



Subject card

Subject name and code	Electric Circuits, PG_00045972						
Field of study	Electrical Engineering						
Date of commencement of studies	February 2025	Academic year of realisation of subject			2024/2025		
Education level	second-cycle studies	Subject group					
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			2.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jacek Horiszny				
	Teachers		dr hab. inż. Jacek Horiszny				
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						
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	10.0		10.0		50
Subject objectives	Obtaining skills in the use of integral Laplace transformation in the theory of electrical circuits for the analysis of circuits in the transient state, as well as skills in the use of the PSPICE simulation program for the analysis of electrical circuits.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_U06] is able to analyse, model, simulate and design electrical systems	Creates a circuit model in PSpice. Performs simulation calculations of steady and transient states with constant and sinusoidally varying energization.			[SU4] Assessment of ability to use methods and tools		
	[K7_W01] has an extended and deepened knowledge of mathematics, including selected issues of numerical methods and knowledge useful for solving tasks in the field of electrotechnology and electrodynamics, has a general knowledge of technical sciences covering their fundamentals and applications	Determines initial conditions for a transient state. Creates an operator model of a circuit for a transient state. Describes the created model with algebraic equations and calculates the Laplace transform of the required quantity. Calculates the inverse transform.			[SW3] Assessment of knowledge contained in written work and projects		
	[K7_K02] is aware of the impact of engineering activities on the environment, understands the non-technical effects of those activities	Assesses the influence of transient processes in an electric circuit on its components.			[SK5] Assessment of ability to solve problems that arise in practice		
Subject contents	Lectures Analysis of transient states using the operator method: basics of the Laplace transform, transform of a differential equation, calculation of free and forced response for first and second order equations, inverse transform, operator impedance, Kirchhoff's laws in the operator form, initial conditions in the operator method. Characteristics of the PSpice program						
Prerequisites and co-requisites	Knowledge of electrical circuits at the first degree level course.						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	written exam	55.0%	70.0%
	tasks for the laboratory	55.0%	30.0%
Recommended reading	Basic literature	1. Bolkowski S.: Teoria obwodów elektrycznych. WNT Warszawa 2012. 2. Osiowski J., Szbatin J.: Podstawy teorii obwodów elektrycznych. WNT warszawa 1998. 3. Papoulis A.: Obwody i układy. WKiŁ Warszawa 1988	
	Supplementary literature	1. Chua L.O., Pen-Min Lin: Komputerowa analiza układów elektronicznych. WNT Warszawa 1981.	
	eResources addresses	Adresy na platformie eNauczanie: OBWODY ELEKTRYCZNE [ET II][2024/25] - Moodle ID: 43428 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=43428	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Calculate the transient current in a given RC, RL or RLC circuit powered by direct or sinusoidal voltage based on the solution of the differential equation using the operator method. 2. Calculate the transient current in a given RC, RL or RLC circuit powered by direct or sinusoidal voltage based on the Laplace equivalent diagram. 3. Expand the periodic current (voltage) waveform into a Fourier trigonometric series. 4. Expand the periodic current (voltage) waveform into a complex Fourier series. 5. Calculate the amplitude and phase spectrum of a continuous signal. 6. Calculate the amplitude and phase spectrum of a discrete signal. 		
Work placement	Not applicable		

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