GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Design of Electric Systems, PG_00038368						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2026/2027			
Education level	second-cycle studies		Subject group				
Mode of study	Part-time studies		Mode of delivery	at the university			
Year of study	1		Language of instruction	Polish			
Semester of study	2		ECTS credits	3.0			
Learning profile	general academic profile		Assessment form	assessment			
Conducting unit	Department of Power Electronics and Electrical Machines -> 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						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	10.0	10.0	0.0	0.0	30
	E-learning hours included: 0.0						
	eNauczanie source address: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=22422						
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	6.0	39.0	75		
Subject objectives	The aim of the course is to introduce students with the methods of analysis, modeling and design of electromechanical drive systems						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W06] has in-depth knowledge of industrial electronics, microprocessor control systems, programmable logic systems and printed circuit design and prototyping computer-aided prototyping	configures basic power electronics and drive systems, applies control and diagnostic methods for power electronics systems	[SW1] Assessment of factual knowledge
[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
[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 health and safety rules that apply when working with electrical devices	[SK5] Assessment of ability to solve problems that arise in practice
[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_U06] is able to analyse, model, simulate and design electrical systems	performs analysis 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

Subject contents

Course content – 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.

Course content – exercises

Project management issues. Design calculations of the main and detailed dimensions of electromechanical transducers. Calculations of the operating parameters (drive or load) of electromechanical transducers.

Course content – laboratory

Development of a numerical model of an electromechanical transducer. Simulation studies using the finite element method. Simulation studies of electromechanical systems. Analysis of selected operating states of the electromechanical transducer based on simulation results.

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
Test	60.0%	60.0%
Practical exercise	60.0%	40.0%

Recommended reading

Basic literature	Pyrhönen J., Jokinen T., Hrabovcová V.: Design of Rotating Electrical Machines, 2014 John Wiley & Sons, Ltd. Gieras J. F., Wang R., Kamper M. J.: Axial Flux Permanent Magnet Brushless Machines, 2nd ed. 2008 Springer Mirosław D.: Projektowanie maszyn elektrycznych prądu przemiennego, Wydawnictwa Naukowo-Techniczne, 1994
Supplementary literature	Ronkowski M., Michna M., Kostro G., Kutt F.: Maszyny elektryczne wokół nas: zastosowanie, budowa, modelowanie, charakterystyki, projektowanie. (e-skrypt). Wyd. PG, Gdańsk 2011.

	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Calculation of the operation point of a permanent magnet. 2. The choice of the motor to the drive system. 3. The choice of the gear box to the drive system. 4. Design calculations of electric machines.	
Practical activites within the subject	Not applicable	

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