

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Design of Pneumatic Systems</b>		Code <b>1010612121010614651</b>
Field of study <b>Mechanical Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>1 / 2</b>
Elective path/specialty <b>Food Industry Machines and Refrigeration</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>1</b> Classes: <b>-</b> Laboratory: <b>1</b> Project/seminars: <b>-</b>		No. of credits <b>1</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>1 100%</b>
<b>Responsible for subject / lecturer:</b>  dr inż. Damian Frąckowiak email: damian.frackowiak@put.poznan.pl tel. 48 61 2244516 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 of the basics of machine design, fluid mechanics and measurement of mechanical quantities.
2	<b>Skills</b>	Students can perform measurement campaigns of basic mechanical quantities and in the field of fluid mechanics. The student is able to analyze the results and draw conclusions.
3	<b>Social competencies</b>	Understanding the need to expand their competence, willingness to work together as a team.
<b>Assumptions and objectives of the course:</b> Knowledge of the construction and operating principles of pneumatic components. Introduction to basic propulsion systems and controls and the basics of design. Knowledge of specialized software for the design and analysis of pneumatic and electropneumatic systems.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. Has an extended knowledge in the area of information technology concerning computer programming and software for engineering calculations and simulation of physical systems. - [K2A_W05] 2. Has an in-depth knowledge of the design and principles of operation and grading machines from the equipment of the chosen group. - [K2A_W18] 3. Has a general understanding of the types of tests and test methods for working machines using modern measurement techniques and data acquisition. - [K2A_W20]		
<b>Skills:</b> 1. He can correctly select the optimal material and processing technology for the typical working machines including the latest achievements of materials science. - [K1A_U06] 2. Is able to perform a fairly complex design project of an average working machine or a subsystem using modern CAD tools, including tools for spatial modeling machines and finite elements calculation method. - [K1A_U07] 3. Is able to perform basic measurements of mechanical properties on a selected machine using modern measurement systems. - [K1A_U08]		
<b>Social competencies:</b> 1. Understands the need for lifelong learning; is able to inspire and organize the learning process of others. - [K2A_K01]		
<b>Assessment methods of study outcomes</b>		

Written exam. Current control preparation to laboratory. Rating of the project tasks.		
<b>Course description</b>		
General information about pneumatic drives. Application of pneumatic systems, with particular emphasis on machinery and equipment of the food industry. The structure of the pneumatic actuator. Installation and Compressed air preparation units. Construction and principles of operation of pneumatic components and equipment. Parameters and characteristics of pneumatic drives. Basic pneumatic circuitry. Pneumatic and electro-pneumatic control. Methodology for the design of pneumatic systems. Computer-aided design using software to build, simulation and analysis of pneumatic systems.		
<b>Basic bibliography:</b>		
1. Szenajch W.: ?Napęd i sterowanie pneumatyczne?. WNT, Warszawa 2003.		
2. Tomasiak E.: Napędy i sterowania hydrauliczne i pneumatyczne. Wyd. Politechniki Śląskiej, Gliwice 2001.		
3. Pr. zb. pod red. J. Świdra: Sterowanie i automatyzacja procesów technologicznych i układów mechatronicznych. Wyd. Politechniki Śląskiej, Gliwice 2002.		
4. Węsierski Ł.: ?Elementy i układy pneumatyczne? Wydaw. AGH, Kraków 1981.		
<b>Additional bibliography:</b>		
1. Milanowski J., Kiczowski T.: ?Pneumatyczne układy sterowniczo-napędowe?. Wyd. Uczelniane WSI, Koszalin 1984.		
2. Świder J., Wszolek G.: Metodyczny zbiór zadań laboratoryjnych i projektowych ze sterowania procesami technologicznymi, Wydawnictwo Politechniki Śląskiej, Gliwice, 2003.		
3. Gerc E. W.: ?Napędy pneumatyczne Teoria i obliczanie?, WNT, 1975.		
<b>Result of average student's workload</b>		
<b>Activity</b>	<b>Time (working hours)</b>	
1. Participation in the lecture	15	
2. Preparation for the exam	2	
3. Participation in the exam	1	
4. Preparation for laboratory	1	
5. Participation in laboratory exercises	15	
6. Capturing the content of training / report	2	
7. Participation in the completion of the course	1	
<b>Student's workload</b>		
<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	37	1
Contact hours	34	1
Practical activities	16	1