

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Hydraulics and Pneumatics		Code ...
Field of study ERASMUS	Profile of study (general academic, practical) practical	Year /Semester - / -
Elective path/specialty -	Subject offered in: English	Course (compulsory, elective) optional
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: - Classes: - Laboratory: 1 Project/seminars: -		No. of credits 5
Status of the course in the study program (Basic, major, other)		(university-wide, from another field) ...
Education areas and fields of science and art Technical sciences		ECTS distribution (number and %) 5 100%
Responsible for subject / lecturer: dr inż. Dariusz Sędziak email: dariusz.sedziak@put.poznan.pl tel. 61 665 2255 Faculty of Mechanical Engineering and Management ul. Piotrowo 3, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge of automation, machine design and electronics
2	Skills	Logical thinking, the use of information obtained from the library and the Internet.
3	Social competencies	Understanding the need for learning and acquiring new knowledge
Assumptions and objectives of the course: The student should obtain knowledge about design of basic conventional pneumatic and hydraulic circuits, valve technology, system commissioning, velocity control methods, basic knowledge about selected components design and testing. The student should obtain knowledge about control actuators in servo valves and proportional valves, valve electronics and sensors.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. He has knowledge of the structure, principles of operation and parameters of sensors and measuring devices and drives used in industrial automation - [K_W19] 2. He knows the general structure and operation of PLCs and be able to program them using LD language - [K_W19,27] 3. Knowledge signals and methods of their transmission automation - [K_W19] 4. He has knowledge on how to connect components for PLCs - [K_W19] 5. He knows the construction and operation of systems automation and supervision of machines and processes - [K_W19]		
Skills:		
1. . Able to prepare studies and reports from the research and experimental simulation and discuss the results of their research, including technical documentation designed mechatronic devices in English. - [K_U03] 2. Able to design complex systems and mechatronics systems, applying the programing and simulation - [-]		
Social competencies:		
1. Understand the need for lifelong learning; can inspire and organize the learning process of others - [K_K01] 2. Is aware of and understands the validity of the non-technical aspects and effects of engineering activities, including its impact on the environment and the associated responsibility for decisions. - [K_K02] 3. Able to interact and work in a group, taking different roles - [K_K03] 4. Able to think and act in a creative and enterprising - [K_K06]		

Assessment methods of study outcomes		
Rating forming and summarizing Lecture: Examination under test consists of 5 questions of general scoring (credit for obtaining 51% of points:> 50% 3.0,> 60% 3.5,> 70%-4.0,> 80% 4.5,> 90 % 5.0) carried out at the end of the semester. Laboratory: Assessment based on content of the six selected topics performed on laboratory exercises. To get credit laboratories all the exercises must be included. Evaluated is the form and the quality of the prepared materials (description of issues, results and analysis).		
Course description		
Design of basic conventional pneumatic and hydraulic circuits, valve terminology, commissioning, velocity control methods. Basic knowledge about flow controllers and orifices and their practical evaluations. Control actuators in servo valves and proportional valves. Control elements in proportional techniques, including valve electronics and sensors. Laboratory: 1. Pneumatic systems – design of basic systems 2. Hydraulic systems – design of basic systems 3. Evaluation of flow characteristics for selected components 4. PLC Control based pneumatic systems 5. Electro-pneumatic positioning module evaluation and programing 6. Electrohydraulic systems evaluation – flow characteristics and positioning systems		
Basic bibliography: 1. Mechatronics, Module 3 Fluidics, Wydawnictwo Chemnitz University of Technology 2. Mechatronics, Module 5: Mechatronic Components, Wydawnictwo Chemnitz University of Technology		
Additional bibliography: 1. Formula Book Hydraulics Pneumatics, Fluid and Mechanical Engineering Systems, Department of Management and Engineering, Linköping University		
Result of average student's workload		
Activity		Time (working hours)
1. Laboratory		15
2. Consultations		15
3. Preparing to practice		15
4. Preparing to exam		15
5. Exam		2
Student's workload		
Source of workload	hours	ECTS
Total workload	60	5
Contact hours	45	3
Practical activities	15	1