COURSE DESCRIPTION CARD - SYLLABUS

Course name
Industrial Boilers [S2EPiO1-ECiO>KP]

Course

Field of study
Industrial and Renewable Energy Systems

Year/Semester
1/1

Area of study (specialization)
Thermal and Renewable Energy

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
15

Projects/seminars
15

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Knowledge acquired during studies in the field of thermodynamics, basics of automation, mechanics and machine construction, materials science, boiler equipment, heat and mass exchange, energy management, fuel combustion, environmental protection. The student is able to use the basic concepts of solid, liquid and gaseous fuels combustion processes. Is able to identify basic thermodynamic processes.

Course objective

Getting to know the structures and heating boiler. Understanding the individual components and function blocks of modern high power power equipment. Mastering the skills of selecting and calculating heat demand. Identification and solving of basic operational and emission problems occurring when using industrial boilers. Construction and types of transmission networks.

Course-related learning outcomes

Knowledge:
knows the basic processes occurring in the life cycle of devices, facilities and technical systems used in the power industry, in particular boilers.
knows the main directions of development of modern boiler structures, taking into account economic

and environmental trends.
has ordered and in-depth knowledge of the impact of combustion process parameters on the efficiency of energy machines and their impact on the functioning of energy systems.

Skills:
is able to use his knowledge to search for the right sources and interpret the information found in order to solve both standard and non-standard engineering problems in the field of boiler equipment operation.
is able to use his knowledge and skills to adapt existing or create new methods and tools to help solve unusual engineering problems related to boiler design issues.
can formulate and test hypotheses related to simple implementation problems.

Social competences:
is ready to critically assess knowledge and received content
is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in the event of difficulties in solving the problem yourse
is ready to think and act in an entrepreneurial manner

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Knowledge acquired as part of the lecture is verified by a final exam consisting of 5 to 6 questions with various points depending on their level of difficulty. Passing threshold: 50% of points. Final issues on the basis of which questions are prepared will be sent to students by e-mail using the university e-mail system.

Skills acquired as part of the tutorialc will be verified on final test consisting of 5 to 6 problems.

Skills acquired as part of the project classes are verified on the basis of short presentations during the semester, questions from the teacher and on the basis of the final project developed. Passing threshold: 50% of points.

Programme content

News regarding the distribution of heating and boiler equipment in terms of fuels and heating power used. Division and classification of fuels applicable to energy processes. Basic operational and production problems encountered in the presented topics. Classification of boiler equipment with presentations and familiarization with the energy and emission criteria. Topics related to energy balance and heat losses. Types and construction as well as the basics of designing individual components of heating devices.

Course topics

Topics in line with curriculum content

Teaching methods

Blackboard lecture with multimedia presentation.

The lecture will be conducted using a multimedia presentation. Classes will be conducted at the blackboard (chalk or white), the student is required to have a calculator.

Project classes: discussing theory and assumptions for classes on the board and performing tasks given by the teacher, independent work on the design task.

Bibliography

Basic
J. Nocoń, j. Poznański, S. Słupek, M. Rywotycki – Technika cieplna – przykłady z techniki spalania, Wydawnictwo AGH, 2007
P. Orłowski, W. Dobrzański, E. Szwarc, Kotły parowe konstrukcja i obliczenia, WNT, Warszawa 1979.

S. Kruczek, Kotły. Konstrukcja i obliczenia, Wydawnictwo Politechniki Wrocławskiej. Wrocław 2001.
J. Jarosiński, Techniki czystego spalania, WN-T, Warszawa 1996.
J. Szargut, A. Ziębik - Podstawy energetyki cieplnej, PWN, Warszawa 1998

Additional

P. Orłowski, Kotły parowe w energetyce przemysłowej. Zagadnienia ekspoatacyjne, WNT, Warszawa 1976.
G. Wielgosiński, R. Zarzycki – Technologie i procesy ochrony powietrza, PWN, 2018
J. Szargut, A. Ziębik - Podstawy energetyki cieplnej, PWN, Warszawa 1998

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,00
Classes requiring direct contact with the teacher	47	1,60
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	13	0,40