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 2022	Academic year of realisation of subject	2024/2025
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		
	Teachers		

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_W08] knows the basics of equipment selection and control of electrical machines and servos	the student is able to determine the requirements for the drive system for a given application. Knows what control method is appropriate	[SW1] Assessment of factual knowledge
[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	the student, using the knowledge acquired in the course, is able to properly perform the task using simulation tools and technical devices. the student is able to process and analyze measurement results and present them in the form of a report.	[SU1] Assessment of task fulfilment [SU5] Assessment of ability to present the results of task [SU2] Assessment of ability to analyse information
[K6_K05] can think and act in an entrepreneurial way	the student is able to plan the method and sequence of activities to perform a laboratory task. The student is able to deal with real technical problems..	[SK1] Assessment of group work skills [SK3] Assessment of ability to organize work [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
Exam	50.0%	50.0%
Laboratory reports	60.0%	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. zbiorowa: Serwonapędy Siemens w praktyce inżynierskiej, 2020, wyd. BTC, ISBN 978-83-64702-19-8
	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:
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	