



## Subject card

Subject name and code	Electronics and electrical engineering, PG_00039954						
Field of study	Management and Production Engineering, Management and Production 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 Subject group related to scientific research 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	3.0				
Learning profile	general academic profile	Assessment form	assessment				
Conducting unit	Department of Control Systems Engineering -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Mirosław Mizan, doc. PG					
	Teachers	dr inż. Mirosław Mizan, doc. PG dr hab. inż. Leszek Jarzębowicz					
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: Elektrotechnika i elektronika dla kier. ZiIP st. I stopnia 2021/22 sem.4 - Moodle ID: 20962 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=20962">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=20962</a>							
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	40.0	75		
Subject objectives	The aim is to explain the fundamental laws of the electrical phenomena and to acquaint students with the basic principle of operation of electrical and electronic equipment.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_K01	The student defines the basic physical quantities in electric circuits. Explains the law describing the relationship between physical quantities in electric circuits. Explains the basic principles of operation of electrical machines and electrical equipment. Uses basic electrical equipment used in industry. Connects electrical circuits. Performs basic measurements of electrical quantities. Interprets the results of the measurements. Uses a modern electric drive systems. Recognizes the importance of self-expanding knowledge and skills in the field of study and related areas. Combines knowledge from various fields.	[SK5] Assessment of ability to solve problems that arise in practice
	K6_W04	The student defines the basic physical quantities in electric circuits. Explains the law describing the relationship between physical quantities in electric circuits. Explains the basic principles of operation of electrical machines and electrical equipment. Uses basic electrical equipment used in industry. Connects electrical circuits. Performs basic measurements of electrical quantities. Interprets the results of the measurements. Uses a modern electric drive systems. Recognizes the importance of self-expanding knowledge and skills in the field of study and related areas. Combines knowledge from various fields.	[SW1] Assessment of factual knowledge
	K6_U02	The student defines the basic physical quantities in electric circuits. Explains the law describing the relationship between physical quantities in electric circuits. Explains the basic principles of operation of electrical machines and electrical equipment. Uses basic electrical equipment used in industry. Connects electrical circuits. Performs basic measurements of electrical quantities. Interprets the results of the measurements. Uses a modern electric drive systems. Recognizes the importance of self-expanding knowledge and skills in the field of study and related areas. Combines knowledge from various fields.	[SU4] Assessment of ability to use methods and tools
Subject contents	Lecture: The basic physical quantities in electrical engineering. Electrical circuit elements and their characteristics. Kirchhoff's laws. DC and AC circuits. Three-phase AC symmetrical circuits. Measurements of electrical and non-electrical quantities by electrical methods. Electric and magnetic field, forces in the electromagnetic field. The Faraday's law of electromagnetic induction. Transformer - the physical phenomena and principles of operation. Electric DC and AC motors - principles of operation, velocity control. Semiconductor electronics components: diode, transistor. Optoelectronics. Power electronic converters in the drive system: rectifier, chopper, inverter. Operational amplifier and its applications - generators, filters, regulators. Elements of digital technology - logic gates, memory and microprocessors. Protection against electric shock. Laboratory: Linear and nonlinear DC circuits - the supply and load elements, measurements of electrical quantities, voltage-current characteristics of the elements. AC circuits - basic elements, measurements of power, current and voltage, setting the parameters. Small power transformer - voltage-current dependence, determination of parameters. The drive system of DC motor - methods of speed and torque control. The drive system with asynchron motor - start-up, speed control. Servodrive with permanent magnet synchronous motor - position, velocity and torque control. Microprocessor controllers in drive systems		
Prerequisites and co-requisites	Basic knowledge in mathematics and physics at secondary level.		

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium	50.0%	60.0%
	Practical exercise	50.0%	40.0%
Recommended reading	Basic literature	1. Pr. zb. : Elektrotechnika i elektronika dla nieelektryków. Podręcznik akademicki Mechanika. WNT, Warszawa 2004  2. Kurdziel R.: Podstawy Elektrotechniki. WNT, Warszawa 1972  3. Tietze U., Schenk C.: Układy półprzewodnikowe. WNT, Warszawa 1996. Zawalich E.,  4. Instructions for laboratory exercises.	
	Supplementary literature	1. Pr. zb.: Poradnik Inżyniera Elektryka. T.1-3. WNT, Warszawa 1996.  2. Matulewicz W.: Maszyny elektryczne podstawy. Wyd. PG, Gdańsk 2005.  3. Horowitz P., Hill W.: Sztuka elektroniki. T.1+2. WKŁ, Warszawa 1996.1.  4. Filipkowski A.: Układy elektroniczne analogowe i cyfrowe. WNT, Warszawa 2006.	
	eResources addresses	Elektrotechnika i elektronika dla kier. ZIIP st. I stopnia 2021/22 sem.4 - Moodle ID: 20962 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=20962">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=20962</a>	
Example issues/ example questions/ tasks being completed	The calculation of the currents in the DC circuit. Calculation of the power of circuit components. The adjustment of the circuit parameters to achieve a specific desired value of the given output parameter of the circuit. The calculation of currents and voltages in a circuit with a transformer. Calculate the current in the symmetrical 3-phase circuit. The connecting of the simple electrical circuit and measuring of basic electrical quantities. The handling of propulsion system with an electric motor.		
Work placement	Not applicable		