



## Subject card

Subject name and code	Control of servomotors, PG_00054495							
Field of study	Electrical Engineering							
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	Part-time studies	Mode of delivery			at the university			
Year of study	3	Language of instruction			Polish			
Semester of study	6	ECTS credits			2.0			
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	15.0	0.0	0.0	30	
	E-learning hours included: 0.0							
	Address on the e-learning platform: <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=6411">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=6411</a>							
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		2.0		18.0		50
Subject objectives	The aim of the course is to discuss the control and programming structures of servo motors with permanent magnet synchronous motors, reluctance motors, stepper motors and servo drives.							

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_W09	knows the methods of producing and transmitting energy	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects
	K6_W10	knows the basics of processing, use and rational use of electricity, including the principles of electric traction	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation
	K6_K05	is able to apply the principles of occupational health and safety	[SK4] Assessment of communication skills, including language correctness [SK3] Assessment of ability to organize work [SK5] Assessment of ability to solve problems that arise in practice
	K6_U09	can select the servo drive to the actuators	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
	K6_U05	has extended knowledge of servo drive systems, control, and diagnostics methods	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
	K6_W11	knows the principles of designing electrical installations and electric lighting, controlling electrical devices	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
	K6_U10	is able to design electrical installations in which he will use servomechanisms	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
	K6_K01	has aware of training due to the emerging new solutions in the field of servo drive controllers	[SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work
Subject contents	Overview of servo systems. Permanent magnet synchronous motor. Reluctance motor. Stepper motor. Servo drive. Overview of the control systems of each mentioned machine. Structure of the control system. PMSM engine control system. Selection of PID controller settings in a system with a servo. Overview of the CNC milling machine and 3D printer system. Position and speed sensors used in servos. Overview of design methods. Overview of the principles of functional safety. Safety functions. Siemens servo drives in practice.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Credit for the lecture	50.0%	20.0%
	Reports from the laboratory exercises	60.0%	80.0%
Recommended reading	Basic literature	Janusz Kwaśniewski, Ireneusz Dominik, Krzysztof Lalik oraz Mateusz Kozek, Serwonapędy Siemens w praktyce inżynierskiej, Wydawnictwo BTC, 2020.  Szellerski Marek Wiktor, Automatyka przemysłowa w praktyce, Wydawnictwo Kabe, 2016.	
	Supplementary literature	Lech Grzesiak, Arkadiusz Kaszewski, Bartłomiej Ufnalski, Sterowanie napędów elektrycznych, PWN, Warszawa, 1, 2021.	
	eResources addresses	Adresy na platformie eNauczanie:	

Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"><li>1. PMSM motor position control system</li><li>2. Discuss the principles of functional safety</li><li>3. Discuss the principle of stepper motor control</li><li>4. Discuss sensors for measuring speed and position used in servos</li></ol>
Work placement	Not applicable