GDAŃSK UNIVERSITY OF TECHNOLOGY

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 2024	Academic year of realisation of subject	2025/2026
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	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

eNauczanie source addresses:

Moodle ID: 2348 Elektronika i elektrotechnika, W, IMM, sem.04 letni 25/26 (PG_00064126)
https://enauczanie.pg.edu.pl/2025/course/view.php?id=2348

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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

This series of lectures covers the fundamentals of electrical engineering, analog, and digital electronics. Students will become familiar with the fundamentals of electrical engineering, electronic components, and linear circuits based on bipolar and field-effect transistors. Basic logic concepts will be introduced and typical digital circuits will be discussed.

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 defines basic physical quantities in electrical circuits. Explains 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 operates basic measuring devices. Connects simple electrical circuits. Measures basic electrical quantities. Interprets measurement results.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject

<table>
<tr><td>Subject contents</td><td>Course content – lecture
Basic Concepts. Voltage and Current, Ohm's Law, Circuit Diagrams, 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, the Zener Diode, Rectifier Circuits. Bipolar Transistors. Principle of Transistor Operation and Its Basic Parameters, Characteristics of Static Transistors. Field-Effect Transistors (FETs). Types of FETs, Structure and Properties, Basic FE Circuits. Numerical Codes, Logic Gates, and Logical Relationships. Combination Functional Circuits and Circuits Using Sequential Logic.
Course content – laboratory
1. Calculating DC circuits using the pSpice simulation program
2. Calculating AC circuits
3. Determining the characteristics of passive filters
4. Studying transients
5. Static and dynamic parameters of semiconductor rectifier diodes
6. Studying the current-voltage characteristics of a Zener diode
7. Analysis of a bipolar transistor</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Final lecture test</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Laboratory classes</td><td>100.0%</td><td>50.0%</td></tr>
</table>
</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. P. Horowitz, W. Hill, (2015). The Art of Electronics, Third Edition, New York, Cambridge University Press, (pdf)
2. Bird, J. (2003). Electrical Circuit Theory and Technology. Oxford: Newnes, An Impring of Elsevier Science (pdf)
3. Ling, S. J., William Moebs, W., & Sanny , J. (2016). University Physics Volume 2 . Houston, Texas : OpenStax (available online). Book URL: https://openstax.org/books/university-physics-volume-2/pages/1-introduction</td></tr>
<tr><td>Supplementary literature</td><td>1. K. Wojtuszkiewicz, Z. Zachara, PSpice. Przykłady praktyczne, W-wa, 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. W. Głocki, L.Grabowski, Pracownia podstaw techniki cyfrowej, WSiP, W-wa, 1998
5. Symulator obwodów elektrycznych: Circuit Simulator version 3.1.3js. Original by Paul Falstad
6. Forbot, Kurs elektroniki dla początkujących
7. Forbot, Kurs elektroniki II</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. Current and voltage dividers
2. RC circuits. Differentiator
3. Half-wave rectifier with resistive and resistive-capacitive loads.
4. Bipolar transistor bias circuits.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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