



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Special Purpose Heating Systems [S1IŚrod1>SIC]

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

compulsory

Number of hours

Lecture

30

Laboratory classes

0

Other (e.g. online)

0

Tutorials

15

Projects/seminars

0

Number of credit points

3,00

Coordinators

dr inż. Fabian Cybichowski

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Lecturers

Prerequisites

Knowledge on heat transfer, fluid mechanics and thermal systems operation. Ability to perform engineering calculations and equipment sizing in basic thermal systems (piping, pumps, control valves), practical knowledge of Excel spreadsheet software with VBA add-in. Awareness of the need to constantly update and supplement knowledge and skills.

Course objective

Students will acquire basic knowledge about principles of operation and design of industrial heating systems.

Course-related learning outcomes

Knowledge:

1. Student has basic knowledge of typical thermal systems used in industrial plants.
2. Student knows calculation methods, design techniques and tools used during design process.

Skills:

1. Student can choose the type of heating system appropriate for specific application.

2. Student can perform the calculation and sizing for piping and other equipment for particular system.
3. Student is able to devise control algorithm for simple thermal system.

Social competences:

1. Awareness of the need to constantly acquire and expand knowledge in order to competently pursue the career in engineering.
2. Student understands non-technical consequences of engineering activities, including the impact on environment, and is aware of their importance.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures:

Test in the form of questions (and/or): open, calculation, drawing, test questions of various types.

Grading 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.

Bonus attendance: +0.5 grade for attendance at 5 lectures, +1.0 grade for attendance at 7 lectures (condition: minimum test score of 40%).

Tutorials:

Written test or defense/presentation of term assignment

Programme content

Lectures:

1. Introduction to industrial heating systems.
2. Specific mediums used in industrial systems (glycol solutions, thermal oil, steam, various food industry).
3. Steam and condensate loop - introduction, calculations, design guidelines
4. Heat recovery in industrial systems - introduction, calculations, design guidelines, hydronic balancing.
5. Principles of operation and automated control of complex heating systems.
6. Health and safety in the context of heating systems.
7. Introduction to tutorial classes - basic calculations and equipment sizing.

Tutorials:

Practical calculations and equipment sizing complementing the lectures.

Teaching methods

Lectures:

Informative lecture with elements of a conversational lecture; Problem lecture; Multimedia presentation;

Problem method; Interactive problem solving; Interactive online materials

Bibliography

Basic:

[1] Poradnik GESTRA (Flowserve) dla systemów parowych.

[2] Learn About Steam, Spirax Sarco (poradnik dostępny na stronie Spirax Sarco)

[3] Safety codes, pressure equipment codes (UDT, BHP)

Additional:

[1] Additional technical materials available on the internet

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00