GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Industrial Electronics, PG_00038349		
Field of study	Electrical Engineering		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Electrified Transportation -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Leszek Jarzębowicz	
	Teachers	dr hab. inż. Jarosław Łuszcz	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	10.0	0.0	10.0	0.0	0.0	20

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	20	2.0	28.0	50

Subject objectives

Understanding the different technical conditions for applications of electronic devices in industrial environments. The acquisition of design skills, software, and use of complex electronic devices and power electronics.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W06] has in-depth knowledge of industrial electronics, microprocessor control systems, programmable logic systems and printed circuit design and prototyping computer-aided prototyping	Student describes the basic issues of industrial electronics. Chooses the controller of machinery and technological equipment and prepares their software.	[SW3] Assessment of knowledge contained in written work and projects
[K7_U04] is able to select industrial electronics equipment and prepare their software, design systems microprocessor systems	Chooses the electronic equipments e.g. programable motion controllers, sensors and other devices to control and data transmission for industry applications; completes their software.	[SU1] Assessment of task fulfilment

Subject contents

Course content – lecture
LECTURE The rules of construction of industrial electronics equipment. Intelligent power modules IPM: integrated protection functions, sensors, drive circuits. Electronic devices and components: sensors, transducers, mixed signal processors, computer interfaces. Optoelectronics and power electronics devices. Industrial transducers with specialized interfaces for measurement: current, voltage, velocity and displacement. Industrial electronics application. Applications of microprocessors and microcontrollers. Industrial computers. Input-output interfaces. Motion control and positioning. Brushless dc and ac servo motors. Basics of computer numerical control. Control algorithms - torque control, speed and location, stiffness of the drive. Programmable motion control. Single and multiaxis motion control systems. Industrial e-automation. The selection of the propulsion system for a given application. Industrial interfaces transmission data. Serial interfaces. Wireless Sensor Network. LABORATORY Electronic transducers. Servodrive and their applications. Programming languages of motion. Data acquisition systems. Specialized interfaces microcontrollers.

Prerequisites and co-requisites

Basic knowledge of electrical engineering, electronics and control engineering.

<table>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Report from laboratory exercises</td><td>60.0%</td><td>30.0%</td></tr>
<tr><td>Midterm colloquium</td><td>60.0%</td><td>70.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">Mohan N., Undeland T.M., Robbins W.P.: Power Electronics. John Wiley & Sons, Inc. N.Y. Chichester Brisbane Toronto Singapore 1995. Szczęsny R.: Komputerowa symulacja układów energoelektronicznych. Gdańsk: Wyd. Politechniki Gdańskiej 1999. Younkin G. W.: Industrial Servo Control Systems. Fundamentals and Application. Marcel Dekker 2003.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">Wilamowski B. M., Irwin J. D.: The Industrial Electronics Handbook. Power electronics and motor drives. CRC Press, Taylor and Francis Group, LCC, 2011</td></tr>
<tr><td>eResources addresses</td><td colspan="2"></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">1. Draw recommended and not recommended for the control optocoupler power electronic devices and explain the impact of electromagnetic disturbances on these systems.
2. Define the servo drive and draw a simplified block diagram. In the figure distinguish signals feedback. Explain the action of the individual blocks.
3. Characterize wireless sensor networks (WSN).</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="3">Not applicable</td></tr>
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