

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Electromechanical Drives		Code 1010641261010330326
Field of study Mechanical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 3 / 6
Elective path/specialty Mechatronics	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 2 Classes: - Laboratory: 1 Project/seminars: -		No. of credits 2
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 %) 2 100% 2 100%
Responsible for subject / lecturer: dr hab. Inż. Tomasz Pajchrowski email: tomasz.pajchrowski@put.poznan.pl tel. 61 665 23 85 Faculty of Electrical Engineering ul. Piotrowo 3, 60-965 Poznań		Responsible for subject / lecturer: mgr inż. Bartłomiej Wicher email: bartlomiej.wicher@put.poznan.pl tel. 61 665 25 75 Faculty of Electrical Engineering ul. Piotrowo 3a, 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Knowledge of physics , mathematics and electrical engineering
2	Skills	skill of solution of basic tasks from electrical engineering on the base of gained knowledge and information from pointed literature
3	Social competencies	appreciation of necessity of broaden their competencies , readiness to co-operate within the group
Assumptions and objectives of the course: Preparation to independent design and getting running electrical DC and AC drives as well as skill acquisition of their analysis and synthesis Education of skill of group work.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Has a basic knowledge of electric drives in machines: three-phase current, AC motors, DC motors, frequency and voltage converters, power electronics. - [K1A_W16] 2. Has an elementary knowledge of automation systems, microcontrollers, control algorithms, industrial robots, electronic navigation systems used in machines, wired and wireless communications in local area networks used in machines. - [K1A_W17]		
Skills:		
1. Is able to use acquired mathematical theories to create and analyze simple mathematical models of machines, their components and simple technical systems - [K1A_U07] 2. Is able to perform basic functional and strength calculations of machine elements such as transmissions, bearings, clutches, brakes - [K1A_U09] 3. Is able to plan and carry out the process of constructing simple assemblies or machines and formulate requirements for electronic and automatic control systems for industry professionals in mechatronic systems - [K1A_U19] 4. Is able to browse catalogs and webpages of machine elements producers for ready parts to use in own projects - [K1A_U15] 5. Is able to competently advise in the selection of equipment for a given application in the industry covered by chosen specialization, based on the acquired knowledge about an equipment group - [K1A_U25]		
Social competencies:		

<p>1. Understands the need and knows the possibilities of lifelong learning. - [K1A_K01]</p> <p>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]</p> <p>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]</p> <p>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]</p>
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Assessment methods of study outcomes		
Lecture: written test and optionally oral explanation of written answers. Laboratory classes: presence on classes and written reports (one per class group).		
Course description		
Features and classification of electric drives. General control structure of electric drives. Static characteristics of electric motors and driven machines. Speed and position control. DC converter-fed drives. Principles of the frequency converter-fed AC induction motors, scalar and vector control, direct torque control (DTC). Soft start of induction motors. Speed control of the synchronous permanent magnet motors. Stepping motors.		
Basic bibliography:		
1. Zawirski K., Deskur J., Kaczmarek T., Automatyka napędu elektrycznego, Wydawnictwo Politechniki Poznańskiej, Poznań, 2012.		
2. Kaczmarek T. , Napęd elektryczny robotów, Wydawnictwo Politechniki Poznańskiej, Poznań, 1998.		
Additional bibliography:		
1. Kosmol J.: Serwonapędy obrabiarek sterowanych numerycznie, WNT, Warszawa, 1998		
2. Bisztyga K.: Sterowanie i regulacja silników elektrycznych, WNT, Warszawa 1989.		
Result of average student's workload		
Activity	Time (working hours)	
1. Lecture participation	30	
2. Consultation on the material submitted to the lectures	2	
3. Preparation to exam	4	
4. Participation in the exam	2	
5. Participation in laboratory exercises	15	
6. Preparing for laboratories	4	
7. Strengthening exercises content	4	
Student's workload		
Source of workload	hours	ECTS
Total workload	61	2
Contact hours	49	2
Practical activities	23	1