



Subject card

Subject name and code	Design of Electromechanical Systems, PG_00068318						
Field of study	Electrical Engineering						
Date of commencement of studies	February 2026		Academic year of realisation of subject		2026/2027		
Education level	second-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Filip Kutt				
	Teachers		dr inż. Filip Kutt				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	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		3.0		17.0	50
Subject objectives	The aim of this course is to provide students with a mastery of methods for analyzing, modeling, and designing electromechanical drive systems. Students will learn the principles of selecting and designing electromechanical system components.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_K03] can interact and work in a group assuming various roles and identify priorities for the achievement of a specific task		cooperates with others in order to complete a given task		[SK1] Assessment of group work skills [SK3] Assessment of ability to organize work		
	[K7_U07] is able to analyse, calculate, design, program and test converters, drive systems, control systems and state observers		analyzes the operating states of an electromechanical system powered by a power converter		[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		
	[K7_W06] has an in-depth knowledge of industrial electronics, microprocessor control systems and in the field of power electronics and drive systems, their control and diagnostic methods		configures basic power electronics and drive systems, applies control and diagnostic methods for power electronics systems		[SW1] Assessment of factual knowledge		
	[K7_U06] is able to analyse, model, simulate and design electrical systems		performs analysis, develops a model, and performs simulation of basic operating states of the system, is able to perform a design of an electrical system		[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		
	[K7_K04] correctly identifies and resolves dilemmas associated with the exercise of the profession, in particular relating to responsibility for his own safety and the safety of others		applies the H&S rules when working with electrical devices		[SK5] Assessment of ability to solve problems that arise in practice		
	[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		design a simple electromechanical system		[SW3] Assessment of knowledge contained in written work and projects		

Subject contents	Course content – lecture Lecture: Structures and components of modern electromechanical drive systems. Calculation of equivalent parameters and modelling of complex electromechanical drive systems. Thermal and Electromagnetic analysis of electromechanical transducers using analytical and numerical methods. Analysis of the motion equations and calculation of mechanical transient processes in complex electromechanical drive systems. Design principles of electromechanical drive systems. Selection rules of the required power and drive parameters of different types of electromechanical drive systems. Possibility of a virtual tour inside the nacelle of a wind turbine and manipulating components of real electric machines using VR goggles and the application available on the eNauczanie platform. Exercises: Issues related to project management. Design calculations for the selected electromechanical drive system and the development of a numerical model with the use of CAD programs (thermal and electromagnetic calculations). Modelling of elements of the electromechanical system with the use of programs for calculations using the finite element method. Analysis of selected system operating states based on the results of simulation tests.		
Prerequisites and co-requisites	Knowledge in the range of electrical machines and analysis methods of electric and magnetic circuits. Extended knowledge in the field of power electronics. Knowledge in the range of design, programming and diagnostics of power converters.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written quiz	60.0%	50.0%
	Exercises	60.0%	50.0%
Recommended reading	Basic literature	1. Pyrhönen J., Jokinen T., Hrabovcová V.: Design of Rotating Electrical Machines. 2014 John Wiley & Sons, Ltd 2. Gieras J. F.: Advancements in Electric Machines. Springer 2010 3. Gieras J. F.: Axial Flux Permanent Magnet Brushless Machines. Springer 2014	
	Supplementary literature	1. Michna M: Designing of brushless permanent magnet motor. Auxiliary materials. 2. Kostro G: Designing of squirrel cage induction motor. Auxiliary materials.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Calculation of the operation point of a permanent magnet. 2. Selection of a motor for a given drive system. 3. Selection of the gearbox for a given drive system. 4. Calculation of basic parameters of a gearbox. 5. Design calculations of electric machines		
Practical activities within the subject	Not applicable		

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