



Subject card

Subject name and code	Electronics and Electrical Engineering, PG_00064126						
Field of study	Mechanical and Medical Engineering						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2026/2027		
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	2		Language of instruction		Polish		
Semester of study	4		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Division of Structural Materials Technology and Welding -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Dionizy Czekaj				
	Teachers		mgr inż. Klaudia Malisz-Rudzińska prof. dr hab. inż. Dionizy Czekaj				
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						
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		2.0		38.0	100
Subject objectives	To familiarize students with the fundamentals of electrical engineering and analog and digital electronics.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W04] has knowledge in automation and robotics of mechanical systems or electrical and electronic engineering or thermodynamics and fluid mechanics including bioreology		The student possesses knowledge regarding the fundamental physical quantities in electrical circuits. The student knows and is able to explain the laws describing the relationships between physical quantities in electrical circuits.		[SW1] Assessment of factual knowledge		
	[K6_U01] is able to acquire knowledge and self-studying, he/she is able to find needed information in specialist books, databases and other sources, he/she is able to integrate information and draw conclusions, he/she is able to communicate by using different technics in work and outside		The student is able to independently expand their knowledge and skills in the fields of electrical engineering and electronics. The student possesses the ability to locate necessary information in source literature and databases.		[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		

Subject contents	Course content – lecture		
	Basic concepts. Electric field. Voltage and current, Ohm's law, circuit diagrams, electric capacitance, capacitor and resistor connections, Kirchhoff's laws, voltage and current dividers. RC and RLC circuits. Diodes and diode circuits. The p-n junction, rectifier diode characteristics, Zener diodes, rectifier circuits. Bipolar transistors. Transistor operating principles and basic parameters, static transistor characteristics. Field-effect transistors (FETs). Types of FETs, FET structure and properties, basic FET circuits. Numerical codes, logic gates, and logic relationships. Combinational logic circuits and sequential logic circuits.		
	Course content – laboratory		
	Laboratory sessions cover selected topics including:		
	1. Use of simulation software (PSpice, Falstad) for electrical circuit analysis 2. Principles of measuring electrical quantities using a multimeter and digital oscilloscope 3. Silicon diodes and light-emitting diodes (LEDs) 4. Practical application of bipolar transistors Transistor-based projects and MOSFETs 5. Voltage regulators 6. Contact components and relays 7. Push-buttons, RGB LEDs, and reed switches 8. Darlington pairs 9. Voltage comparators 10. Analog sensors 11. Practical Boolean algebra 12. CMOS logic gate circuits 13. Logic gates used as signal generators 14. Alarm siren and light effects 15. Memory circuits 16. Display control		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		100.0%	50.0%
		75.0%	50.0%
Recommended reading	Basic literature	1. P. Horowitz, W. Hill, Sztuka elektroniki, T1, T2, WKŁ, 1996 2. S. Kuta, Elementy i układy elektroniczne. Uczelniane Wydawnictwo Naukowo-Dydaktyczne AGH, Kraków, 2003 3. B. Pióro, M. Pióro, Podstawy elektroniki, WsiP, W-wa 1999 4. W. Głocki, Układy cyfrowe, WSiP, W-wa, 1999,	
	Supplementary literature	1. K. Wojtuszkiewicz, Z. Zachara, PSpice. Przykłady praktyczne, Wwa, Mikom, 2000 2. Z. Zachara, K. Wojtuszkiewicz, PSpice. Symulacje wzmacniaczy dyskretnych, W-wa, Mikom, 2001 3. T. Masewicz, Radioelektronika dla praktyków, WKŁ, W-wa, 1986 4. J. Piecha, Elementy i układy cyfrowe, PWN, Warszawa, 1990 5. W. Głocki, L. Grabowski, Pracownia podstaw techniki cyfrowej, WSiP, W-wa, 1998 6. Symulator obwodów elektrycznych: Circuit Simulator version 3.1.3.js. Original by Paul Falstad (https://www.falstad.com/circuit/)	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Ohm's Law 2. Analysis of circuits containing ideal R, L, and C components. 3. Diffusion model of a semiconductor diode. 4. Bipolar transistor biasing circuits. 5. Logic gates and state tables.		
Practical activities within the subject	Not applicable		

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