

表 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Introduction to Advanced Electrical Drives, PG_00038322									
Field of study	Automation, Robotics and Control Systems									
Date of commencement of studies	October 2023		Academic year of realisation of subject			2024/2025				
Education level	second-cycle studies		Subject group			Optional subject group 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	2		Language of instruction			Polish				
Semester of study	3		ECTS credits			2.0				
Learning profile	general academic profile		Assessment form			assessment				
Conducting unit	Department of Control Engineering -> Faculty of Electrical and Control Engineering				ng					
Name and surname	Subject supervisor		prof. dr hab. inż. Marcin Morawiec							
of lecturer (lecturers)	Teachers			_						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM		
	Number of study hours	10.0	0.0	10.0	0.0		0.0	20		
	E-learning hours included: 0.0									
	Adresy na platformie eNauczanie:									
Learning activity and number of study hours	Learning activity Participation ir classes include plan		n didactic ed in study	Participation in consultation hours		Self-study		SUM		
	Number of study 20 hours		4.0		26.0 50					
Subject objectives	The aim is to understand the structures of modern electric drives as well as methods and tools for control like FOC control, flux and angular velocity observer, optimal control of electric machines.									
Learning outcomes	Course out	Subject outcome			Method of verification					
	K7_K04		The student is able to divide the work in a group in order to complete the task. Is aware of the dangers of electric machines and is able to work safely			[SK3] Assessment of ability to organize work [SK1] Assessment of group work skills				
	K7_U07		Is able to build a simulation model of a drive system with a given structure and assess the quality of control			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools				
	K7_W10		the student understands the need for advanced methods of machine control and is able to justify it. Can describe the principle of operation and purpose of structures.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects				
	K7_K06		the student is able to adjust the solution to the task with the use of existing tools and is aware of the consequences of a wrong choice			[SK5] Assessment of ability to solve problems that arise in practice				
Subject contents	The cotrnol rules of the torque and flux in AC electrical machines, the basic structure of the control system, the principles of control with field weakening region. Structure and properties of the estimators variables: flux, load torque, angular speed and position. Decoupled control and feedback linearization. The efficiency of the electrical drive system, operation conditions with maximum efficiency. Implementation of digital control system. Diagnosis of the electric drives.									
Prerequisites and co-requisites	Basic knowledge of electrical engineering, electrical drives, power electronics and control theory including observers.									
Assessment methods	Subject passing criteria		Passing threshold			Percentage of the final grade				
and criteria	Colloquium of the lecture		50.0%			50.0%				
Laboratory reports			100.0%			50.0%				

Recommended reading	Basic literature		Laboratory instructions and lectures reported ineNauczanie Krzemiński Z.: Cyfrowe sterowanie maszynami asynchronicznymi, Gdańsk, Wydawnictwo PG, 2003. Orłowska-Kowalska T.: Bezczujnikowe układy napędowe z maszynami asynchronicznymi, Oficyna Wydawnicza politechniki Wrocławskiej, 2005. Zawirski K.: Układy napędowe z maszynami synchronicznymi, Wydawnictwo Politechniki Poznańskiej, Poznań, 2005. Kowalski C.: Monitorowanie i diagnostyka uszkodzeń silników z wykorzystaniem sieci neuronowych, Oficyna wydawnicza Politechniki Wrocławskiej, 2005.			
	Supplementary literature	1. 2.	Bielawski C.: Automatyka napędu elektrycznego, WNT, 1980. Abu Rub H., Guziński J., lqbal J.: High performance control of AC drives with Matlab Simulink models, Willey, 2012.			
	eResources addresses					
Example issues/ example questions/ tasks being completed	 Vector model of induction machine Features of the flux estimation methods What is the structure tof the MRAS based encod estimator 					
work placement	Not applicable					