

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Mobile machinery gears and drives		Code 1010614161010614583
Field of study Mechanika i budowa maszyn	Profile of study (general academic, practical) (brak)	Year /Semester 3 / 6
Elective path/specialty Maszyny robocze	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: 16 Classes: - Laboratory: 8 Project/seminars: -		No. of credits 4
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		ECTS distribution (number and %) 4 100%
Responsible for subject / lecturer: 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		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	The knowledge gained in the field of the hydraulic and pneumatic actuators. Basic knowledge of the basics of machine design, theory of machines.
2	Skills	Skills acquired in the courses: hydraulic and pneumatic actuators, 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. Knows the construction and function of hydraulic and electric propulsion systems used in working machines. - [K1A_W16] 2. Knows design methods of selected hydrostatic propulsion systems. - [K1A_W17] 3. Knows programs aiding the design and analysis of the work of hydrostatic propulsion systems. - [K1A_W24]		
Skills:		
1. Is able to describe the basic drive systems used in working machines - [K1A_U09] 2. Is able to design selected hydrostatic drive systems - [-] 3. 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. 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		

<p>- Written exam of the course. - Assessment of laboratory exercises based on assessments of the reports and short entrance tests.</p>		
Course description		
<p>Classification of propulsion systems Types and construction of the main drives, auxiliary drives, examples of construction. Hydrostatic transmissions in wheeled and tracked machines, examples and solutions. Hydraulic actuators, hydraulic tools in tractors. Hydraulic steering servomechanisms. Monitoring and control of hydrostatic drives, "load sensing" (LS) and LUDV control systems, hydraulic drives with programmable microprocessor control. Analysis of exemplary drive systems for wheeled and tracked machines. 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, examples of practical applications in relation to traction drives.</p>		
Basic bibliography:		
<p>1. Szydelski Z.: Pojazdy samochodowe ? napęd i sterowanie hydrauliczne. WKŁ, W-wa, 1999. 2. Osiecki A. : Hydrostatyczny napęd maszyn. WNT, Warszawa 1998. 3. Stryczek S.: Napęd hydrostatyczny. Tom I i II, WNT, Warszawa, 2005. 4. S. Januszewski, A. Pytlak, M. Rosnowska-Nowaczyk; Napęd Elektryczny; WSiP Warszawa 1994</p>		
Additional bibliography:		
<p>1. Pizoń A.: Elektrohydrauliczne analogowe i cyfrowe układy automatyki. WNT, Warszawa, 1998. 2. Exner H., Freitag R., Geis H., Lang R., Oppolzer J., Schwab P., Sumpf E.: Der Hydraulik Trainer Band 1, Grundlagen und komponenten der fluidtechnik Hydraulik. Mannesmann Rexroth, 1998. 3. J. Kosmol; Elektryczne silniki i układy napędowe obrabiarek i maszyn technologicznych; Wydawnictwo Politechniki Śląskiej; Gliwice 1993.</p>		
Result of average student's workload		
Activity	Time (working hours)	
1. Udział w wykładach	16	
2. Utrwalenie treści wykładu	6	
3. Konsultacje dotyczące materiału przekazanego na wykładach	2	
4. Przygotowanie do egzaminu	6	
5. Udział w egzaminie	1	
6. Przygotowanie do ćwiczeń laboratoryjnych	6	
7. Udział w ćwiczeniach laboratoryjnych	8	
8. Konsultacje dotyczące materiału przekazanego na ćwiczeniach laboratoryjnych	2	
9. Udział w zaliczeniu	1	
Student's workload		
Source of workload	hours	ECTS
Total workload	60	4
Contact hours	30	2
Practical activities	27	2