GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00056126		
Field of study	Mechatronics		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
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	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Power Electronics and Electrical Machines -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Krzysztof Iwan	
	Teachers	dr hab. inż. Michał Michna	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	0.0	0.0	30

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 4934 Napędy i systemy zasilania w robotyce
https://enauczanie.pg.edu.pl/2025/course/view.php?id=4934

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	0.0	0.0	30

Subject objectives

Provision of theoretical information in the field of analysis and synthesis of electric drive systems used in modern industrial automation systems and robotic drives.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U06] is able to identify and formulate specification of simple, practical engineering tasks, distinctive for mechatronics		[SU3] Assessment of ability to use knowledge gained from the subject
[K6_W08] knows and understands design and production processes of elements and simple mechatronic devices		[SW1] Assessment of factual knowledge
[K6_U05] is able to use properly chosen tools to compare design solutions of elements and mechatronics systems according to given application and economic criteria (e.g. power demand, speed, costs)		[SU3] Assessment of ability to use knowledge gained from the subject
[K6_W10] has knowledge about development trends in the field of engineering and technology sciences and scientific disciplines: Mechanical Engineering, Automation, Electronics, Electrical Engineering and Space Technologies, adequate for Mechatronics curse		[SW1] Assessment of factual knowledge
[K6_W11] has knowledge about the life cycle of mechatronic systems and objects		[SW1] Assessment of factual knowledge

Subject contents

Course content – lecture

1. Basic components of an of the robotics and industrial automation electric drive systems
2. Design and implementation of an electric drive system: requirements, mechanical characteristics, efficiency map, linear and rotary motors
3. The operation principles, basic properties and characteristics of the different types of electrical machines used in industrial automation systems: asynchronous motors, brushless DC motors, switched reluctance motors
4. Power supply and control application in modern electrical drive systems: sensor and sensorless drive systems, field-oriented control
5. Current trends in industrial automation and in robotics:

- Multiple-criteria design methods and rapid prototyping of drive systems
- Designing of a low-power drive systems for high efficiency applications
- High-speed and multiphase electric machines and their power supply systems
- Damage-resistant drive systems
- Inverter systems for cooperation with the power grid and renewable energy installations
- Energy efficient drive systems

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
	50.0%	100.0%

Recommended reading

Basic literature

1. Kaczmarek T., K. Zawirski. Układy napędowe z silnikiem synchronicznym. Wyd. Politechniki Poznańskiej, Poznań, 2000r

2. Kosmol J.: Napędy mechatroniczne. Gliwice: Wydawnictwo Politechniki Śląskiej, 2013.

3. Ronkowski M., Michna M., Kostro G., Kutt F.: Maszyny elektryczne wokół nas. Zastosowanie, budowa, modelowanie, charakterystyki, projektowanie, Wydawnictwo Politechniki Gdańskiej, 2011

4. Świtoński E. (red.): Modelowanie mechatronicznych układów napędowych. Wydawnictwo Politechniki Śląskiej 2005.

5. Turowski J. : Podstawy mechatroniki. Wydawnictwo Wyższej Szkoły Humanistyczno-Ekonomicznej w Łodzi, 2008.

	Supplementary literature	1. Bishop Robert H. (Editor): The Mechatronics Handbook. CRC Press, 2002. 2. Damic V., Montgomery J.: Mechatronics by Bond Graphs. An object approach to modeling and simulation. Springer 2003. 3. Fishwick Paul A.: Handbook of Dynamic System Modeling. Chapman & Hall/CRC 2007 4. Fritzson Peter: Principles of Object-Oriented Modeling with Simulation with Modelica. J. Wiley&Sons 2004. 5. Karnopp D. C., Margolis D. L., Rosenberg R. C.: System Dynamics, Modelling and simulation of mechatronic systems, John Wiley Inc, 2000. 6. Lyshevski S. E.: Electromechanical Systems, Electric Machines, and Applied Mechatronics, CRC Press, 2000.
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Practical activites within the subject	Not applicable	

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