



Subject card

Subject name and code	Electromechanical Systems, PG_00038346						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
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 - > Wydziały Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Andrzej Wilk				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	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 in didactic classes included in study plan		Participation in 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_U06] is able to analyse, model, simulate and design electrical systems		He/She simulates transient and steady states of electromechanical systems. He/She determines the parameters of lumped elements of electromechanical system		[SU1] Assessment of task fulfilment		
	[K7_W07] has an in-depth, theoretically grounded knowledge of electromechanical systems and their electromechanical systems and their design, electrotraction systems power supply and electrical energy storage devices		He/She develops mathematical models of electromechanical systems. He/She deterimnes the electromechanical couplings in the design of electromechanical systems		[SW3] Assessment of knowledge contained in written work and projects		
Subject contents	LECTURES:						
	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 synchronous 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.						
	LABORATORY:						
	Start-up test of DC commutator motor and determination of the circuit parameters. Start-up test of induction motor and determination of the circuit parameters. Short-circuit test od synchronous motor and determination of the circuit parameters. Inrush test of transformer.						

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.: Modelowanie systemów energetycznych. 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, 2005. 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.: Elektromechaniczne przetworniki energii. KOMEL, Katowice 2002. 4. Szymanowski A.: Fundamentals of hybrid vehicle drives. Instytut Technologii Eksploatacji, Warsaw-Radom 2000.	
	eResources addresses	Adresy na platformie eNauczanie:	
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		

Document generated electronically. Does not require a seal or signature.