



## Subject card

Subject name and code	Design of automatic control systems with electric motors, PG_00059856						
Field of study	Automation, Robotics and Control Systems						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2023/2024		
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 Controlled Electric Drives -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Marcin Morawiec				
	Teachers						
Lesson types and methods of instruction	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_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] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools		
	[K6_K05] can think and act in an entrepreneurial way		Student can think and act in an entrepreneurial way		[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills		
	[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] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge		
	[K6_W07] has basic knowledge related to control and automation systems		has basic knowledge related to control and automation systems		[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation		
	[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] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		

Subject contents	<div>1. Introduction to electric drive</div> <div>2. Overview of converter systems used in micro and servo drives</div> <div>3. Converter drive automation including microdrives</div> <div>4. Design of a system with a microdrive controlled by a microcontroller (electronics design)</div> <div>5. Implementation of the control system in a system with a microcontroller</div> <div>6. Functional tests in the laboratory</div>		
Prerequisites and co-requisites	Basic knowledge of the electric drive		
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	<div>Dębowski A., Automatyka napędu Elektrycznego, Wydawnictwo Naukowe PWN, 2017.</div> <div>Gibilisco S., Schematy elektroniczne i elektryczne. Przewodnik dla początkujących, Wydawnictwo Helion, 2021.</div> <div><a href="https://forbot.pl/blog/kurs-arduino-silniki-pwm-serwomechanizm-zewnetrzne-biblioteki-id3913">https://forbot.pl/blog/kurs-arduino-silniki-pwm-serwomechanizm-zewnetrzne-biblioteki-id3913</a></div> <div><a href="http://www.st.com">www.st.com</a></div>	
	Supplementary literature	-	
	eResources addresses	Adresy na platformie eNauczanie:	
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.		
Work placement	Not applicable		