COURSE DESCRIPTION CARD - SYLLABUS

Course name
Combustion processes

Course

Field of study
Industrial and Renewable Energy
Area of study (specialization)
Gas technology and renewable ene
Level of study
Second-cycle studies
Form of study
full-time

Year/Semester
1/1
Profile of study
general academic
Course offered in
polish
Requirements
compulsory

Number of hours

Lecture
15
Tutorials

Laboratory classes
15
Projects/seminars

Other (e.g. online)

Number of credit points

2

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

Basic has knowledge in the field of fluid mechanics, physics, thermodynamics, chemistry and knowledge

about combustion processes of natural gases . Student should also have skills to evaluate the results of experiments, observations, and calculations, and discuss measurements errors.

Course objective

To present knowledge about main thermodynamics parameters of flammable gases. Presentation of the thermodynamic quantities that describe the combustion process of gaseous fuels.

Course-related learning outcomes

Knowledge

Has expanded knowledge about the development directions of new low emission and high efficiency combustion technology

Has ordered and in-depth knowledge necessary design of combustion systems for energetic machines and devices

Knows the main direction of scientific research in field of fuel combustion

Skills

Is able to notice systemic and non-technical aspects during solving engineering tasks in the field of combustion processes.

Is able to design and conduct experiments and simulations of combustion processes as well as process and interpret their results.

Can independently plan and implement their own lifelong learning and guide others in this regard.

Social competences

Is ready to recognize the importance of knowledge field of fuel use and their impact on enviroment

He is ready to fulfill social obligations, inspire and organize activities for the social environment

It is ready to initiate actions for the social interest, especially in the area of reducing the negative impact of the use of fossil fuels

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.

Programme content

Lecture: Thermodynamic quantities describing the of gaseous fuels, Thermodynamic quantities describing the combustion process of gaseous fuels, Joule-Thompson phenomena, Flammability limits,

methane number, low and high heating value, Adiabatic flame temperature, laminar and turbulent flame speed, kinetic reaction of combustion process, laminar premixed flames, laminar diffusion flames, turbulent premixed flames, flame acoustic interaction, laser-otical method for combustion processes

Laboratory: analysis of fuel combustion in a kinetic and diffusion flame, calculations of equilibrium parameters of the combustion process, determination of laminar combustion speed, measurement of diffusion flame length, analysis of toxic compound distribution and temperature in a vortex flame,

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

Warnatz J., Maas U., Dibble R.W.: Combustion, Sprinter-Verlag, Berlin?Heidelberg 1999

Dobski T.: Spalanie gazów ziemnych o dużej zawartości azotu w urządzeniach przemysłowych, Wydawnictwo Politechniki Poznańskiej, Poznań 2001

Jarosiński J.: Techniki czystego spalania, WNT, Warszawa 1996

Molenda J.: Gaz ziemny. Paliwo i surowiec, WNT, Warszawa 2004

Wolfgang trier: Glass Furnaces, Design Construction and Operation,

Ecbert: Laser Diagnostic for combustion processes

Thierry Poinsot: Theoretical and numerical combustion

John Carrol:Natural Gas Hydrates

Andrzej Kowalkiewicz: Podstawy procesów spalania

Józef Jarosiński: Techniki czystego spalania

Additional

Glassman I.: Combustion, Academic Press, New York 1977,

Wilk R.K.: Low-emission Combustion, Wydawnictwo Politechniki Śląskiej, Gliwice 2002

Kowalkiewicz podstawowy procesów spalania, WNT, Warszawa 2000

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratories, development of laboratories, preparation for passing and exam, participation in consultations) [1]	30	1,0

[1] delete or add other activities as appropriate