



## 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						
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 electronic 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		

Subject contents	<p>Lecture list of topics</p> <p>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 amplifying 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, quantization, coding and Nyquist theorem. 11. Combinational and sequential digital circuits.</p> <p>Laboratory list of topics:</p> <p>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.</p>											
Prerequisites and co-requisites	no prerequisites.											
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 808 794 837">Subject passing criteria</th> <th data-bbox="799 808 1139 837">Passing threshold</th> <th data-bbox="1144 808 1482 837">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 844 794 896">Lecture - test written at the end of a term.</td> <td data-bbox="799 844 1139 896">50.0%</td> <td data-bbox="1144 844 1482 896">50.0%</td> </tr> <tr> <td data-bbox="456 902 794 954">Laboratory - reports of practical exercises.</td> <td data-bbox="799 902 1139 954">50.0%</td> <td data-bbox="1144 902 1482 954">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Lecture - test written at the end of a term.	50.0%	50.0%	Laboratory - reports of practical exercises.	50.0%	50.0%
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Laboratory - reports of practical exercises.	50.0%	50.0%										
Recommended reading	Basic literature	<p>1. J. Watson: <i>Elektronika</i>, WKiŁ, 2002.</p> <p>2. P. Horowitz i W. Hill: <i>Sztuka elektroniki</i>, WKiŁ, 1996.</p> <p>3. M. Polowczyk , A. Jurewicz: <i>Elektronika dla Mechaników</i>, Wyd. PG, 2002.</p>										
	Supplementary literature	<p>1. A. Sedra and K. C Smith: <i>Microelectronic circuits</i>, Oxford, 2007.</p> <p>2. J. Osowski, J. Szabatin: <i>Podstawy teorii obwodów</i>, t.2, WNT.</p> <p>3. M. Polowczyk , E. Klugmann: <i>Przyrządy półprzewodnikowe</i>, Wyd. PG, 1996.</p>										
	eResources addresses											
Example issues/ example questions/ tasks being completed	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).											
Work placement	Not applicable											