Subject contents

Process of heat and mass transfer in buildings. 2D and steady heat transfer problems in structure components. Unsteady heat transfer in the most common engineering problems. Heat balance model of building. Moisture transfer through structure components. Model of in-door air exchange in buildings. Air exchange through building envelope. Thermal comfort in buildings. Renewable energy sources and methods of their usage. Energy passive buildings: requirements, design methods, thermal comfort. Zero-energy buildings: conception and design methods.

Prerequisites and co-requisites

Passed exam of the course Building Physics or Fundamentals of Building Physics.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Project	60.0%	50.0%
Midterm colloquium	60.0%	50.0%

Recommended reading

Basic literature	1. Pogorzelski J.A., : Fizyka budowli, podstawy wymiany ciepła i masy, Wydawnictwo Politechniki Białostockiej, Białystok, 1987. 2. Klemm P.: Budownictwo Ogólne. Fizyka Budowli, Tom 2, Arkady Warszawa, 2006.
Supplementary literature	1. Mikoś J.:Budownictwo ekologiczne. Wydawnictwo Politechniki Śląskiej, Gliwice, 1996. 2. Staniszewski B.: Wymiana ciepła. Podstawy teoretyczne. PWN, Warszawa, 1980.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

Modeling of the heat transfer process using the finite element method.

Work placement

Not applicable