COURSE DESCRIPTION CARD - SYLLABUS

Course name

Industrial Gas Technologies

Course

Field of study

Power Engineering

Year/Semester

4/7

Area of study (specialization)

Thermal energy

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

30

Other (e.g. online)

Tutorials

Projects/seminars

15

Number of credit points

6

Lecturers

Responsible for the course/lecturer:

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Faculty of Transpot Engineering

ul. Piotrowo 3 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Student has basic 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 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 detailed and theoretically founded knowledge in the field of principles of construction, modeling, life cycle processes of energy system components; knows the main development trends of these systems.

Has a structured and in-depth knowledge in the scope of: management of supply and energy consumption supplying processes and objects, economic conditions in power engineering and energy law.

Skills

Is able through the selection and application of appropriate methods and tools, including advanced information and communication techniques (ICT) to analyze and diagnose the operation of power devices and their components in steady and transient states.

Can assess the usefulness of methods and tools used in measurement, diagnosis and decision support related to energy processes.

Social competences

Correctly identifies and resolves dilemmas related to the state's energy security; can think and act in a creative and enterprising way. Can integrate the information to interpret and learn from them, create and justify opinions. Is aware of the importance of acting in a professional manner, observing the rules of professional ethics and requirements of others, care for the heritage and traditions of the profession, as well as respect for diversity

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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.

Project: the skills acquired during the design class will be assessed on the basis of the solution to the engineering problem presented by the student during the last class presentation.

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 combustion process of non-standard gaseous fuels, assessment of the impact of plotting parameters on the emission of toxic compounds during the combustion of non-standard

gaseous fuels, determination of the properties of gaseous fuels after the thermal biomass processing process

Project: solution of an scientific problems in the field of gaseous fuel use

Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board

Laboratory: multimedia presentation and performance of tasks given by the teacher - practical exercises.

Project: multimedia presentation illustrated with examples given on a blackboard 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

Vademecum Gazownika, praca zbiorowa

Additional

P. Basu: Biomass Gasification and Pyrolysis: Practical Design and Theory

A. Lefebvre: Gas Turbine Combustion

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,0
Classes requiring direct contact with the teacher	75	3,0
Student's own work (literature studies, preparation for laboratories, development of laboratories, preparation for passing and exam, preparation of the project, participation in consultations) [1]	75	3,0

[1] delete or add other activities as appropriate