



## Subject card

Subject name and code	Electrical Engineering, PG_00038052						
Field of study	Automation, Robotics and Control Systems						
Date of commencement of studies	October 2026	Academic year of realisation of subject				2026/2027	
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 Electrical Engineering -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jacek Horiszny				
	Teachers		dr hab. inż. Jacek Horiszny				
Lesson types	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	<p>The course aims to:</p> <ul style="list-style-type: none"> <li>introduce students to the basic laws of electrical phenomena and the definitions of terms used in electrical engineering.</li> <li>introduce students to the characteristics of electrical system components.</li> <li>teach students methods of circuit analysis.</li> </ul>						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[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	
	[K6_W04] has basic knowledge of methods of analysis of direct and alternating current circuits		The student describes an electrical system using equations whose form depends on the chosen calculation method. Calculates currents, voltages, and power in electrical system components.			[SW1] Assessment of factual knowledge	
	[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		Student explains the functioning of an electrical system and identifies the roles of its individual components. He constructs an electrical model of the system adapted to the analysis aims.			[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment	
Subject contents	<p>Course content – lecture Basic concepts and laws in electrical engineering. Electrical circuit elements and their characteristics. Linear and nonlinear DC circuits. Single-phase linear sinusoidal current circuits. RMS and average value of current and voltage. Fasor method. Power in sinusoidal current circuits. Equivalent circuit of the load. Magnetically coupled circuits, transformer. Resonance phenomenon in an electrical circuit. Three-phase circuit. Transient state in an electrical circuit.</p> <p>Course content – exercises Calculating forces in systems of point electric charges. Hemispherical ground electrodes: electric field and potential distribution, resistance. Electrodynamical forces between current-carrying conductors. Induced voltages of rotation and transformation. Solving linear and nonlinear DC circuits. Solving linear AC circuits. Solving transients in circuits.</p>						

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	55.0%	75.0%
	Midterm colloquium	55.0%	25.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. Bolkowski S.: Teoria obwodów elektrycznych. WNT, Warszawa 2005.</li> <li>2. Horiszny J., Aftyka W., Tiliouine H., Mizan M.: Obwody elektryczne w stanach ustalonych. Zbiór zadań. Wydawnictwo PG, Gdańsk 2004.</li> </ol>	
	Supplementary literature	<ol style="list-style-type: none"> <li>1. Krakowski M.: Elektrotechnika teoretyczna. PWN, Warszawa 1999.</li> <li>2. Pr. zb.: Poradnik Inżyniera Elektryka. T.1-3. WNT, Warszawa 1996.</li> </ol>	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. Calculate the electric field distribution and capacitance in a multilayer flat capacitor.</li> <li>2. Calculate the electric field distribution and resistance in a grounding system with hemispherical electrodes.</li> <li>3. Calculate the induced voltage and inductance in a two-wire line.</li> <li>4. Calculate the currents in a linear DC circuit.</li> <li>5. Calculate the currents in a nonlinear DC circuit.</li> <li>6. Calculate the currents in a linear AC circuit.</li> <li>7. Determine the current or voltage waveform in an electrical circuit during a transient state.</li> </ol>		
Practical activities within the subject	Not applicable		

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