



## Subject card

Subject name and code	Electrical Engineering, PG_00038052						
Field of study	Automation, Robotics and Control Systems						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2022/2023		
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study		
Mode of study	Full-time studies		Mode of delivery		blended-learning		
Year of study	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		exam		
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				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	E-learning hours included: 30.0						
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	60		8.0		57.0	125
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 equipment. Teaching the methods of the analysis of simple electrical circuits.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U05] can use analytical and simulation methods to solve tasks in the field of automation and robotics and use various techniques to carry out engineering tasks related to automation and robotics devices and systems		The student explains the law describing the relationship between physical quantities in electric circuits. Calculates the value of the currents, voltages and power in the elements of electrical circuit.		[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		
	[K6_W04] has basic knowledge of methods of analysis of direct and alternating current circuits		The student defines the basic physical quantities in electric circuits. Explains the basic principles of operation of electrical machines and electrical equipment. 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_K02] can work in a group taking on different roles in it		The student is able to work in a group with different roles.		[SK5] Assessment of ability to solve problems that arise in practice		
Subject contents	The basic physical quantities in electrical engineering. Electrical circuit elements and their characteristics. Kirchhoff's laws. Solving linear DC circuits. Nonlinear circuits: determination of bias point. Single-phase sinusoidal current linear circuits, the current-voltage relations for the resistor, coil and capacitor. Method of complex amplitudes for calculation of currents and voltages in AC circuits. Powers in AC circuits. Equivalent circuit of the load. The phenomenon of resonance in the electrical circuit. Three-phase AC circuit - the basic formulas. Transient in a circuit. Electric and magnetic field, forces in the electromagnetic field. The Faraday's law of electromagnetic induction. Transformer - the physical phenomena and principles of operation, the basic equations. Rotating electrical machines - working principle, motor and generator mode of operation. Basic types of electric motors - DC, asynchronous, synchronous, permanent magnet.						
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
	Written exam	50.0%	60.0%
	Midterm colloquium	50.0%	40.0%
Recommended reading	Basic literature	1. Kurdziel R.: Podstawy Elektrotechniki. WNT, Warszawa 1972. 2. Horiszny J., Aftyka W., Tiliouine H., Mizan M.: Obwody elektryczne w stanach ustalonych. Zbiór zadań. Wyd. PG, Gdańsk 2004.	
	Supplementary literature	1. Bolkowski S.: Teoria obwodów elektrycznych. WNT, Warszawa 2005. 2. Matulewicz W.: Maszyny elektryczne – podstawy. Wyd. PG, Gdańsk 2005. 3. Pr. zb.: Poradnik Inżyniera Elektryka. T.1-3. WNT, Warszawa 1996.	
	eResources addresses	Adresy na platformie eNauczanie: Elektrotechnika [2022/23] - Moodle ID: 24565 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=24565">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=24565</a>	
Example issues/ example questions/ tasks being completed	The calculation of the currents in the DC circuit. Calculation of currents in the AC 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 the loads of the given nominal values. The calculation of currents and voltages in a circuit with a transformer. Calculate the current in the symmetrical 3-phase circuit. Determination of resonant frequencies of the circuit. Determination of the start- and end-values of selected parameters and the duration of the transition state in a transient circuit.		
Work placement	Not applicable		

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