

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Fuels and energy conversion		Code 1010314441010315643
Field of study Power Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 2 / 4
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) part-time	
No. of hours Lecture: 15 Classes: - Laboratory: 15 Project/seminars: -		No. of credits 4
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences		ECTS distribution (number and %) 4 100%
Responsible for subject / lecturer: dr inż. Robert Wróblewski email: robert.wróblewski@put.poznan.pl tel. 61 665 2523 Wydział Elektryczny ul. Piotrowo 3A, 60-965 Poznań		
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		

<p>Lecture</p> <ul style="list-style-type: none"> - assessment of knowledge and skills demonstrated on a problem-oriented written exam, <p>Continuous assessment of each activity (rewarding activity and quality of perception).</p> <p>Laboratory exercises:</p> <ul style="list-style-type: none"> - 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. <p>Obtaining extra points for activity during classes, especially for:</p> <ul style="list-style-type: none"> - 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		
<p>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</p> <p>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.</p>		
Basic bibliography:		
<ol style="list-style-type: none"> 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:		
<ol style="list-style-type: none"> 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	15	
2. Laboratories	15	
3. Preparation for laboratory classes	10	
4. Reports	6	
5. Consultation	5	
6. Preparing for the exam	25	
7. Exam	3	
Student's workload		
Source of workload	hours	ECTS
Total workload	79	4
Contact hours	38	2
Practical activities	36	2