



## Subject card

Subject name and code	Drive Automatics and Servomechanisms, PG_00038107						
Field of study	Automation, Robotics and Control Systems						
Date of commencement of studies	October 2020	Academic year of realisation of subject				2022/2023	
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	5	ECTS credits				5.0	
Learning profile	general academic profile	Assessment form				exam	
Conducting unit	Department of Controlled Electric Drives -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Elżbieta Bogalecka					
	Teachers	dr inż. Mirosław Włas dr hab. inż. Marcin Morawiec dr hab. inż. Arkadiusz Lewicki dr hab. inż. Elżbieta Bogalecka					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	0.0	60
	E-learning hours included: 0.0						
AUTOMATYKA NAPĘDU I SERWOMECHANIZMY [2022/23] - Moodle ID: 25132 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=25132">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=25132</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	60	8.0		57.0		125
Subject objectives	The aims of the course are: to show the principles and applications of industrial controlled electrical drives, including the principles of operation of electrical machines, introduction to the physics of motion control and energy conversion., to learn methods of controlling servodrives.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	K6_W08		the student is able to dimension the elements of the drive system: converter, motor, sensors and select the proper structure of the control system.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects	
	K6_U05		the student is able to configure the converter to the given task, write a program for the servo in G-code, select the settings of the regulators and evaluate the operation of the drive control system			[SU3] Assessment of ability to use knowledge gained from the subject	
	K6_K05		Working in a group, the student is able to distribute tasks and perform them according to the program. The student is able to quickly master the operation of new tools and devices.			[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills	
Subject contents	Machine as an actuator in the control system, the rules of position, speed and torque control of electrical machines, equations of motion. Types of electrical machines, load characteristics, operating point of the drive, mechanical characteristics . Types of electrical machines and their properties. The structure of control system. Selection of control variables and parameters, measurement of electrical and mechanical variables. Energy Recovery during braking . Influence of limitations to the quality of control. Terms of scalar and vector control of AC machine. Servomechanism: control structures, distortions, effect of friction, gravity, moment of inertia and the load on quality control. Analysis of selected industrial applications: lift, winch, winder, the drive traction, a robot arm.						
Prerequisites and co-requisites	Knowledge of the basics of power electronics, electrical engineering, including transients in electrical circuits, mechanics and control theory						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Exam	50.0%	50.0%
	Laboratory reports	60.0%	50.0%
Recommended reading	Basic literature	1. Laboratory instructions and lectures reported in <a href="http://www.ely.pg.gda.pl/KANE">www.ely.pg.gda.pl/KANE</a> 2. Zawirski K, Deskur J.: Automatyka napędu elektrycznego, 2012. 3. Bielawski C.: Automatyka napędu elektrycznego, WNT, 1980.	
	Supplementary literature	1. Krzemiński Z.: Cyfrowe sterowanie maszynami asynchronicznymi, Gdańsk, Wydawnictwo PG, 2003. 2. Orłowska-Kowalska T.: BezczyJNIKowe układy napędowe z maszynami asynchronicznymi, Oficyna Wydawnicza politechniki Wrocławskiej, 2005. 3. Zawirski K.: Układy napędowe z maszynami synchronicznymi, Wydawnictwo Politechniki Poznańskiej, Poznań, 2005.	
	eResources addresses	Podstawowe <a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=16839">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=16839</a> - lecture materials and laboratory instructions	
Example issues/ example questions/ tasks being completed	1. Equation of motion  2. Mathematical model of DC machine  3. The rules of the controller parameters setting  4. Servodrive control system structure  5. V/f control of induction machine		
Work placement	Not applicable		