COURSE DESCRIPTION CARD - SYLLABUS

Course name
Fuel and Energy Conversion

Course

Field of study
Power Engineering

Year/Semester
2/4

Area of study (specialization)
-

Profile of study
general academic

Level of study
First-cycle studies

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

3

Lecturers

Responsible for the course/lecturer:
dr inż. Robert Wróblewski

email: robert.wróblewski@put.poznan.pl

tel. 61 665 2523

Faculty of Environmental Engineering and Energy

ul. Piotrowo 3A 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Basic knowledge in the field of physics, chemistry, economic geography. The ability to effectively self-study in a field related to the chosen field of study. Is aware of the need to expand their competences, readiness to cooperate within a team

Course objective

Understanding the characteristics of energy fuels and how to use them for energy purposes. (How to convert some forms of energy into others)

Course-related learning outcomes

Knowledge

1. Student has knowledge of the characteristics of gaseous, liquid and solid fuels as well as their resources and extraction in Poland and in the world.

2. The student has ordered and theoretically founded knowledge of the characteristics of the combustion process and stoichiometric calculations as well as the gasification process and the conversion of one fuel to another.

3. Student is knowledgeable about modern combustion and gasification technologies and devices used in these processes.

Skills

1. As a result of the course the student will be able to use the appropriate technological system to burn various types of fuels, taking into account the reduction of harmful substances.

2. Perform stoichiometric calculations for liquid and solid gaseous fuels, determine calorific value.

Social competences

1. The student is aware of the environmental impact of the use of fossil fuels.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- assessment of knowledge and skills demonstrated during the written exam

Laboratory classes:

- assessment based on ongoing monitoring of messages and reports made

Getting extra points for activity during classes, especially for:

- proposing to discuss additional aspects of the issue;

- effectiveness of applying the acquired knowledge when solving a given problem;

- ability to cooperate within a team that practically performs a specific task in a laboratory;

- comments related to the improvement of teaching materials;

- aesthetic care of prepared reports and tasks? as part of self-study.

Programme content

Lecture:

Fuels: gaseous, solid and liquid, resources and characteristics. Biofuels. Municipal and industrial waste as heat sources. Elemental reaction kinetics. Basic equations describing the combustion process. Low-

carbon fuel combustion. Increased combustion efficiency? regeneration and heat recuperation High-efficiency combustion technologies. Oxygen combustion. Combustion safety: explosion, detonation.

Laboratory classes:

performance of laboratory measurements in the field of technical analysis of fuels (measurement of combustion heat and calorific value, ash content, moisture and volatile substances), regulation and control of the combustion process, biomass pelleting, electrolysis process and fuel cell

Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board

Laboratory classes: classes at laboratory positions

Bibliography

Basic

1. Kortylewski W.:Spalanie i Paliwa, Oficyna Wydawnicza Politechniki Wrocławskiej 2008

2. Wandrasz J. W., Wandrasz A. J.: Paliwa formowalne biopaliwa i paliwa z odpadów w procesach termicznych, wydawnictwo Seidel-Przywecki Sp. z o. o., Warszawa 2006.

3. Lewandowski W. M., Ryms M.:Biopaliwa, , WNT Warszawa, 2013

Additional

1. Kruczek S.: Kotły. Konstrukcje i obliczanie, Oficyna Wydawnicza Politechniki Wrocławskiej, 2001

2. Kozaczka J.: Procesy zgazowania. Inżynierskie metody obliczeń. Wydawnictwa AGH, Kraków 1994

3. Chmielniak T. J.: Technologie energetyczne, , WNT , 2015.

4. Bis Z. Kotły fluidalne teoria i praktyka, , Częstochowa 2010

Breakdown of average student's workload

	Hours	ECTS
Total workload	80	3,0
Classes requiring direct contact with the teacher	60	2,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests/exam) [1]	20	1,0

[1] delete or add other activities as appropriate