GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electric Circuits, PG_00045972		
Field of study	OBWODY ELEKTRYCZNE		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2025/2026
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 -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jacek Horiszny	
	Teachers		

Lesson types

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_K02] is aware of the impact of engineering activities on the environment, understands the the non-technical effects of those activities	Assesses the influence of transient processes in an electric circuit on its components.	[SK5] Ocena umiejętności rozwiązywania problemów występujących w praktyce
[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 Lapalce transform of the required quantity. Calculates the inverse transform.	[SW3] Ocena wiedzy zawartej w opracowaniu tekstowym i projektowym
[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] Ocena umiejętności korzystania z metod i narzędzi

Subject contents

Course content – lecture
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.

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>tasks for the laboratory</td><td>55.0%</td><td>30.0%</td></tr>
<tr><td>written exam</td><td>55.0%</td><td>70.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>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</td></tr>
<tr><td>Supplementary literature</td><td>1. Chua L.O., Pen-Min Lin: Komputerowa analiza układów elektronicznych. WNT Warszawa 1981.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">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.</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
</table>

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