

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Energy Management in gas and fluid transportation</b>		Code <b>1010631231010633216</b>
Field of study <b>Transport</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>2 / 3</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>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>		ECTS distribution (number and %) <b>2 100%</b>
<b>Responsible for subject / lecturer:</b>  prof. dr hab. inż. Piotr Krzyślak email: piotr.krzyślak@put.poznan.pl tel. 616652209 Faculty of Working Machines and Transportation ul. Piotrowo 3 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Knowledge engineering for transportation of liquid and gas, operating characteristics. Basics of technical thermodynamics, a measure of goodness assessment of machinery, circuits. Physico-chemical properties of gases and liquids. Balance methods.
2	<b>Skills</b>	Perform calculations of thermodynamic and flow. Construction of algorithms. Reading and analysis of technological schemes.
3	<b>Social competencies</b>	Understanding the need to quantify the thermodynamic, economic and environmental. Social aspects (quality) of the above issues
<b>Assumptions and objectives of the course:</b> Rationalization and improvement of energy use in a variety of applications for pipelines		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Has a structured, theoretically founded knowledge in the field of transport economics: economic importance and functions of transport - [K2A_W11]		
2. Has a basic knowledge of the organization, control and management of transportation systems, including: management, monitoring and control of transport systems, control functions and methods of control problems solving - [K2A_W20]		
<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 - [K2A_U01]		
2. Has the preparation required in industrial environment, knows safety rules for the job, is able to use for technical standards on unification, safety and recycling of machinery and equipment - [K2A_U08]		
3. Is able to estimate the materials and environmental cost and labor input to develop a logistics object of own design - [K2A_U09]		
4. Is able draw by hand machine elements and schematics in accordance with the principles of engineering drawing and European standards - [K2A_U12]		
<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 in short and long-term aspect - [K2A\_K02]
2. Has a sense of responsibility for one's own work and is willing to comply with the principles of teamwork and taking responsibility for collaborative tasks - [K2A\_K04]
3. Is able to identify and resolve the dilemmas associated with the profession, among others. problems at the technology/environment level - [K2A\_K06]
4. Is aware of the transfer of knowledge to society, takes steps to ensure that the information is understandable, presents different solutions and points of view - [K2A\_K08]

<b>Assessment methods of study outcomes</b>		
Exam		
<b>Course description</b>		
<p>Pipeline transportation systems. Use of machinery and equipment for pipeline transport. The economics of energy use. Energy and economic analysis of selected process for pipelines. Improving energy use and increase in transport economics through rationalization choose the type of energy source, its parameters, power supply devices and receivers. Varying network operating for pipelines. Monitoring of network operating for pipelines. Account the cumulative energy consumption. Environmental costs. Economy associated transport processes. Compressed gas tanks. Underground storage of natural gas? accumulation of gases. The possibility of using renewable fuels</p>		
<b>Basic bibliography:</b>		
<ol style="list-style-type: none"> <li>1. J. Szargut, A. Ziębik - Podstawy energetyki cieplnej, PWN, Warszawa 1998</li> <li>2. Bąkowski K.: Gazyfikacja. Gazociągi, stacje redukcyjne, instalacje i urządzenia gazowe. Wyd. I. Wydawnictwa Naukowo-Techniczne NT. Warszawa 1996</li> <li>3. Bąkowski K.: Sieci i instalacje gazowe poradnik projektowania budowy i eksploatacji. Wyd. III zmienione. Wydawnictwa Naukowo-Techniczne NT. Warszawa 2007</li> </ol>		
<b>Additional bibliography:</b>		
<ol style="list-style-type: none"> <li>1. Lewandowski W.: Proekologiczne odnawialne źródła energii. WNT. Warszawa 2006</li> <li>2. Skorek J. , Kalina J.: Gazowe układy kogeneracyjne. WNT. Warszawa 2005</li> </ol>		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. Participation in the lecture	30	
2. Consultation	3	
3. Preparing to pass	6	
4. Exam	4	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	43	2
Contact hours	37	1
Practical activities	0	0