

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject (-)		Code 1010621271010638166
Field of study Mechanical Engineering	Profile of study (general academic, practical) general academic	Year /Semester 4 / 7
Elective path/specialty Thermal Engineering and Renewable Energy	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 1 Classes: - Laboratory: 1 Project/seminars: -		No. of credits 2
Status of the course in the study program (Basic, major, other) other		(university-wide, from another field) university-wide
Education areas and fields of science and art technical sciences		ECTS distribution (number and %) 2 100%
Responsible for subject / lecturer: dr inż. Rafał Ślefarski email: rafal.slefarski@put.poznan.pl tel. 616652218 Faculty of Transport Engineering ul. Piotrowo 3 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge in the field of thermodynamics and fluid mechanics and knowledge about construction of energetic machines fired by gaseous fuels
2	Skills	Student have skills required for calculation of basic physico-chemical parameters of gaseous fuels such as: adiabatic flame temperature, laminar flame speed, energy balance of gas fired units
3	Social competencies	Student is able to cooperate in team network assuming various roles in it to solve the tasks posed before him
Assumptions and objectives of the course: To acquaint students with modern technologies connected to use of gaseous fuels in heat energy production, electricity production and in domestic sector.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Has basic knowledge in fields of fluid mechanics, ideal gases, Newtonian and non-Newtonian viscous liquids, theory of thermal-flow machines - [M1_W07]		
2. Has basic knowledge in the field of technical thermodynamics, i.e. the theory of thermodynamic transformations, heat transfer, thermal machines and heating, drying and cooling devices. - [M1_W08]		
3. has elementary knowledge of economics and financing of industrial enterprises, the banking system, commercial law, and business accounting - [M1_W24]		
Skills:		
1. Is able to properly use modern equipment to measure the main physical quantities used in machine testing and production control. - [M1_U04]		
2. Is able to apply the basic technical standards for unification and security as well as for recycling - [M1_U07]		
Social competencies:		
1. He is ready to fulfill social obligations, co-organizing activities for the social environment - [M1_K03]		
2. He is ready to think and act in an entrepreneurial way - [M1_K05]		
Assessment methods of study outcomes		

Lecture: the written examination The evaluation of student knowledge will be held based on an answers on 5 questions from the material presented during the lectures. Laboratory classes - evaluation reports made exercises and final test		
Course description		
alternative gaseous fuels, gasification processes, pyrolysis process, biogas production, low emission gas burners, gas fuenace, high efficiency combustion technology, modern gas engines, cycles and modern gas turbines, gas flaring,		
Basic bibliography: 1. Dobski, T.: Combustion Gases in Modern Technologies, 2scd Ed., Wydawnictwo Politechniki Poznańskiej, 2. Molenda J.: Gaz ziemny. Paliwo i surowiec, WNT, Warszawa 3. Vademecum Gazownika, praca zbiorowa		
Additional bibliography: 1. R. Stone: introduction to Internal Combustion Engines, Third edition 2. A. Gupta, High temperature air combustion, CRC Press		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation in the lecture	15	
2. Fixing the lecture	7	
3. Preparing to pass the lecture	7	
4. Participation in the completion of the lecture	2	
5. Preparation for the laboratory classes	10	
6. Participation in the laboratory	15	
7. Fixing the knowledge from laboratory classes	7	
8. Preparing to pass laboratory	7	
9. Participation in the completion of the lecture	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	72	2
Contact hours	34	1
Practical activities	38	1