

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Construction of industrial gas facilities</b>		Code <b>1010632231010635537</b>
Field of study <b>Mechanika i budowa maszyn</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>2 / 3</b>
Elective path/specialty <b>Gas technology and renewable energy</b>	Subject offered in: <b>English</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>2</b> Classes: <b>-</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>2</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>2 100%</b> <b>2 100%</b>
<b>Responsible for subject / lecturer:</b> dr inż. Rafał Ślefarski email: rafa.slefarski@put.poznan.pl tel. 616652218 Faculty of Machines and Transport ul. Piotrowo 3 60-965 Poznań		<b>Responsible for subject / lecturer:</b> mgr inż Bartosz Ziegler email: bartosz.ziegler@put.poznan.pl tel. 616652218 Faculty of Machines and Transport ul. Piotrowo 3 60-965 Poznań
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Basic knowledge from fluid mechanics, thermodynamics and energy processes. Knowledge of construction machinery and energy equipment.
2	<b>Skills</b>	Can solve engineering problems with the use of scientific methods and find relevant information in literature, on the Internet, in data bases, and in other sources.
3	<b>Social competencies</b>	Knows the limitations of his or her own knowledge and skills, understands the non-technical aspects and results of engineering activity and their importance.
<b>Assumptions and objectives of the course:</b> To acquaint students with the theoretical and practical problems related to constructions of compressor, pumps, compression gas station and modern electricity generation units		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Has comprehensive knowledge about physics, thermodynamics, and the burning of gas fuels, necessary for solving engineering and scientific problems within his or her area of study [K2A_W04] - [-]		
2. Has current knowledge about the developments in the gas energy sector [K2A_W04] - [-]		
3. Has a general knowledge of the principles and methods of constructing energetic equipment and machines, [K2A_W19] - [-]		
4. Has detailed knowledge about Polish gas system [K2A_W12] - [-]		
5. Has general knowledge in the field of standardization, recommendations and EU directives, national, international and industry standards [K2A_W09] - [-]		
<b>Skills:</b>		
1. Understands the need for lifelong learning; is able to inspire and organize the learning process of others. [K2A_K02] - [-]		
2. Is able to interact in a group taking on the different roles. [K2A_K03] - [-]		
3. Can perform typical energy balances of power machines - [K1A_U08] - [-]		
<b>Social competencies:</b>		
1. Is aware of and understands the importance and impact of non-technical aspects of mechanical engineering activities and its impact on the environment and responsibility for own decisions. - [K2A_K02] - [-]		
2. Is able to set priorities for realization of undertaken tasks. ? [K2A_K04] - [-]		
3. Is able to think and act in an entrepreneurial manner. [K2A_K05] - [-]		

<b>Assessment methods of study outcomes</b>		
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.		
<b>Course description</b>		
Performance characteristics and regulation process of steam turbine, Friction losses rotating elements, pressure losses in inlet and outlet ducts of steam turbine, Materials and thermal strength issues of elements of compressors, construction of axial and radial compressor, fluid flow thru the rotors Transients thermal stresses of elements of construction of steam turbine, Combined heat and power generation, CHP ? gas engines, gas turbines, manganese,		
<b>Basic bibliography:</b>		
1. Tuliszka E.: Turbiny cieplne. Zagadnienia termodynamiczne i przeplywowe. WNT, Warszawa 1973		
2. Chmielniak T. Maszyny Przeplywowe. Wydawnictwo Politechniki Slaskiej, Gliwice 1997		
3. Perycz St.: Turbiny parowe i gazowe. Seria Maszyny Przeplywowe t. 10 Zaklad Naukowy im. Ossolińskich, Wydawnictwo Polskiej Akademii Nauk 1992		
4. Tuliszka E.: Sprężarki, dmuchawy i wentylatory. WNT, Warszawa 1976		
5. Saravanamutto: Gas turbine theory		
6. J.h Horlock Adcanced Gas turbine cycles		
<b>Additional bibliography:</b>		
1. Peters: Turbulent combustion		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. Preparation for the lecture	10	
2. Participation in the lecture	30	
3. Fixing the lecture	30	
4. Consultation for the lecture	4	
5. Preparing to pass the lecture	15	
6. Participation in the completion of the lecture	2	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	91	2
Contact hours	36	0
Practical activities	0	0