COURSE DESCRIPTION CARD - SYLLABUS

Course name
Gas technology [S2EPiO1-ECiO>TG]

Course

Field of study
Industrial and Renewable Energy Systems

Year/Semester
2/3

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
30

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Student has knowledge in the field of thermodynamics and fluid mechanics and knowledge about phenomena existing in energetic machines such as gas turbine, gas engines and knowledge about production, pre-treatment, storage and transportation of gaseous fuels. Student should also have skills required to analyze simple energy systems in terms of energy production (combustion processes), heat energy transport, flow phenomena and impact on the natural environment.

Course objective

To acquaint students with modern, low-emission and high efficiency technologies connected to use of gaseous fuels in heat and electricity production as well as production of non-standard gaseous fuels.

Course-related learning outcomes

Knowledge:
has expanded knowledge in the construction and operation of energetic divices and machines powered by gaseous fuels.
he knows the main directions of development of the gas industry.
he knows the legal issues related to the design and use of energy systems powered by gas.

Skills:
is able to formulate and test hypotheses related to simple research problems in field of gas technology.
is able to manage the work of the team.
is able to interact with other people as part of team work in solution of scientific problems related to gas energy sector.

Social competences:
he is ready to critically assess his knowledge in the field of extraction, production and use of gas fuels in the energy sector.
is ready to initiate actions for the social interest related to the improvement of the country"s energy security.
is ready to think and act in an entrepreneurial way.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture: Knowledge acquired during the lecture is verified during the final test carried. Each test consists of 5 questions (open). 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 laboratory classes will be verified basis on the final test, consisting of 10 tasks differently scored depending on their level of difficulty. Passing threshold: 50% of points.

Programme content

Lecture: Methods and apparatus for syngas, biogas and pyrolysis gas production, advanced gas turbine cycles, new ignition systems for gas engines, low emission combustion processes of gaseous fuels in furnace and boilers, thermal neutralization of VOCs, reduction systems for toxic compounds, energy storage processes, power to X (ammonia, hydrogen)
Laboratory: analysis of the process of combustion of gaseous fuels in a diffusion burner, performance of the energy balance of an industrial furnace, assessment of the operation of a gas boiler, determination of the efficiency of the condensing boiler, assessment of the impact of the plotting parameters on the emission of toxic compounds during the combustion of gaseous fuels, determination of the properties of gaseous fuels

Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board
Laboratory: multimedia presentation and performance of tasks given by the teacher - practical exercises.

Bibliography

Basic
Dobski, T.: Combustion Gases in Modern Technologies, 2scd Ed., Wydawnictwo Politechniki Poznańskiej
Jarosiński J.: Techniki czystego spalania, WNT,
Molenda J.: Gaz ziemny. Paliwo i surowiec, WNT, Warszawa
Additional
Hiroshi T., Gupta A.: High Temperature Air Combustion
P. Jansohn. Modern Gas Turbine Systems
A. Lefebvre: Gas Turbine Combustion
R. Stone: introduction to Internal Combustion Engines, Third edition
Joachim G. Wunning: Handbook of Burner Technology for Industrial Furnaces

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	4,00
Classes requiring direct contact with the teacher	45	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	0,50