



Subject card

Subject name and code	Electric Circuits, PG_00050028						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2026/2027		
Education level	second-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	Part-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	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	10.0	0.0	10.0	0.0	0.0	20
	E-learning hours included: 0.0						
	eNauczanie source addresses: Moodle ID: 7244 OBWODY ELEKTRYCZNE [Niestacjonarne][ET][2026/27] https://enauczanie.pg.edu.pl/2025/course/view.php?id=7244						
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	20		4.0		26.0	50
Subject objectives	Acquiring knowledge and skills in the analysis of transient states in electrical circuits using analytical and numerical methods.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[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		The student creates a model of an electrical circuit. Describes it using Laplace transform equations. Calculates Laplace transforms and inverse Laplace transforms.		[SW1] Assessment of factual knowledge		
	[K7_K02] is aware of the impact of engineering activities on the environment, understands the the non-technical effects of those activities		Student is aware of the environmental impact of engineering activities, understands the non-technical effects of this activity.		[SK5] Assessment of ability to solve problems that arise in practice		
	[K7_U06] is able to analyse, model, simulate and design electrical systems		Student creates a circuit model in a simulation program. Calculates initial conditions and transient current and voltage waveforms. Compares numerical and analytical solutions.		[SU4] Assessment of ability to use methods and tools		

Subject contents	Course content – lecture Characterization of transients , commutation law, initial conditions. Transient analysis using the operator method: basics of the Laplace transform, transform of a differential equation, calculation of the free and forced response for first- and second-order equations, inverse transform, impedance, Kirchhoff's laws in operator form, initial conditions in the operator method, applications of Thevenin's and Norton's theorems. Characterization of the PSpice program.		
	Course content – laboratory Calculation of initial conditions in a second-order circuit. Transient state in a first-order circuit with a constant supply. Transient state in a first-order circuit with a sinusoidal supply. Transient state in a second-order circuit with a constant supply. Analysis of converter operation.		
Prerequisites and co-requisites	Knowledge of electrical circuits in the first degree level course in electrical engineering.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	55.0%	70.0%
	Completion of laboratory tasks1	60.0%	30.0%
Recommended reading	Basic literature	1. Bolkowski S.: Teoria obwodów elektrycznych. WNT Warszawa 2012. 2. Osiowski J., Szabatin J.: Podstawy teorii obwodów elektrycznych. WNT Warszawa 1998. 3. Zimny P., Karwowski K.: Spice klucz do elektrotechniki. Wydawnictwo Politechniki Gdańskiej. Gdańsk 2001. 4. Król A., Moczko J.: PSpice - Symulacja i optymalizacja układów elektronicznych. Wyd. Nakom. Poznań 2000. 5. Dobrowolski A.: Pod maską SPICE'a. Metody i algorytmy analizy układów elektronicznych. Wydawnictwo BTC. Warszawa 2004. 6. Wojtuszkiewicz K., Zachara Z.: PSpice. Przykłady praktyczne. Wyd. Mikom, Listopad 2000.	
	Supplementary literature	1. Chua L.O., Pen-Min Lin: Komputerowa analiza układów elektronicznych. WNT Warszawa 1981. 2. Izydorczyk J.: PSpice. Komputerowa symulacja układów elektronicznych. Wydawnictwo Helion. Warszawa 1993. 3. Porębski J., Korohoda P.: Spice. Program analizy nieliniowej układów elektronicznych. WNT Warszawa 1994.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. For a given electric circuit, calculate the initial conditions for a second-order differential equation. 2. For a given circuit, calculate the initial conditions for an operator equivalent circuit. 3. Calculate the transient state in a first-order circuit using the Laplace transform of the differential equation. 4. Calculate the transient state in a first-order circuit using the Laplace equivalent circuit. 5. Calculate the transient state in a second-order circuit. 6. Calculate the transient state using Thevenin's theorem. 7. Calculate the transient state using Norton's theorem.		
Practical activities within the subject	Not applicable		

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