

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Physicochemistry of gases and fluids in Transport</b>		Code <b>1010631251010635315</b>
Field of study <b>Transport</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>3 / 5</b>
Elective path/specialty <b>Engineering of Pipeline Transport</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>2</b> Classes: <b>1</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>4</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>		ECTS distribution (number and %) <b>4 100%</b>
<b>Responsible for subject / lecturer:</b> dr inż. Ryszard Piątkowski email: ryszard.piatkowski@put.poznan.pl tel. 616652214 Faculty of Working Machines and Transportation Piotrowo3, 60-965 Poznań		<b>Responsible for subject / lecturer:</b> prof. dr hab inż. Wiesław Zwierzycki email: wieslaw.zwierzycki@put.poznan.pl wieslaw.zwierzycki@put.poznan.pl tel. 616652237 Faculty of Working Machines and Transportation Piotrowo3, 60-965 Poznań
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Students have an understanding of basic physics and chemistry and the basics of thermodynamics and fluid mechanics
2	<b>Skills</b>	Strict use of terminology concepts of mechanics, thermodynamics, physics, and chemistry.
3	<b>Social competencies</b>	Working in an interdisciplinary team. Ability to lead a team and knowledge of team.
<b>Assumptions and objectives of the course:</b> Understanding the relationships describing the basic physical and chemical properties of liquid transport		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Has an extended knowledge of physics, static physics: internal and external friction, thermal and electrical conductivity, diffusion - [K2A-W02]		
2. Has an extended knowledge of chemistry, in the construction of the periodic table and properties of elements, types of chemical reactions, chemical analysis - [K2A-W03]		
3. Has an extended knowledge of the applied mechanics, basics of analytical mechanics - [K2A-W04]		
<b>Skills:</b>		
1. Is able to obtain information from the literature, internet, databases and other sources in Polish and English. Can integrate the information to interpret and learn from them, create and justify opinions - [K1A_U01]		
2. Has the ability to self-educate using modern teaching tools such as remote lectures, webpages and databases, educational software, electronic editions - [K1A_U06]		
<b>Social competencies:</b>		
1. Understands the need and knows the possibilities of lifelong learning, knows the need for acquiring new knowledge for professional development - [K1A_K01]		
2. 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 in short and long-term aspect - [K1A_K02]		
3. Is able to identify and resolve the dilemmas associated with the profession, among others. problems at the technology/environment level - [K1A_K06]		

<b>Assessment methods of study outcomes</b>		
Exam, final test		
<b>Course description</b>		
Thermodynamic properties: the equation of state for ideal gases, real gas compressibility factor, the standard equation of natural gases. The viscosity of gases and liquids, depending on pressure and temperature, the viscous forces Non-Newtonian fluid. The impact of the gas on pipeline materials, thermodynamic and chemical potential. Effect of aggressive ingredients, anti-corrosion and anti-erosion.		
<b>Basic bibliography:</b>		
1. J. Molenda: Gaz ziemny, PWN 1999		
<b>Additional bibliography:</b>		
<b>Result of average student's workload</b>		
<b>Activity</b>	<b>Time (working hours)</b>	
1. Participation in the lecture	30	
2. Consultation	3	
3. Preparing to pass	12	
4. Exam	3	
5. Participation in exercises	15	
6. Consolidation of the lecture content	14	
7. consultations	3	
8. Preparing to pass	6	
9. Final test	3	
<b>Student's workload</b>		
<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	89	4
Contact hours	57	2
Practical activities	0	0