

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Control of Mechatronic Systems		Code 1010324391010326006
Field of study Electrical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 5 / 9
Elective path/specialty Electrical Systems in Mechatronics	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: - Classes: - Laboratory: 18 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: Ph. D. Wiesław Łyskawiński email: Wieslaw.Lyskawinski@put.poznan.pl tel. 61 665 2781 Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań		Responsible for subject / lecturer: Ph. D. Cezary Jędrzycka email: Cezary.Jedryczka@put.poznan.pl tel. 61 647 5803 Faculty of Electrical Engineering ul. Piotrowo 3A, 60-965 Poznań
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Elementary knowledge of electrical machines, power electronics and control theory
2	Skills	Principles of programming on a general level. Skill of effective self-education in a field related to the chosen field of study
3	Social competencies	The awareness of the need to boarding skills and knowledge. Demonstrate a willingness to cooperate in a team
Assumptions and objectives of the course: Students master the skills of setting up and configuration of advanced frequency converters and automation actuators. Students learn how to elaborate algorithms and develop programs for the control systems of selected process by using programmable logic controllers. Consolidation of skills algorithmization of control process in mechatronics.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. distinguish the structures and control methods of mechatronic systems and able to characterize the principle of operation of automatic control systems of speed, torque and displacement - [K_W22 +++]		
Skills: 1. can formulate rules for cascade control, modular and symmetrical optimization criteria and apply direct and indirect control of flux and torque and vector control - [K_U10++]		
Social competencies: 1. able to think and act in an entrepreneurial manner in the area of automation of mechatronic systems - [K_K04++]		
Assessment methods of study outcomes		

<p>Laboratory:</p> <ul style="list-style-type: none"> - test and favoring knowledge necessary to solve the problems in the area of laboratory tasks - continuous evaluation for each course - rewarding gain skills - assessment of knowledge and skills related to the implementation of the tasks in practice - evaluation of the reports from performed exercise <p>Extra points for the activity in the classroom, in particular for:</p> <ul style="list-style-type: none"> - proposals to discuss supplementary aspects of the subject; - effectiveness of the application of the knowledge gained during solving the given problem; - comments related to the improvement of teaching materials; - quality and diligence of the developed reports - in the self-study. 		
Course description		
<p>General control structure of mechatronic system ? requirements and problems. Advanced configuration of frequency converters. Speed controls of squirrel-cage induction motors. PLC programming languages. Direct as well as indirect flux and torque control, vector control methods with open and closed-loop. Speed control systems of the synchronous motors: mathematical models, flux and torque control structures. Sensorless control of permanent magnets synchronous motors. Position control systems, electric servo drives using asynchronous and synchronous machines and stepper motors</p>		
Basic bibliography:		
<ol style="list-style-type: none"> 1. Automatyka napędu elektrycznego, Deskur J., Kaczmarek T., Zawirski K., Wydawnictwo Politechniki Poznańskiej, Poznań 2012. 2. Napęd elektryczny robotów, Wyd.2, Kaczmarek T., Wyd. Politechniki Poznańskiej, Poznań, 1998 3. Układy napędowe z silnikami synchronicznymi , Kaczmarek T., Zawirski K., Wyd. PP, Poznań, 2000 4. Drive solutions, Mechatronics for production and logistics, pod redakcją Dr. Edwin Kiel, wyd. Springer, ISBN 978-3-540-76704-6 		
Additional bibliography:		
<ol style="list-style-type: none"> 1. Automatyka napędu przekształtnikowego, Tunia H., Kaźmierkowski M.P., PWN, Warszawa, 1988 2. Dokumentacje techniczne wykorzystywanych przemienników częstotliwości oraz układów sterowania (dostępne w laboratorium). 3. Control of Electrical Drives, Leonhard W., Springer-Verlag, Berlin-Heidelberg-NewYork-Tokyo, 1985 		
Result of average student's workload		
Activity	Time (working hours)	
1. participation in laboratory classes	18	
2. participation in the consultations	9	
3. preparation and development of laboratory reports	18	
Student's workload		
Source of workload	hours	ECTS
Total workload	45	2
Contact hours	27	1
Practical activities	36	1