



Subject card

Subject name and code	Design of automatic control systems with electric motors, PG_00059856						
Field of study	PROJEKT UKŁADÓW AUTOMATYCZNEJ REGULACJI MIKRO MASZYN ELEKTRYCZNYCH						
Date of commencement of studies	October 2023		Academic year of realisation of subject		2025/2026		
Education level	first-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	6		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Electric Drives and Energy Conversion -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Marcin Morawiec				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	30.0	0.0	45
	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	45		10.0		45.0	100
Subject objectives	The aim of the course is to familiarize with automatic control systems used in electric micromachines such as DC motors, servo drives, hybrid motors.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_K05] can think and act in an entrepreneurial way		Student can think and act in an entrepreneurial way		[SK5] Ocena umiejętności rozwiązywania problemów występujących w praktyce [SK1] Ocena umiejętności pracy w grupie		
	[K6_W07] has basic knowledge related to control and automation systems		has knowledge related to control and automation systems		[SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym [SW2] Ocena wiedzy zawartej w prezentacji		
	[K6_U04] has the ability to self-educate, among other things, in order to improve professional qualifications		has the ability to self-educate, among others in order to improve professional qualifications		[SU5] Ocena umiejętności zaprezentowania wyników realizacji zadania [SU4] Ocena umiejętności korzystania z metod i narzędzi		
	[K6_W11] knows the hazards arising from devices, installations, systems and technical systems, basic principles of occupational health and safety, taking into account the role of control and security systems in controlling automation and robotics facilities		knows the threats posed by devices, installations, systems and technical systems, as well as the basic principles of occupational health and safety		[SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym [SW1] Ocena wiedzy faktograficznej		
	[K6_W06] knows the structure of computers and microprocessors and the tasks of operating systems, has basic knowledge of the basics of computer software, drivers, microprocessor technology, design of simple algorithms and the operation of information networks		knows the structure of computers and microprocessors and the tasks of operating systems, has basic knowledge of the basics of computer software, controllers, microprocessor technology		[SW2] Ocena wiedzy zawartej w prezentacji [SW1] Ocena wiedzy faktograficznej		

Subject contents	Course content – lecture 1. Introduction to electric drive 2. Overview of converter systems used in micro and servo drives 3. Converter drive automation including microdrives 4. Design of a system with a microdrive controlled by a microcontroller (electronics design) 5. Implementation of the control system in a system with a microcontroller 6. Functional tests in the laboratory		
Prerequisites and co-requisites	Basic knowledge of electric propulsion - the principle of electric motors with permanent magnets, relaxation and DC motors - is required for the course. Basic knowledge of control systems, regulators and estimation methods.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture	50.0%	15.0%
	Project	75.0%	85.0%
Recommended reading	Basic literature		1. Dębowski A., Automatyka napędu Elektrycznego, Wydawnictwo Naukowe PWN, 2017. 2. Gibilisco S., Schematy elektroniczne i elektryczne. Przewodnik dla początkujących, Wydawnictwo Helion, 2021. 3. Sendoh, M., Ishiyama, K., & Arai, K. I. (2002). Direction and individual control of magnetic micromachine. IEEE Transactions on Magnetics, 38(5 I), 3356-3358. https://doi.org/10.1109/TMAG.2002.802306 4. S. S. Irudayaraj and A. Emadi, "Micromachines: principles of operation, dynamics, and control," IEEE International Conference on Electric Machines and Drives, 2005., San Antonio, TX, USA, 2005, pp. 1108-1115, doi: 10.1109/IEMDC.2005.195860. 5. https://forbot.pl/blog/kurs-arduino-silniki-pwm-serwomechanizm-zewnetrzne-biblioteki-id3913 6. www.st.com
	Supplementary literature		-
	eResources addresses		
Example issues/ example questions/ tasks being completed	Design of the control system of the selected servo (with a servo drive, DC motor, stepper motor, hybrid motor), PCB design, simulation of the control system in PLECS, software design for STM32 or other.		
Practical activities within the subject	Not applicable		

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