



Subject card

Subject name and code	Electrical Engineering and Electronics, PG_00072242						
Field of study	Mechanical Engineering						
Date of commencement of studies	October 2026		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	1		Language of instruction		Polish		
Semester of study	2		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. Anna Czystaw dr inż. Artur Sitko dr hab. inż. Dariusz Fydrych mgr inż. Julia Wienconeck dr inż. Grzegorz Gajowiec dr hab. inż. Agnieszka Ossowska 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		5.0		35.0	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_U05] is able to plan and conduct experiments related to the operating parameters of mechanical devices, interpret the results, and formulate appropriate conclusions	The student knows and can explain the laws describing the relationships between physical quantities in electrical circuits. They are able to draw conclusions.	[SU2] Assessment of ability to analyse information
	[K6_W01] possesses advanced knowledge of mathematics, physics, and mechanics, applied to the modeling, analysis, and description of phenomena and processes occurring in mechanical systems	Student posiada wiedzę z zakresu podstaw elektroniki i elektrotechniki.	[SW1] Assessment of factual knowledge
	[K6_W04] knows and understands the principles of operation, integration and evaluation of technical systems, including mechanical, automation, robotics, electrical, electronic and energy systems, as well as measurement, experimental and computational methods used in research, data analysis and performance assessment	The student knows and understands the operating principles of basic electronic components, as well as the measurement, experimental, and computational methods used to evaluate their operating characteristics.	[SW1] Assessment of factual knowledge
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. Characteristics and applications of passive components. Resistor connections. Star-delta transformation. 4. Capacitor. Capacitor connections. 5. Silicon diodes and light-emitting diodes (LEDs) 6. Practical application of bipolar transistors Transistor-based projects and MOSFETs 7. Voltage regulators 8. Contact components and relays 9. Push-buttons, RGB LEDs, and reed switches 10. Darlington pairs 11. Voltage comparators 12. Analog sensors 13. Practical Boolean algebra 14. CMOS logic gate circuits 15. Logic gates used as signal generators 16. Alarm siren and light effects 17. Memory circuits 18. Display control		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory	100.0%	50.0%
	Colloquium (test)	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 3.1.3js. 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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