STUDY MODULE DESCRIPTION FORM						
	of the module/subject		Code 1010331251010339995			
Field of study Automatic Control and Robotics			Profile of study (general academic, practical (brak)	Year /Semester		
Elective path/specialty			Subject offered in: Polish	Course (compulsory, elective) obligatory		
Cycle c	f study:		Form of study (full-time,part-time)	• · · ·		
	First-cyc	cle studies	full-time			
No. of I	nours			No. of credits		
Lectu	re: - Classes	s: - Laboratory: 15	Project/seminars:	- 2		
Status	of the course in the study	program (Basic, major, other)	(university-wide, from another	field)		
		(brak)	(brak)			
Educat	ion areas and fields of sci	ence and art		ECTS distribution (number and %)		
tech	nical sciences			2 100%		
Resp	onsible for subj	ect / lecturer:	Responsible for subje	ct / lecturer:		
pro	f. dr hab. inż. Krzyszto	f Zawirski	prof. dr hab. inż. Krzysztof	fZawirski		
	ail: krzysztof.zawirski@		email: krzysztof.zawirski@put.poznan.pl			
	61 6652386		tel. 61 6652386			
	ulty of Electrical Engir Piotrowo 3A 60-965 Po	5	Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań			
-						
Prere	equisites in term	s of knowledge, skills and	d social competencies			
1	Knowledge	Student should have knowledge in chosen branches of physics including the electricity and the magnetism and the knowledge of the theory of electric circuits.				
2	Skills	Student is able to obtain information from literature, databases and other sources; has abilities of the self-education for improving qualifications and the update of professional competence				
3	Social competencies	Student is aware of a need to expand his competence and readiness to undertake the cooperation in the team; has an awareness of the importance and understands other aspects				
Assi	Imptions and obj	of engineering activity, including ectives of the course:	its initiaence on the environme			
	• •	ng, operation and characteristics o	f the basic drives with converte	ers		
	Study outco	mes and reference to the	educational results for	r a field of study		
Knov	vledge:					
	student has a knowlee V19++]	dge tidied up in the structure, the a	application and control of the a	utomation and robotics systems		
		stands typical engineering technol g devices - [K_W20++]	ogies, knows and understands	s principles of the selection of		
Skill	s:					
	dent is able to use mod ations and robotics sys	dels of simple electromechanical s stems - [K_U05+++]	ystems, as well as to use then	n for analysis and design		
2. Student is able to select the kind and parameters of servo- and measuring system, control unit for the chosen application and to effect their integration in the form of the ultimate measuring-control system - [K_U17++]						
	al competencies:		<u> </u>			
1. Student has an awareness of the need for the professional approach towards technical issues, of meticulous acquainting oneself with documentation and environmental conditions, in which devices and their elements can function - [K_K04++]]						
		Assessment metho	ds of study outcomes			

Laboratory exercises are counted independently from the lecture, based on attendance and activity in the class and reports (one per exercise group).

Course description

Lab. Detailed review of the reports by leading labs and commentary discussions. Form of classes: Programming and team work. Program content: Parameters, characteristics and operating conditions of the induction and direct current machine, thyristor direct current drive, transistor DC drive, induction motor starting methods, cage engine frequency control, electric machine heat conditions, fan drive.

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

3. Kaźmierkowski M.P, Tunia H., Automatic Control of Converter-Fed Drives, ELSEVIER, Amstertdam, London, New York, Tokyo, Warszawa , 1994

4. Zawirski K., Deskur J., Kaczmarek T., Automatyka napędu elektrycznego, Wydawnictwo Politechniki Poznańskiej, Poznań, 2012.

5. Lech Grzesiak L., Kaszewski A., Ufnalski B.: Sterowanie napędów elektrycznych. Analiza, modelowanie, projektowanie. Wydawnictwo Naukowe PWN, Warszawa 2016.

6. Sieklucki G., Bisztyga B., Zdrojewski A., Orzechowski T., Sykulski R.: Modele i zasady sterowania napedami elektrycznymi, Wydawnictwo AGH, Kraków 2014.

Additional bibliography:

1. Leonhard W., Control of Electrical Drives, Springer, Berlin, New York, 2001

2. Leonhard W., Control of Electrical Drives, Springer, Berlin, New York, 2001

3. Kaczmarek T., Napęd elektryczny robotów, Wydawnictwo Politechniki Poznańskiej, Poznań, 1998

4. Kaźmierkowski M.P, Tunia H., Automatic Control of Converter-Fed Drives, ELSEVIER, Amstertdam, London, New York, Tokyo, Warszawa , 1994

5. Brock S., Łuczak D., Nowopolski K., Pajchrowski T., Zawirski K.: Two Approaches to Speed Control for Multi-Mass System With Variable Mechanical Parameters, IEEE Transactions on Industrial Electronics, VOL. 64, NO. 4, APRIL 20

6. Fabiański B., Zawirski K.: Simplified model of Switched Reluctance Motor for real-time calculations, Przegląd Elektrotechniczny, ISSN 0033-2097, R. 92 NR 7/2016

7. Nowopolski K., Wicher B., Zawirski K.: Experimental Analysis of Selected Control Algorithms of Electromechanical Object with Backlash and Elastic Joint, IEEE 17th International Conference on Power Electronics and Motion Control, Varna, Bulgaria, 25 ? 30 of September 2016

8. Szczesniak P., Urbanski K., Fedyczak Z., Zawirski K.: Comparative study of drive systems using vector-controlled PMSM fed by a matrix converter and a conventional frequency converter, TURKISH JOURNAL OF ELECTRICAL ENGINEERING & COMPUTER SCIENCES, vol. 24, pp. 1516?1531, 2016

Result of average student's workload

Activity	Time (working hours)			
1. Participation in the lecture	15			
2. Consultation		5		
3. Preparation for raport	5			
Student's workload				
Source of workload	hours	ECTS		
Total workload	25	2		
Contact hours	5	0		
Practical activities	0	0		