COURSE DESCRIPTION CARD - SYLLABUS

Course name
District Heating

Course

Field of study
Environmental Engineering
Area of study (specialization)
-
Level of study
First-cycle studies
Form of study
full-time

Year/Semester
3 / 5
Profile of study
general academic
Course offered in
Polish
Requirements
compulsory

Number of hours

Lecture
30
Laboratory classes
0
Other (e.g. online)
0
Tutorials
15
Projects/seminars
15

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
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Faculty of Environmental Engineering and Energy

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Responsible for the course/lecturer:

Prerequisites

1. Knowledge:

Fundamentals of combustion processes. Incompressible fluid flows in pipes, pressure loss, pump selection. Pressure, pressure units. Fundamentals of heat exchange. Basics of materials science. Control systems.

2. Skills:

Calculation of simple and complex hydraulic networks. Calculation of heat transfer through flat and curved walls. Selection of control equipment for hydraulic networks.

3. Social competencies:

Ability to work in team. Awareness of the need to continually update and supplement one's knowledge and skills.

Course objective

To teach students basic information about municipal and industrial heat distribution systems, including: heat source, pipe line system, heat transfer units.

Course-related learning outcomes

Knowledge

1. The student has knowledge of systems and development trends in urban heat supply systems and cities based on conventional heat sources - [KIS_W05]

2. The student knows the principles of construction, design and operation: medium power heating plants (with a different energy carrier), heating networks and heating nodes - [KIS_W05,KIS_W06]

3. The student has knowledge of the heating system design algorithm and social, economic and other non-technical conditions of engineering activities - [KIS_W07, KIS_W08]

Skills

1. The student is able to calculate the heat power of sources supplying heat to buildings - [KIS_U06, KIS_U07, KIS_U08, KIS_U09, KIS_U10]

2. The student is able to carry out projects of medium power heating plant and heating network together with regulation and security systems - [KIS_U06, KIS_U07, KIS_U08, KIS_U09, KIS_U10]

3. The student is able to draw up an ordered graph of thermal needs and analyze the operation of the heating system during the year - [KIS_U06, KIS_U07, KIS_U08, KIS_U09, KIS_U10]

4. The student is able to draw up a pressure line for a high parameter heating system - [KIS_U07, KIS_U08]

Social competences

1. The student is aware of the role of the heating system in the urban agglomeration - [KIS_K01, KIS_K03]

2. The student understands the need and purposefulness of teamwork in solving theoretical and practical issues - [KIS_K03]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: written egzam

Seminars (design classes): evaluation of work progress during contact hours, presentation of finished design or/and written test.

Tutorials: written open-type test or defense/presentation of term assignment.

Programme content

Review of basic issues in the field of District Heating: historical outline, classification and structure of district heating systems.

Heat balance of the heating system.

Annual heat demand analysis.

Heating plants - control and security systems.

Algorithm for heating systems design.

Heating pipelines - materials used, cable routing, selection.

Thermal nodes - introduction, demonstrative calculations and illustrative selection.

New trends in heating systems.

Teaching methods

Lecture: multimedia presentation, didactic quiz.

Exercises: multimedia presentation and / or solving tasks on the board.

Project: ongoing solving of project problems and consulting work progress.

Bibliography

Basic

1. Bagieński Z., Amanowicz Ł., Ciepłownictwo. Projektowanie kotłowni i ciepłowni, Wydawnictwo Politechniki Poznańskiej 2018

2. Nantka M. B., Ogrzewnictwo i ciepłownictwo, tom I, Wyd. Politechniki Śląskiej, Gliwice 2013

3. Zaborowska E., Projektowanie kotłowni wodnych na paliwa ciekłe i gazowe, Wyd. Politechniki Gdańskiej 2018

4. Mizielińska K., Olszak J., Gazowe i olejowe źródła ciepła małej mocy, OWPW, Warszawa 2006

5. Krygier K., Sieci ciepłownicze, OWPW, Warszawa 2006

6. Zaborowska E., Zasady projektowania wodnych węzłów ciepłowniczych, Wyd. Politechniki Gdańskiej, 2018

Additional

1. Szkarowski A., Łatowski L., Ciepłownictwo, WNT, Warszawa 2006

2. Żarski K., Obiegi wodne i parowe w kotłowniach, Warszawa 2000

3. Krygier K., Wybrane zagadnienia z ciepłownictwa, WPW, Warszawa 1989 oraz Sieci cieplne, materiały do ćwiczeń projektowych, WPW, Warszawa 1993

4. Żarski K., Węzły cieplne w miejskich systemach ciepłowniczych, Wydawnictwo Instal, 2014

5. Foit H., Indywidualne węzły cieplne, WPŚ, Gliwice 2010

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	60	2,5
Student's own work (literature studies, preparation for tutorials, preparation for tests/exam, project preparation) [1]	40	1,5

[1] delete or add other activities as appropriate