



## Subject card

Subject name and code	Electronics, PG_00038074						
Field of study	Automation, Robotics and Control Systems						
Date of commencement of studies	October 2026	Academic year of realisation of subject				2026/2027	
Education level	first-cycle studies	Subject group					
Mode of study	Full-time studies	Mode of delivery				at the university	
Year of study	1	Language of instruction				Polish	
Semester of study	2	ECTS credits				4.0	
Learning profile	general academic profile	Assessment form				exam	
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 hab. inż. Marek Turzyński				
	Teachers						
Lesson types	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						
	eNauczanie source address: <a href="https://enauczanie.pg.edu.pl/2025/course/view.php?id=3723">https://enauczanie.pg.edu.pl/2025/course/view.php?id=3723</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		5.0		35.0	100
Subject objectives	The aim of the course is to provide the student with knowledge of basic electronic components and systems. The student will learn the principles of operation of elementary semiconductor devices and the operational properties of basic electronic systems. In addition, the student will acquire the skills of independent analysis of simple electronic systems.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U08] can design and build systems and devices in the field related to mechatronics and robotics systems		Projektuje prosty układ elektroniczny.		[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		
	[K6_W05] has basic knowledge of the principles of operation of basic electronic, energy and power electronic components and systems		Describes the mechanisms of physical phenomena occurring in semiconductor materials. Identifies and defines the operating principles of basic electronic components and systems.		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
	[K6_W04] has basic knowledge of methods of analysis of direct and alternating current circuits		Analyzes simple electronic circuits. Performs simple laboratory measurements and analyzes and evaluates the obtained results.		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
	[K6_K05] can think and act in an entrepreneurial way		Dobiera parametry elementów elektronicznych pod kątem optymalizacji rachunku ekonomicznego.		[SK5] Assessment of ability to solve problems that arise in practice		

Subject contents	<p>Course content – lecture</p> <p>Laboratory equipment: multimeters, oscilloscopes, measuring probes. Passive electronic components: resistors, capacitors, inductors. Semiconductors: conduction processes, doped semiconductors, pn junction, ms junction. Diodes: switching, rectifier, Schottky, Zener, photodiodes, light emitting diodes, solar panels. Transistors bipolar and unipolar: structure, operation principles, electrical data and characteristics. Optoelectronic components. Amplifiers: technical data, characteristics, influence of negative feedback. Differential and operational amplifiers. Filters. Power amplifiers. Generators. Power supply units. Phase lock loop. Digital circuit technologies.</p>		
	<p>Course content – laboratory</p> <p>1) Passive components. 2) Semiconductor diodes. 3) Bipolar transistor. 4) Unipolar transistor. 5) Photovoltaic cells. 6) Elements of digital technology. 7) Negative feedback amplifier. 8) Comparator, univibrator. 9) Active filters. 10) Voltage-tuned generator. 11) Phase-locked loop. 12) Differential amplifier.</p>		
Prerequisites and co-requisites	Fundamentals of physics. Basic circuit theory.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Practical exercises	50.0%	50.0%
	Written test	50.0%	50.0%
Recommended reading	Basic literature	<p>Opolski A.: Elektronika dla elektryków. Wydawnictwo PG, Pomorska Biblioteka Cyfrowa, 2008.</p> <p>Opolski A. (red.): Elektronika dla elektryków - Laboratorium. Wydawnictwo PG. Gdańsk 2000.</p> <p>Schubert T.F, Kim E.: Fundamentals of Electronics: Book 1 Electronic Devices and Circuit Applications, Springer 2015.</p> <p>Bartlett J.: Electronics for Beginners: A Practical Introduction to Schematics, Circuits, and Microcontrollers, Apress 2020</p>	
	Supplementary literature	<p>Hennel J.: Podstawy elektroniki półprzewodnikowej. WNT Warszawa 2003.</p> <p>Boksa J.: Analogowe układy elektroniczne. Wydawnictwo BTC Warszawa 2007.</p> <p>Filipkowski A.: Układy elektroniczne analogowe i cyfrowe. WNT Warszawa 2006.</p> <p>Horowitz P, Hill W.: Sztuka elektroniki, Wydawnictwa Komunikacji i Łączności WKŁ, 201</p>	
	eResources addresses	<p>Supplementary</p> <p><a href="https://www.electronics-tutorials.ws/pl">https://www.electronics-tutorials.ws/pl</a> - Basic tutorials about electronics.</p>	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>Field-effect transistors: structure, classification, graphic symbols and current-voltage output characteristics.</li> <li>Inverting amplifier: circuit, transfer characteristic, amplification factor.</li> </ol>		
Practical activities within the subject	Not applicable		

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