STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Air-conditioning in advanced technologies	**1010134271010137740**

Field of study	Profile of study (general academic, practical)	Year /Semester
Environmental Engineering Extramural First-	**(brak)**	**4 / 7**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**elective**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**part-time**

No. of hours				No. of credits
Lecture: **14**	Classes: **12**	Laboratory: **-**	Project/seminars: **-**	**4**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**4 100%**
Technical sciences	**4 100%**

Responsible for subject / lecturer:

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Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Knowledge of mathematic, physic, chemistry and biology which is a basis for microbiological and chemical pollution in air. Thermodynamics, Fluid Mechanics, Heat Engineering for humid air and heat transfer.
2	**Skills**	Solving and deriving mathematical formulas and differential equations Solving hydraulic calculations, heat losses and drawing with AutoCAD software
3	**Social competencies**	The student should be aware of getting knowledge and skills

Assumptions and objectives of the course:

The main aim of the course is to present and discuss general principles and method used in ventilation and air-conditioning, equipment and strategies of ventilation and air-conditioning used in different situations.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Knowledge of solution for simple cases of ventilation and air-conditioning - [K_W01]
2. Basis knowledge of ventilation and air-conditioning systems - [K_W02]
3. Basis knowledge of heat and mass transfer, thermodynamics and fluid mechanics of ventilation and air-conditioning systems - [K_W03]
4. Basis knowledge of development strategies of ventilation and air-conditioning systems - [K_W05]
5. Basic methods for designing simple ventilation and air-conditioning systems - [K_W07]

Skills:

1. The student is able to get information of simple ventilation and air-conditioning systems from literature and analyze them - [K_U01]
2. The student is able to exchange information in HVAC engineering society - [K_U02]
3. The student has self-education ability - [K_U05]
4. The student is able to use AutoCAD software for designing ventilation and air-conditioning systems - [K_U09]
5. The student is able to design the simple ventilation and air-conditioning system - [K_U16]

Social competencies:

1. The student understand the need for getting knowledge for all his live - [K_K01]
2. The student understand the impact of ventilation and air conditioning on internal environment - [K_K02]

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Assessment methods of study outcomes

Written classes of theory and h-x chart calculations, projects.

Course description

Definition of ventilation and air conditioning, classification. Parameters of outdoor climate. Parameters of climate comfort and thermal comfort. Description and division of ventilation and air-conditioning systems. Ventilating and air conditioning loads: latent heat loads, humidity loads, emission of pollutions. Calculation of volume of ventilating air for fixed and unfixed emission of loads. Distribution of ventilating air systems. Classification and characteristic of air streams, supply air diffusers, exhaust air diffusers. Distribution of ventilating air systems in special kind of compartments. Dimensioning of air ducts, pressure line. Elements of air handling units and ventilating installation: fans, filters, heat exchangers, recuperators, rotary exchangers, weather grills, dampers, fire dampers. Structures of natural and mechanical ventilation systems. Classification of ventilation in industry buildings. Aeration, local guys, air curtains. Air cleaning devices for industry ventilating installations. Acoustic problems in ventilation systems, noise sources, noise absorption and noise calculations.

Basis of chilled water systems: division, water chillers, free-cooling.

Basic bibliography:

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. Malicki M.: Wentylacja i klimatyzacja. PWN Warszawa 1980

5. Jones W.P.: Klimatyzacja. ARKADY. Warszawa 2001

Additional bibliography:

1. Gaziński B.: Technika klimatyzacyjna dla praktyków. Komfort cieplny, zasady obliczeń i urządzenia. Systherm Serwis. Poznań 2005

2. Baumgarth, Horner, Reeker: Poradnik Klimatyzacji. Tom 1: Podstawy. Wydanie 1 polskie na podstawie 5. zmienionego i rozszerzonego wydania niemieckiego. Systherm, Poznań 2011

Result of average student's workload

Activity	Time (working hours)
1. Lectures participation	14
2. Classes	12
3. Participation and preparing for examination	6

Student's workload

Source of workload	hours	ECTS
Total workload	62	4
Contact hours	26	4
Practical activities	12	2

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