

Subject card

Subject name and code	Electromechanical Systems, PG_00038346								
Field of study	Electrical Engineering								
Date of commencement of studies	October 2023		Academic year of realisation of subject			2023/2024			
Education level	second-cycle studies		Subject group			Obligatory subject group in the field of study			
						Subject group related to scientific research in the field of study			
Mode of study	Part-time studies		Mode of delivery			at the university			
Year of study	1		Language of instruction			Polish			
Semester of study	1		ECTS credits			4.0			
Learning profile	general academic profile		Assessment form			exam			
Conducting unit	Department of Power Electronics and Electrical Machines -> Faculty of Electrical and Control Engineering								
Name and surname of lecturer (lecturers)	Subject supervisor dr hab. inż. Andrzej Wilk								
	Teachers		dr hab. inż. Andrzej Wilk						
	dr inż. Filip Kutt								
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Project	t	Seminar	SUM	
of instruction	Number of study hours	20.0	0.0	10.0	0.0		0.0	30	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity Participation ir classes include plan		I didactic Participation in ed in study consultation hours		Self-study SUM				
	Number of study hours	30		12.0		58.0		100	
Subject objectives	The main objective of the course is to learn of student of principles of electromechanical energy conversion and modeling of electromechanical systems with electric machines described in natural, alfa-beta and d-q axes.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	K7_W04		Student knows methods for formulation of mathematical models of electromechanical systems with electric machines described in natural, alpha-beta and d-q axes.			[SW2] Assessment of knowledge contained in presentation			
	K7_U06		Student can simulate transient and steady states of electromechnical systems. Student is able to analyse waveforms of electromechnaical quantities. Student can design of electromechanical systems.			[SU1] Assessment of task fulfilment			
Subject contents	General structure and functionality of electromechanical system. Mathematical model of general electromechanical system formulated in natural axes. Mathematical model of electromechanical system with induction machine. Mathematical model of electromechanical system with DC machine. Clarke and Park transformations. Mathematica models of electromechanical systems with machine described in alpha-beta and d-q axes.								
Prerequisites and co-requisites	General knowledge of the subjects of Electrical circuits, Electrodynamics and Electrical machines, ability to analyse electrical and magnetic circuits in steady and dynamic states, ability to analyse electrical machines in steady states.								
Assessment methods and criteria	Subject passing criteria		Passing threshold			Percentage of the final grade			
	Practical exercise		60.0%			40.0%			
	Written exam		60.0%			60.0%			

Recommended reading	Basic literature	1. Cichy M.: Modelling of energy systems (textbook in Polish). Wyd. PG, Gdańsk 2001. 2. Gieras J.: Advancements in electric machines. Springer Netherlands, 2008. 3. Kaczmarek T., Zawirski K.: Układy napędowe z silnikiem synchronicznym. Wyd. PP, Poznań 2000. 4. Lyshevski S. E., Nano- and micro-electromechanical systems: Fundamental of micro- and nano-engineering. CRC Press, 2000. 5. Meisel J.: Zasady elektromechanicznego przetwarzania energii. WNT, Warszawa 1970.				
	Supplementary literature	1. Karnopp D. C., Margolis D. L., Rosenberg R. C.: System dynamics, modeling and simulation of mechatronic systems. John Wiley Inc, 2000. 2. Lyshevski S. E.: Electromechanical systems, electric machines, and applied mechatronics. CRC Press, 2000. 3. Puchała A.: Electromechanical transducers (textbook in Polish). KOMEL, Katowice 2002. 4. Szymanowski A.: Fundamentals of hybrid vehicle drives. Instytut Technologii Eksploatacji, Warsaw-Radom 2000.				
	eResources addresses	Adresy na platformie eNauczanie:				
		SYSTEMY ELEKTROMECHANICZNE [Niestacjonarne][2023/24] - Moodle ID: 28963 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28963				
Example issues/ example questions/ tasks being completed	Draw and describe a general structure of electromechanical system.					
	Draw and describe the physical and dynamic circuit models, and dynamic characteristics of dc motor.					
	Calculate the circuit model parameters and time constant of dc motor using its manufacturing data sheet.					
Work placement	Not applicable					