



Subject card

Subject name and code	Electronics, PG_00039313						
Field of study	Medical and Mechanical Engineering, Mechanical and Medical 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		3.0		17.0	50
Subject objectives	The aim is to present fundamentals of electrical engineering.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_W06		Student has an elementary knowledge of electrical engineering and electronics. Student explains principles of operation of basic electronic circuits such as rectifiers, electronic amplifiers and generators.		[SW1] Assessment of factual knowledge		
	K6_U01		Student is aware of the need to update knowledge throughout life and is able to select appropriate methods of learning and teaching. Student can find the necessary information in the literature, databases, and other sources, can integrate information and formulate conclusions and justify opinions.		[SU4] Assessment of ability to use methods and tools [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	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. CMOS inverter. 12. Combinational and sequential digital circuits. Laboratory list of topics: 1. Introductory remarks. 2. Measurements of a input stage of an operational amplifier. 3. Selected applications of the operational amplifier. 4. Negative feedback in amplifiers. 5. Bipolar transistor basic configurations of operation. 6. MOS transistor basic configurations of operation. 7. Power amplifier. 8. Amplifier with resonance circuits.		
Prerequisites and co-requisites	no prerequisites.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory - reports of practical exercises.	50.0%	50.0%
	Lecture - test written at the end of a term.	50.0%	50.0%
Recommended reading	Basic literature	1. J. Watson: <i>Elektronika</i> , WKiŁ, 2002. 2. P. Horowitz i W. Hill: <i>Sztuka elektroniki</i> , WKiŁ, 1996. 3. M. Polowczyk , A. Jurewicz: <i>Elektronika dla Mechaników</i> , Wyd. PG, 2002. 4. M. Polowczyk , E. Klugmann: <i>Przyrządy półprzewodnikowe</i> , Wyd. PG, 1996.	
	Supplementary literature	1. A. Sedra and K. C Smith: <i>Microelectronic circuits</i> , Oxford, 2007. 2. J. Osiowski, J. Szabatin: <i>Podstawy teorii obwodów</i> , t.2, WNT. 3. A. Filipkowski: <i>Układy elektroniczne analogowe i cyfrowe</i> , WNT	
	eResources addresses		
Example issues/ example questions/ tasks being completed	What assumptions are used to anlyze circuits containing ideal operational amplifier?		
Work placement	Not applicable		