COURSE DESCRIPTION CARD - SYLLABUS

Course name
Diagnostics for HVAC Systems [N1IŚrod2>DIHVAC]

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
part-time

Requirements
elective

Number of hours

Lecture
10

Laboratory classes
10

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

dr inż. Radosław Górzeński
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Lecturers

Prerequisites

He has knowledge of mathematics, physics, chemistry and biology, which is the basis for understanding transformations mathematical as well as identification and assessment of thermal and microbiological phenomena in rooms and air preparation devices. He has knowledge of thermodynamics, heat transfer and fluid mechanics, ventilation - in the field of thermodynamics moist air, the theory of heat penetration, conduction and heat transfer as well as air flows in rooms and ventilation devices. Ability to perform mathematical transformations, derivations of mathematical formulas. The student should be aware of the consequences of decisions made. Be aware of the necessity constantly updating and supplementing knowledge and skills. Be aware of your value theoretical and practical knowledge

Course objective

The aim of the course is to familiarize students with the methods of testing and diagnostics of heating, ventilation and air-conditioning systems as part of acceptance, control and verification tests. The aim of the course is to develop the ability to supervise and perform research and interpret the results.

Course-related learning outcomes

Knowledge:

1. The student has knowledge of how to use the laws describing the flow of liquids and gases in practice in practice
2. Has knowledge in the field of airtightness of ducts and buildings
3. Has knowledge in the field of evaluation of technologies and installation materials, connecting wires and networks in
systems
4. Has basic knowledge about the life cycle of devices, including technical equipment systems buildings
5. Has knowledge of development trends in the field of technical equipment systems buildings

Skills:
1. The student is able to interpret the results of the measurements, draw conclusions and formulate opinions
2. Can perform measurements and prepare a report describing the methodology, circumstances and results
measurements of systems of technical equipment of buildings, including elements of supply systems in heat and cold
3. Can perform experimental measurements (pressure, temperature, fluid velocity,
flow rates, heat streams, efficiency of heat exchangers, thermovision)
4. Can make a critical analysis of the functioning and evaluate the existing solutions technical in the field of environmental engineering, in particular devices, facilities, systems, processes related to the technical equipment of buildings, central heat supply, networks
heating, water supply and sewage systems

Social competences:
1. The student is able to interact and work in a group
2. Is aware of the need to repeat measurement activities and assess uncertainty measurement results
3. He sees the need for systematic learning and deepening his competences

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures:
Written test with various types of questions and a problem task to be calculated.
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.

Programme content

Lectures:
1. Measurements of air flows (thermoanemometers, pipes, use of VAV and BMS regulators) and water flows (water installations, rotameters, flowmeters, pressure difference measurement on balancing valves)
2. Measurements of heat/cold consumption (heat meters, balancing)
3. Performance measurements of fan coil units, splits, exchanger power, boiler efficiency measurements
4. Electrical measurements (fan motors, system compressors
and heat pumps) 5. Determination of complex parameters (heat recovery efficiency, COP, ESEER)
6. Using BMS for diagnostics, analysis of measurement data o
varying degrees of accuracy (e.g. invoices, periodic readings of heat and cooling meters, continuous monitoring, BMS)
7. Influence of users (building occupancy assessment methods, video surveillance, counting gates, usage profiles)
8. Benchmarking. The use and impact of diagnostics on reducing operating costs
Laboratories:
1. Measurement of the heating medium volume flow
2. Hydraulic balancing of the existing installation
underfloor heating with Grundfos pump and software
3. Thermographic measurements
4. Testing the air tightness of the room using the pressure method

5. Analysis of operating data of the air handling unit
6. Evaluation of the range of the air stream

Course topics

none

Teaching methods

Lectures:
Informative lecture with elements of a conversational lecture; Multimedia presentation; Discussing case studies
Experiment method; Practical exercises

Bibliography

Basic:
[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] Jones W.P.: Klimatyzacja. ARKADY. Warszawa 2001

Additional:
[1] Wymagania techniczne COBRTI INSTAL Zeszyt 5.
[2] Wymagania techniczne COBRTI INSTAL Zeszyt 6.
[3] Wymagania techniczne COBRTI INSTAL Zeszyt 8.

Breakdown of average student's workload

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