COURSE DESCRIPTION CARD - SYLLABUS

Course name
Ventilation [N1IŚrod2>Went]

Course

Field of study
Environmental Engineering

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
20

Laboratory classes
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
20

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge in the field of mathematics, physics and chemistry, which is the basis for understanding mathematical transformations and identifying air pollutants, as well as knowledge of thermodynamics, heat exchange and fluid mechanics in the field of moist air, the theory of heat penetration, conduction and transfer of heat and behavior of fluids. Knowledge in the field of materials science related to ventilation. Ability to perform hydraulic calculations, selection of diameters, calculations of pressure losses and making drawings in the AutoCAD technique. Awareness of supplementing knowledge and skills.

Course objective

Acquiring knowledge in the field of ventilation of rooms for various purposes, of air preparation and selection of ventilation devices ensuring proper air quality. Gaining skills in the selection of the size of the air stream, devices, designing air distribution with the selection of diffusers and exhausts for the selected room.

Course-related learning outcomes

Knowledge:
1. The student has general knowledge of climate comfort, determination
loads for ventilation, in particular, moisture gains, pollutant emissions and methods for determining the amount of ventilation air
2. Knows the fundamental structures of mechanical supply, exhaust, and supply ventilation systems exhaust air, including systems with heat recovery from exhaust air
3. Has knowledge of the characteristics of all components of air handling units, incl
in particular: air filters, heaters, heat recovery exchangers, fans
4. Has knowledge in the field of aerodynamic calculations of air installations, including the determination of losses pressure, system characteristics, cooperation of the fan and the duct network, and control methods performance of this system
5. Knows the basic air distribution systems in mechanically ventilated rooms, characteristics of diffusers and exhausts
6. Has general knowledge of room acoustics and principles of acoustic calculations and selection silencers
7. Knows the basic structures in industrial ventilation

Skills:
1. The student is able to determine the amount of ventilation air for steady and unsteady emission loads
2. Is able to perform calculations in the field of air distribution in a room in order to select air inlet and outlet air vents
3. Can calculate the heat efficiency of the heater in the air handling unit, taking into account the efficiency of devices for heat recovery from exhaust air
4. Is able to perform aerodynamic calculations of an air installation for a selected case, select duct cross-sections, calculate pressure losses and the operating point of the fan - duct network system
5. Can use the catalogs of device manufacturers and select ventilation devices based on charts or selection programs
6. Can make drawings of the ventilation system in the AutoCad technique.

Social competences:
1. The student is aware of the impact of instalations comfort on human well-being
2. Is aware of the importance of ventilation as a technical element of building equipment affecting human health and safety.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures:
Written exam with open questions and a calculation task.
Rating scale: 0-50%: 2.0; 51-60%: 3.0; 61-70%: 3.5; 71-80%: 4.0; 81-90%: 4.5; 91-100%: 5.0. "
Tutorials:
The final grade is the average of grades from 4 tasks.
The assessment of the task takes into account: timeliness of completion, assessment of individual work and the correctness of each part of the project based on the checklist.
A positive grade should be obtained for each task. Each part of the project is assessed.
The passing threshold for each task is set separately, with a minimum of 50% of points for the correctness of performing a given task.

Programme content

General and specific issues in the field of ventilation of various types of rooms, installation design parameters and connections with thermal comfort and external climate, as well as ventilation devices and equipment. The issues will be presented during a lecture with elements of accounting exercises. Practical skills in designing a ventilation system for a selected room will be developed during design classes.

Course topics

Lectures:
1. Room ventilation tasks
2. Climatic parameters and thermal comfort with quality and cleanliness

air. Outdoor climate, design parameters.
3. Thermal comfort and thermal parameters of rooms, design ventilation air flows.
4. Types and division of ventilation systems, effectiveness and efficiency
ventilation, Coanda effect.
5. Air handling units and installations.
6. Dimensioning of air ducts, pressure lines. Elements of air handling units and ventilation installations.
7. Air distribution and ventilation equipment.
8. Acoustic problems in ventilation installations, requirements
acoustic. Industrial ventilation. Aeration. Local lashings.

Design:
Individual design of a ventilation system for a selected open-space room with the selection of the air flow, air supply elements, air handling unit and hydraulic calculations. Preparation of detailed drawings of the designed installation: installation diagram in axonometrics, installation views in
room and engine room, cross-sections of installations in the room and engine room, and cross-sections of shafts. Preparation of a technical description. Presentation of the completed project.

Teaching methods

Lectures:
Informative lecture with elements of a conversational lecture; Multimedia presentation; Discussion; Exercise elements
Project:
Individual work on the project; Case study discussion; Consultations; Case study analysis;

Bibliography

Basic:
[1] Przydróżny S.: Wentylacja. Wydawnictwo Politechniki Wrocławskiej. Wrocław 1991.
[2] Recknagel H., Sprenger E., Schramek E.R.: Kompendium wiedzy: ogrzewnictwo, klimatyzacja, ciepła woda, chłodnictwo, Wydawnictwo Omni Scala, Wrocław 2008.
[3] Pełech A.: Wentylacja i klimatyzacja - podstawy. Oficyna Wydawnicza Politechniki Wrocławskiej. Wrocław 2008.
[4] Pełech A., Szczęśniak S.: Wentylacja i klimatyzacja. Zadania z rozwiązaniami i komentarzami. Oficyna Wydawnicza Politechniki Wrocławskiej. Wrocław 2012.
[5] Malicki M.: Wentylacja i klimatyzacja. PWN Warszawa 1980.
[6] Jones W.P.: Klimatyzacja. ARKADY. Warszawa 2001.

Additional:
[1] Mizieliński B.: Systemy oddymiania budynków. WNT Warszawa 1999.
[2] Gaziński B.: Technika klimatyzacyjna dla praktyków. Komfort cieplny, zasady obliczeń i urządzenia. Systherm Serwis. Poznań 2005.
[3] Baumgarth, Horner, Reeker: Poradnik Klimatyzacji. Tom 1: Podstawy. Wydanie 1 polskie na podstawie 5. zmienionego i rozszerzonego wydania niemieckiego. Systherm, Poznań 2011.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	40	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	60	2,50