STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Fuels and energy conversion		**1010311441010315643**

Field of study	Profile of study (general academic, practical)	Year /Semester
Power Engineering	**(brak)**	**2 / 4**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**full-time**

No. of hours					No. of credits
Lecture: **30**	Classes: **-**	Laboratory: **15**	Project/seminars: **-**		**3**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**3 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic information on physics, chemistry, economic geography
2	**Skills**	Ability to effectively self-study in a field related to a chosen field of study
3	**Social competencies**	He is aware of the need to expand his competencies, readiness to cooperate within the team

Assumptions and objectives of the course:

Getting to know the characteristics of energy fuels and how they are used for energy purposes (how to process some forms of energy in others)

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. He has knowledge of the characteristics of gas, liquid and solid fuels and their resources and production in Poland and in the world. - [K_W07 +; K_W09 ++; K_W022 ++]
2. It has a structured and theoretical knowledge of the characteristics of the combustion process and stoichiometric calculations and the process of gasification and conversion of some fuels into others. - [K_W03 +++; K_W09 ++; K_W08 ++]
3. He is knowledgeable about modern combustion technologies, gasification and equipment in these processes. - [K_W06 ++]

Skills:

1. As a result of the class the student will be able to use the appropriate technological system for burning different types of fuels, including the reduction of harmful emissions. - [K_U01 +; K_U02 ++]
2. Carry out stoichiometric calculations for liquid and solid gas fuels to determine calorific value. - [K_U01 +; K_U04 ++; K_U09 ++]

Social competencies:

1. He is aware of the environmental impact of using fossil fuels. - [K_K02 ++; K_K04 ++]

Assessment methods of study outcomes

Lecture

- assessment of knowledge and skills demonstrated on a problem-oriented written exam,

Continuous assessment of each activity (rewarding activity and quality of perception).

Laboratory exercises:

- checking and rewarding the knowledge needed to solve problems in a given area of laboratory tasks,
- assessment of knowledge and skills related to the performance of the exercise task, evaluation of the exercise report.

Obtaining extra points for activity during classes, especially for:

- proposing to discuss additional aspects of the issue;
- the effectiveness of the use of acquired knowledge when solving a given problem;
- ability to cooperate within a team practically performing a detailed task in a laboratory;
- comments related to the improvement of didactic materials;
- the aesthetic diligence of the reports and tasks developed - within the framework of self-study.

Course description

Applied methods of teaching: lecture with multimedia presentation (including drawings, photographs, films) supplemented with examples given on the board, interactive lecture with questions to students or specific students, laboratory - team work, detailed review of reports by leading labs and commentary discussions

Fuels: gas, solid and liquid - resources and characteristics. Biofuels. Municipal and industrial waste as a source of heat. Kinetics of elementary reactions. Basic equations describing the course of the combustion process. Low-emission fuel combustion. Increased combustion efficiency - heat recovery and recuperation High-efficiency combustion technologies. Burning in oxygen. Safety of combustion: explosion, detonation.

Basic bibliography:

1. 1. Spalanie i Paliwa, W. Kortylewski, Oficyna Wydawnicza Politechniki Wrocławskiej 2008
2. 4. Paliwa formowalne biopaliwa i paliwa z odpadów w procesach termicznych, J. W. Wandrasz, A. J. Wandrasz, wydawnictwo ?Seidel-Przywecki? Sp. z o. o., Warszawa 2006.
3. 2. Biopaliwa, Witold M. Lewandowski, Michał Ryms, WNT Warszawa, 2013

Additional bibliography:

1. 6. Kotły. Konstrukcje i obliczanie, S. Kruczek, Oficyna Wydawnicza Politechniki Wrocławskiej,2001
2. 7. Procesy zgazowania. Inżynierskie metody obliczeń. J. Kozaczka, Wydawnictwa AGH, Kraków 1994
3. 5. Technologie energetyczne, T. J. Chmielniak, WNT , 2015.
4. 3. Kotły fluidalne ? teoria i praktyka, Z. Bis, Częstochowa 2010

Result of average student's workload

Activity	Time (working hours)
1. Lecture	30
2. Laboratories	15
3. Preparation for laboratory classes	10
4. Reports	6
5. Consultation	5
6. Preparing for the exam	20
7. Exam	3

Student’s workload

Source of workload	hours	ECTS
Total workload	89	3
Contact hours	53	2
Practical activities	36	1