

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject (-)		Code 1010614261010648162
Field of study Mechanical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 3 / 6
Elective path/specialty Heavy Machinery	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) part-time	
No. of hours Lecture: 9 Classes: 9 Laboratory: - Project/seminars: -		No. of credits 1
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 1 100% 1 100%
Responsible for subject / lecturer: dr inż. Damian Frackowiak email: damian.frackowiak@put.poznan.pl tel. 61 665 2054 Faculty of Transport Engineering) ul. Piotrowo 3 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	The knowledge gained in the field of the hydraulic and pneumatic drives. Basic knowledge of the basics of machine design, theory of machines.
2	Skills	Skills acquired in the courses: hydraulic and pneumatic drives, basics of machine design. Ability to solve problems in the field of fluid mechanics, automation and mechanics.
3	Social competencies	Understanding the need to expand their competence, willingness to work together as a team.
Assumptions and objectives of the course: Understanding the structure of the propulsion systems of self-propelled working machines, types, construction and characteristics of the drives and methods of their control. Examination and computer simulation of selected hydrostatic drives used in working machines.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. He knows the construction and principle of operation of hydraulic and electric drive systems used in working machines. - [K1A_W16]		
2. He knows computer programs supporting design and analysis of hydrostatic drive systems. - [K1A_W24]		
Skills:		
1. Can describe the basic drive systems used in working machines. - [K1A_U09]		
2. Is able to build and analyze selected systems used in drives of working machines. - [K1A_U19]		
Social competencies:		
1. Understands the need and knows the possibilities of lifelong learning. - [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. - [K1A_K02]		
3. Is aware of the importance of behavior in a professional manner, compliance with the rules of professional ethics and respect for cultural diversity. - [K1A_K03]		
4. 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. - [K1A_K04]		

Assessment methods of study outcomes		
- Written exam of the course. - Assessment of laboratory exercises based on assessments of the reports and short entrance tests.		
Course description		
Monitoring and control of hydrostatic drives, "load sensing". Analysis of exemplary drive systems for wheeled and tracked machines. Hydraulic steering servomechanisms. Propulsion systems with DC and AC motors. Control and speed regulation of electric motors, braking, reverse in direction of work. Computer programs for modeling and simulation of hydraulic and electro-hydraulic transmissions.		
Basic bibliography:		
1. Osiecki A.: Hydrostatyczny napęd maszyn. WNT, Warszawa , 2004. 2. Stryczek St.: Napęd hydrostatyczny elementy. WNT, Warszawa, 2003. 3. Stryczek St.: Napęd hydrostatyczny układy . WNT, Warszawa, 2003. 4. Szenajch W.: Napęd i sterowanie pneumatyczne. WNT, Warszawa, 2003.		
Additional bibliography:		
1. Szydelski Z.: Pojazdy samochodowe napęd i sterowanie hydrauliczne. WKŁ, W-wa,1999. 2. Pr. zb. pod red. J. Świdra: Sterowanie i automatyzacja procesów technologicznych i układów mechatronicznych. Wyd. Politechniki Śląskiej, Gliwice, 2002.		
Result of average student's workload		
Activity	Time (working hours)	
1. Preparation for classes	1	
2. Participation in classes	30	
3. Consolidation of the content of classes / report	1	
4. Consultations	1	
5. Preparation for the exam / pass	2	
6. Participation in the exam / pass	1	
Student's workload		
Source of workload	hours	ECTS
Total workload	36	1
Contact hours	32	1
Practical activities	18	1