



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

HVAC Laboratories [S1IŚrod2>LHVAC]

### Course

Field of study

Environmental Engineering

Year/Semester

4/7

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

elective

### Number of hours

Lecture

0

Laboratory classes

30

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

### Number of credit points

2,00

### Coordinators

dr hab. inż. Katarzyna Ratajczak

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### Lecturers

### Prerequisites

Knowledge from major classes: ventilation, air-conditioning with refrigeration, heating in the scope discussed in the first cycle studies. Skills acquired in major classes: ventilation, air conditioning with refrigeration, heating. Awareness of constantly updating and supplementing knowledge and skills, willingness to work in a group.

### Course objective

The aim of the course is to broaden the knowledge and skills acquired in the subjects of ventilation, air conditioning, refrigeration and heating and to use in a practical way the acquired knowledge and skills during laboratory exercises. Performing laboratory exercises together with the preparation of a presentation and report is also to help in the preparation of an engineering thesis by drawing attention to the elements of scientific research and their components, including literature review, description of variants, presentation of results and drawing conclusions.

### Course-related learning outcomes

Knowledge:

1. The student has knowledge of the changing trends in HVAC systems

2. Has knowledge of modern elements of HVAC systems
3. Has knowledge in the development of HVAC technology and tools used to carry out experiences
4. Has knowledge in the field of research conducted at the Institute of Environmental Engineering and Building Installations of PUT

#### Skills:

1. The student is able to plan an experiment based on a literature review, taking into account aspects economic, ecological or energy
2. Can plan variants, thanks to which it will be possible to evaluate a given solution
3. Is able to conduct an experiment on a research stand that imitates an element of the system HVAC using the right tools
4. Can present the results of experiments orally and in writing
5. Can draw conclusions from the conducted experiments

#### Social competences:

1. The student is able to work in a group and sees individual responsibility in teamwork
2. Sees the need to be up to date in matters related to the development of HVAC technology

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

#### Laboratories:

Performing a minimum of 2 laboratory exercises out of the proposed 4-5, passing entrance tests, making an oral presentation for all course participants and preparing a report on the experiments carried out, including the placement of the results in the literature.

The final grade consists of: 50 points. presentation of the results and scope of the exercise and 50 points. report on the results carried out

Grading scale: 0-50 points = 2.0; 51-60 points = 3.0; 61-70pts=3.5;71-80pts=4.0; 81-90pts=4.5;91-100pts=5.0

### Programme content

Laboratory exercises will cover issues discussed in the subjects of ventilation, air-conditioning with refrigeration, heating and issues related to scientific research conducted at IISiB PUT.

### Course topics

#### Laboratories:

Students complete a minimum of three laboratory exercises. The exercise will be selected during the first class from a set of 4-5 suggestions. The availability of the proposals takes into account the currently ongoing scientific research of the Institute's employees.

#### Sample topics:

1. Assessment of the efficiency and effectiveness of reversible fans
2. The influence of ventilation on evaporation in swimming pools
3. Cooperation of general and technological ventilation in a chemical laboratory
4. Testing the air conditioner system

Topics will be announced before the semester begins

### Teaching methods

Experiment method; Practical exercises; Discussion

### Bibliography

#### Basic:

[1] Ratajczak K. "Układy wentylacyjne krytych basenów kąpielowych w aspekcie energooszczędności" Wyd. Politechniki Poznańskiej, Poznań 20165

[2] Amanowicz Ł., Ratajczak K., Szczechowiak E. "Badania jednorurowych systemów wentylacyjnych pod kątem oceny mieszania się strumieni powietrza w czerpni i wyrzutni ", Ciepłownictwo Ogrzewnictwo

Wentylacja 50/6, 2019.

[3] Literature will be given before the beginning of the semester and adapted to the current one state of the art

Additional:

[1] Supplementary literature will be given before the beginning of the semester and adapted to the current one state of the art

### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00