GDAŃSK UNIVERSITY OF TECHNOLOGY

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 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	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 inż. Mirosław Włas
	Teachers — dr inż. Mirosław Włas; dr hab. inż. Elżbieta Bogalecka; dr hab. inż. Arkadiusz Lewicki; prof. dr hab. inż. Marcin Morawiec

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

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_U05] can use analytical and simulation methods to solve tasks in the field of automation and robotics and use various techniques to carry out engineering tasks related to automation and robotics devices and systems	ability to prepare a reliable laboratory test report. the student is able to configure and select controller parameters on a real object	[SU3] Assessment of ability to use knowledge gained from the subject [SU5] Assessment of ability to present the results of task
[K6_W08] knows the basics of equipment selection and control of electrical machines and servos	the student is able to configure and select controller parameters on a real object the student is able to select the parameters of the drive system components for the application	[SW1] Assessment of factual knowledge
[K6_K05] can think and act in an entrepreneurial way	ability to organize work in a laboratory group to complete a given task. ability to select tools, measurement methods and sequence to perform a complex task.	[SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice

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
	Laboratory reports	60.0%	50.0%
	Exam	50.0%	50.0%

Recommended reading	Basic literature	1. Laboratory instructions and lectures reported in www.ely.pg.gda.pl/KANE 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.: Bezczujnikowe 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 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=16839 - lecture materials and laboratory instructions Adresy na platformie eNauczanie: AUTOMATYKA NAPĘDU I SERWOMECHANIZMY [2023/24] - Moodle ID: 32142 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32142

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