GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00060052						
Field of study	Environmental Engineering						
Date of commencement of studies	February 2024		Academic year of realisation of subject	2024/2025			
Education level	second-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	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 Sanitary Engineering -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		mgr inż. Krzysztof Kaiser				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	15.0	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	19.0		54
Subject objectives	Expanding knowledge of the theoretical foundations and practical solutions of ventilation and air-conditioning systems for rooms and ventilation devices, as well as the basics of the selection and operation of ventilation and air-conditioning systems, including energy aspects for various types of rooms.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
K7_U10	The student designs an air-conditioning and ventilation system for a hospital operating room	[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
K7_U03	The student performs the design task in accordance with the adopted assumptions	[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
K7_U12	The student analyzes and evaluates the selected design solution in technical and economic terms.	[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 [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
K7_W04	The student lists and defines basic concepts in the field of optimization of the operation of ventilation and air conditioning systems. In addition, he knows methods, systems and devices for rational management of resources and energy in ventilation and air conditioning.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
K7_W06	The student designs a mechanical ventilation and technical air conditioning installation in a selected building, both by performing manual calculations and using programs dedicated to the industry. Has the ability to perform calculations within a set of ventilation and air-conditioning devices using knowledge, among others: in the field of thermodynamics, basic thermal and humidity phenomena.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge

Subject contents

Lectures:Humid air parameters and air quality for non-residential premises- physicochemical parameters of air,- Mollier's i-x diagram,- air thermal and moisture treatment processes,- air quality and its purity,- concentration of pollutants in the airDetermining the amount of ventilation air for non-residential premises- determining the amount of ventilation air based on the requirements of legal acts, exchange rates, pollutant emissions, heat load,- ventilation efficiencyAir distribution systems- principles of air distribution,- types of air flows in roomsDetermining device parameters using Mollier's i-x diagram- determining outdoor and indoor air parameters and processes for the summer and winter periods,- calculating the power of heat exchangers,- calculating the efficiency of humidifiersAir filtration and noise attenuation- air filtration mechanisms,- types and classes of filters,- filtration degrees,- sound propagation and noise sources,- attenuation vibrations and oscillations.Ventilation and air conditioning in legal acts- acts, regulations relating to air conditioning and ventilation installations,- standards.Installations cooperating with the air conditioning and ventilation system- chilled water unit and water chiller,- hot technological water installation, hydraulic installation,- steam installation for humidification.Project:Concept of air conditioning installation for aseptic ventilation of the hospital operating room- establishing legal requirements,- calculating the efficiency of the installation, air exchange rate and time constant,- establishing the locations of air supply and exhaust vents and the distribution of air flows,- establishing the location of the air conditioning and ventilation unit of the N and W parts,- establishing the necessary modules for heat and humidity treatment of air, filtration degrees and heat recovery method,- establishing the route of ventilation ducts, calculating the dimensions of ducts and determining the total flow resistance,- establishing the parameters of the fan, heat exchanger power, humidification system efficiency,- establishing the value of the emitted noise, establishing the need to use a noise silencer,- selecting installation elements from catalogues,- planning the use of necessary automation elements.

Prerequisites and co-requisites

Has knowledge of mathematics, physics, chemistry and biology, which is the basis for understanding mathematical transformations and identifying and assessing thermal and microbiological phenomena in rooms and air conditioning devices and systems. Has knowledge of thermodynamics, heat transfer and fluid mechanics, ventilation - in the field of thermodynamics of moist air, theory of heat penetration, conduction and transfer, as well as air flows in rooms and ventilation and air-conditioning devices

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Design task	60.0%	50.0%
	Final colloquium	60.0%	50.0%
Recommended reading	Basic literature	1. Recknagel H., Sprenger E., Schramek E.R.: Compendium of knowledge: heating, air conditioning, hot water, refrigeration, Omni Scala Publishing House, Wrocław 20082. Pełech A.: Ventilation and air conditioning - basics. Publishing House of Wrocław University of Technology. Wrocław 20083. Malicki M.: Ventilation and air conditioning. PWN Warsaw 1980 5. Jones W.P.: Air conditioning. ARKADY. Warsaw 20014. Porowski M., Szczechowiak E.: Air conditioning of clean rooms. TerMedia Publishing House 1999.	
	Supplementary literature	1. Krzysztof Kaiser, 2014. Ventilation and air conditioning of laboratories. Publisher: Grupa Medium2. Krzysztof Kaiser, Andrzej Wolski, 2007. Air conditioning and ventilation in hospitals. Theory and practice of operation. Publisher: Wydawnictwo MASTASt, ISBN: 978-83-921555-2-2	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Calculate the system efficiency, air exchange rates and time constant for the operating room.Determine the location of the air conditioning and ventilation unit for the laboratory room complex.		
Work placement	Not applicable		

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