



## Subject card

Subject name and code	, PG_00060052						
Field of study	Environmental Engineering						
Date of commencement of studies	February 2025	Academic year of realisation of subject			2025/2026		
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_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.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
	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.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
	K7_U12	The student analyzes and evaluates the selected design solution in technical and economic terms.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
	K7_U03	The student performs the design task in accordance with the adopted assumptions	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject
	K7_U10	The student designs an air-conditioning and ventilation system for a hospital operating room	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject
Subject contents	<p>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 air Determining 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 efficiency Air distribution systems- principles of air distribution,- types of air flows in rooms Determining 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 humidifiers Air 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.</p>		
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
	Final colloquium	60.0%	50.0%
	Design task	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. Pelech 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 MASTAS, ISBN: 978-83-921555-2-2	
	eResources addresses	Adresy na platformie eNauczenie:	
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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