

## 。 GDAŃSK UNIVERSITY OF TECHNOLOGY

## Subject card

Subject name and code	Fundamentals of electrical engineering, PG_00058332								
Field of study	Hydrogen Technologies and Electromobility								
Date of commencement of studies	October 2025		Academic year of realisation of subject			2025/2	2025/2026		
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	1		Language of instruction			Polish			
Semester of study	1		ECTS credits			3.0			
Learning profile	general academic profile		Assessment form			exam			
Conducting unit	Katedra Elektrotechni	ki -> Faculty of	f Electrical and Control Engineering -> Wydziały Politechniki Gdańsl			iki Gdańskiej			
Name and surname	Subject supervisor		dr inż. Joanna Wołoszyn						
of lecturer (lecturers)	Teachers		dr inż. Joanna Wołoszyn						
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Project S		Seminar	SUM	
of instruction	Number of study hours	30.0	30.0	0.0	0.0		0.0	60	
	E-learning hours inclu	E-learning hours included: 0.0							
Learning activity and number of study hours	Learning activity	Participation in classes includ plan	didactic Participation in consultation hours		n ours	Self-study		SUM	
	Number of study hours	60		3.0		12.0		75	
Subject objectives	Knowledge and understanding of the laws describing the electrical circuits. Mastering the methods of analysis of DC and AC electrical circuits and create energy balance circuit. The ability to use symbolic method for analyzing AC electrical circuits. Understanding the phenomenon of resonance in electrical circuits. Ability to perform fazor graphs of voltage, current and power in AC electrical circuits.								
Learning outcomes	Course out	Subject outcome Method of verification							
	[K6_U04] can apply t methods to the analy design of electrical e devices and systems	The student can solve the given electrical circuit and confirm the correctness of this solution. Student is able to assess the influence of variability of electric circuit elements on the values of currents, voltages and power in the electric circuit.			[SU4] Assessment of ability to use methods and tools				
Subject contents	LECTURES The basic concepts of electrical engineering. The law describing the phenomenon of electrical, physical quantities and their units. The electrical circuit elements and their characteristics. Physical quantities and their units describing electrical phenomena. Dimensional analysis. Current, potential, voltage, resistance, conductance. Elements of electrical circuits. Ohm's law. Circuit linearity, stationarity, passivity. Kirchhoff's laws. The classification of signals. Periodic and no periodic signals. The basic concepts in electric circuits. Joule's law, power and energy. Tellegen's theorem, the balance of power. Methods for solving DC circuits: similarities, superposition, nodal analysis, loop currents and Thevenin's. AC circuits. The average value and the effective signal. The method of complex amplitudes. Methods for solving AC circuits: similarities, superposition, nodal, loop currents and Thevenin. Phasor diagram of circuit. The capacity in AC circuits. The measurements of voltage, current, power and energy. The phenomenon of resonance. The match of the receiver to the source. Reactive power compensation. Magnetically coupled circuits.								
Prerequisites and co-requisites	Knowledge of the Foundations of Mathematics. Knowledge of the Physics at the secondary school level								

Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade		
and criteria	Written exam	60.0%	65.0%		
	Midterm colloquium	50.0%	35.0%		
Recommended reading	Basic literature	<ol> <li>Bolkowski S.: Teoria obwodów 2009.</li> <li>Bolkowski S. <i>at al.</i>: Zbiór zadań WNT Warszawa 2009.</li> <li>Cichocki A. <i>at al.</i>: Zbiór zadań Warszawa 1985.</li> <li>Horiszny J. <i>at al.</i>: Obwody elel zadań. Wydawnictwo PG. Gdai</li> <li>Kurdziel R.: Podstawy elektrote</li> <li>Krakowski M.: Elektrotechnika 1999.</li> <li>Mikołajuk K., Trzaska Z.: Elektrosch</li> </ol>	elektrycznych. WNT Warszawa z elektrotechniki teoretycznej. z elektrotechniki teoretycznej. PWN ktryczne w stanie ustalonym. Zbiór ńsk 2005. cchniki. WNT Warszawa 1973. teoretyczna. T. 1. PWN Warszawa otechnika teoretyczna - analiza i w liniowych. PWN Warszawa 1987		
	eResources addresses				
Example issues/ example questions/ tasks being completed	<ol> <li>For a given circuit of DC current write equations according to Kirchhoff's laws allowing to solve the circuit.</li> <li>Give the rules for matching the load to the real source of current. What is the efficiency of the circuit under these conditions? Write the appropriate dependencies.</li> <li>For block diagram give an idea of Thevenin method. Provide the necessary assumptions for this method.</li> <li>Give the definition of active power in the AC circuit. Calculate the active power of the load, which voltage and current are described by the formulas: u(t) = Umsin (t + a) and i(t) = Im sin (t + b). Calculate the active power of the load, in which the voltage and current are periodically changing waveforms.</li> <li>For a given circuit of AC current create the phasor graph of currents and voltages.</li> <li>What is a parallel resonant circuit? Calculate quality factor for the parallel RLC circuit.</li> </ol>				
Work placement	Not applicable				

Document generated electronically. Does not require a seal or signature.