GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electronics, PG_00039882		
Field of study	Mechanical Engineering, Mechanical Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2021/2022
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	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Microelectronic Systems -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Wiesław Kordalski	
	Teachers	dr hab. inż. Wiesław Kordalski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	0.0	0.0	30

E-learning hours included: 0.0

Adresy na platformie eNauczanie:

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	30	5.0	15.0	50

Subject objectives

The aim is to present fundamentals of electrical engineering.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W10] possesses basic knowledge on electronics and electrical engineering	Student has an elementary knowledge of electrical engineering and electronics. Student explains principles of operation of basic electronic circuits such as rectifiers and elctronic amplifiers.	[SW1] Assessment of factual knowledge
[K6_U05] is able to plant an experiment within the range of measuring the basic operating parameters of mechanical devices using a specialized equipment, interpret the results and reach the correct conclusions	The student is able to find the necessary information in professional literature, databases and other sources to measure the basic parameters of mechanical devices. The student is able to interpret the measurement results and draw conclusions.	[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information

<table>
<tr><td>Subject contents</td><td>Lecture list of topics

1. Semiconductors in electronics: electronic conductivity, piezo-, photo- and magnetoresistivity; Hall effect. 2. Semiconductor sensors: piezoresistors, thermistors, photoresistors, gaussotrons, Hall sensor, pressure and gas sensors. 3. Semiconductor diodes and their applications. 4. Bipolar and field effect transistors: current-voltage characteristics and amplyfing capabilities. 5. Microelectromechanical systems (MEMS). 6. Rectifiers and suppliers. 7. Spectrum of periodic and nonperiodic electronic signals; linear and nonlinear signal distortions in electronic circuits. 8. Signal amplifying. Operational amplifiers and voltage comparators. 9. Sine wave generators. Relaxation oscillators and multivibrators. 10. Digital representation of analog signal: sampling, quatization, coding and Nyquist theorem. 11. Combinational and sequential digital circuits.

Laboratory list of topics:

1. Introductory remarks. 2. Measurements of static characteristics of selected semiconductor diodes. 3. Current- voltage characteristics of Zener diodes. 4. Measurements of a input stage of an operational amplifier. 5. Selected applications of operational amplifiers. 6. Negative feedback in amplifiers. 7. Bipolar transistor basic configurations of operation. 8. MOS transistor basic configurations of operation. 9. Power amplifier. 10. Amplifier with resonance circuits.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>no prerequisites.</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>Lecture - test written at the end of a term.</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Laboratory - reports of practical exercises.</td><td>50.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. J. Watson: Elektronika, WKiŁ, 2002.

2. P. Horowitz i W. Hill: Sztuka elektroniki, WKiŁ, 1996.

3. M. Polowczyk , A. Jurewicz: Elektronika dla Mechaników, Wyd. PG, 2002.</td></tr>
<tr><td>Supplementary literature</td><td>1. A. Sedra and K. C Smith: Microelectronic circuits, Oxford, 2007.

2. J. Osiowski, J. Szabatin: Podstawy teorii obwodów, t.2, WNT.

3. M. Polowczyk , E. Klugmann: Przyrządy półprzwodnikowe, Wyd. PG, 1996.</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>Draw common-emitter output characetistics for an n-p-n bipolar transistor and define the normal common-emitter current gain (beta) and the normal common-base current gain (alpha).</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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