

| <b>STUDY MODULE DESCRIPTION FORM</b>   |   |  |                                    |
|--|---|--|------------------------------------|
| Name of the module/subject<br><b>Gas fuels transportation II</b>   |   |  | Code<br><b>1010631321010634492</b> |
| Field of study<br><b>Transport</b>   | Profile of study (general academic, practical)<br><b>(brak)</b> |  | Year /Semester<br><b>1 / 2</b>     |
| Elective path/specialty<br><b>Engineering of Pipeline Transport</b>  | Subject offered in:<br><b>Polish</b>                            | Course (compulsory, elective)<br><b>obligatory</b>   |                                    |
| Cycle of study:<br><b>Second-cycle studies</b>   |   | Form of study (full-time, part-time)<br><b>full-time</b>   |                                    |
| No. of hours<br>Lecture: <b>1</b> Classes: <b>1</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>  |   |  | No. of credits<br><b>3</b>         |
| Status of the course in the study program (Basic, major, other)<br><b>(brak)</b>   |   | (university-wide, from another field)<br><b>(brak)</b>   |                                    |
| Education areas and fields of science and art  |   |  | ECTS distribution (number and %)   |
| <b>Responsible for subject / lecturer:</b><br><br>dr inż. Rafał Ślefarski<br>email: rafal.slefarski@put.poznan.pl<br>tel. 616652218<br>Faculty of Working Machines and Transportation<br>ul. Piotrowo 3 60-965 Poznań      |   |  |                                    |
| <b>Prerequisites in terms of knowledge, skills and social competencies:</b>  |   |  |                                    |
| 1  | <b>Knowledge</b>  | Students have an understanding of the basics of machine design, and compression of the basics of thermodynamics, fluid mechanics.  |                                    |
| 2  | <b>Skills</b>   | Strict use of terminology concepts of mechanics, thermodynamics, machinery and equipment for pipelines   |                                    |
| 3  | <b>Social competencies</b>                                      | Understanding the social and economic consequences of improper or poor maintenance of machines and equipment. The ability to formulate tasks for the rational use of machines and equipment for pipelines. The ability to work and analysis team |                                    |
| <b>Assumptions and objectives of the course:</b><br>Aggravation of knowledge in gas transport.   |   |  |                                    |
| <b>Study outcomes and reference to the educational results for a field of study</b>  |   |  |                                    |
| <b>Knowledge:</b>  |   |  |                                    |
| 1. Has a detailed knowledge of the transport systems modeling, models of transport systems, the distribution of streams in transport networks - [K2A_W10]  |   |  |                                    |
| 2. Has a structured, theoretically founded knowledge in the area of transport infrastructure, including: transport networks, the overall characterization and classification of transport infrastructure - [K2A_W12]       |   |  |                                    |
| 3. Has a structured, theoretically founded knowledge in the field of transport means, general characteristics and classification of transport, their functional properties and basic technical parameters - [K2A-W14]      |   |  |                                    |
| <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]  |   |  |                                    |
| <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>  |                      |      |
|--|----------------------|------|
| Final test   |                      |      |
| <b>Course description</b>  |                      |      |
| The flow of real gases through pipelines, flow with variable-pressure pipeline network as a battery of gas. The calculation determining the secretion of hydrated state. Degassing of liquefied natural gas - LNG. Security of gas transport, the danger zone. Combustion type gas explosion and detonation. |                      |      |
| <b>Basic bibliography:</b>   |                      |      |
| 1. Krzysztof Kogut, Krzysztof Bytnar: Obliczanie Sieci Gazowych Cz. I oraz II, wydawnictwo AGH 2007  |                      |      |
| 2. Energy Supply and Pipeline Transportation: Challenges & Opportunities, wydawnictwo ASME 2008, ISBN #: 0791802724  |                      |      |
| 3. J. Carroll: Natural Gas Hydrates, GPP 2003  |                      |      |
| <b>Additional bibliography:</b>  |                      |      |
|  |                      |      |
| <b>Result of average student's workload</b>  |                      |      |
| Activity   | Time (working hours) |      |
| 1. Participation in the lecture  | 15                   |      |
| 2. Consultation  | 3                    |      |
| 3. Preparing to pass   | 6                    |      |
| 4. Exam  | 3                    |      |
| 5. Participation in exercises  | 15                   |      |
| 6. consultations   | 3                    |      |
| 7. Preparing to pass   | 6                    |      |
| 8. Final test  | 2                    |      |
| <b>Student's workload</b>  |                      |      |
| Source of workload   | hours                | ECTS |
| Total workload   | 53                   | 3    |
| Contact hours  | 31                   | 2    |
| Practical activities   | 22                   | 1    |