GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Industrial ventilation and air conditioning systems, PG_00057352		
Field of study	Power Engineering		
Date of commencement of studies	February 2024	Academic year of realisation of subject	2024/2025
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	3.0
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	8.0	37.0	75

Subject objectives

Expand knowledge of the theoretical basis and practical solutions of ventilation and air-conditioning systems for rooms and ventilation equipment, as well as the basics of selection and operation of ventilation and air-conditioning systems for different types of rooms.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W02] has extended and deepened knowledge of physics, chemistry, thermodynamics, fluid mechanics, material science, necessary to understand and describe basic thermal and flow phenomena occurring in and around power equipment and systems, transmission networks and internal installations	The student designs a mechanical ventilation and air-conditioning installation in a selected building both by hand calculations and in progarms dedicated to the industry. Possesses the ability to make calculations as part of a unit of ventilation and air-conditioning equipment using knowledge of, inter alia, thermodynamics, and basic thermo-humidity phenomena.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[K7_W10] knows the basic installations of advanced energy systems, transmission networks and internal installations and their impact on the environment	The student lists and defines basic concepts in the field of optimising the operation of ventilation and air-conditioning systems. Furthermore, he/she is familiar with methods and devices for the rational management of energy and resources in ventilation and air-conditioning.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

Subject contents	Lectures:Humid air parameters and air quality in non-residential premises, Physico-chemical parameters of air,Mollier's i-x diagram,Thermo-humid air treatment processes,air quality and air purity,concentration of pollutants in the airDetermination of ventilation air quantities for public premisesDetermination of the amount of ventilation air on the basis of the requirements of legal acts, exchange multiplication factor, emission of pollutants, heat load,ventilation efficiency.3 Air distribution systems /1.5 h/.principles of air distribution,types of room air flows.4 Determination of equipment parameters using the i-x Mollier diagram /3 h/.determination of outdoor and indoor air parameters and processes for summer and winter periods,calculation of heat exchanger capacitiescalculation of humidifier output Air filtration and noise attenuationMechanisms of air filtration,types and classes of filtersDegrees of filtration,sound propagation and noise sourcesvibration attenuation.Ventilation and air conditioning in legal actslaws, regulations relating to the installation of air conditioning and ventilation,standards. Systems working with air-conditioning and ventilation systemschiller and water chiller, hot process water system, hydraulic system, steam installation for humidification.Exercises:Project: concept of an air-conditioning - aseptic ventilation system for a hospital operating theatreDetermination of legal requirements,calculation of system capacity, air change rates and time constant,Determination of locations of supply and extract air diffusers and air flow distribution,determining the location of the air handling unit for parts N and W,Determination of necessary modules of heat and humidity treatment of air, degrees of filtration and method of heat recovery,Determination of the routing of ventilation ducts, calculation of duct dimensions and determination of the total flow resistance,Determination of fan parameters, heat exchanger output, humidification system efficiency,Determining the value of noise emitted, determining the need for a silencer,selection of system components from catalogues,planning of necessary automation components.
Prerequisites and co-requisites	Has knowledge of mathematics, physics, chemistry and biology that is fundamental to understanding transformations ofmathematics and the identification and evaluation of thermal and microbiological phenomena in roomsand air-conditioning equipment and systems. Has knowledge of thermodynamics, heat transfer and fluid mechanics, ventilation - in terms of thermodynamics of humid air, theories of heat penetration, conduction and transfer, and airflows inrooms and ventilation and air-conditioning equipment.

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.: Kompendium wiedzy: ogrzewnictwo, klimatyzacja, ciepła woda, chłodnictwo, Wydawnictwo Omni Scala, Wrocław 2008
2. Pełech A.: Wentylacja i klimatyzacja - podstawy. Oficyna Wydawnicza Politechniki Wrocławskiej. Wrocław 2008
3. Malicki M.: Wentylacja i klimatyzacja. PWN Warszawa 1980 5. Jones W.P.: Klimatyzacja. ARKADY. Warszawa 2001
4. Porowski M., Szczechowiak E.: Klimatyzacja pomieszczeń czystych. Wyd. TerMedia 1999.

Supplementary literature

1. Krzysztof Kaiser, 2014. Wentylacja i klimatyzacja laboratoriów. Wydawca: Grupa Medium
2. Krzysztof Kaiser, Andrzej Wolski, 2007. Klimatyzacja i wentylacja w szpitalach. Teoria i praktyka eksploatacji. Wydawnictwo:Wydawnictwo MASTASt, ISBN: 978-83-921555-2-2

eResources addresses: Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	Calculate system capacities, air change rates and time constant for the operatory room.Determine the location of the air conditioning and ventilation unit for the laboratory room complex.
Work placement	Not applicable