



Subject card

Subject name and code	Fundamentals of electrical engineering and electronics, PG_00055878						
Field of study	Power Engineering						
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 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	2	ECTS credits			7.0		
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 inż. Adam Młyński					
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	15.0	0.0	0.0	75
	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	75	13.0	87.0	175		
Subject objectives	Defining basic concepts in electricity. Acquainting with the basic laws of electrics. Acquainting with the methods of analysis of electric circuits and the phenomena occurring in them.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W05] has structured knowledge in the field of electrical engineering and electronics, necessary to understand the basics of operation and selection of electrical machines, electricity transmission systems and power electronic devices	calculates parameters of equivalent circuits for elements of the power system			[SW3] Assessment of knowledge contained in written work and projects		
	[K6_K02] is able to work in a group taking different roles in it, can think and act in an entrepreneurial way, is aware of responsibility for their own work and responsibility for teamwork	recognizes the potential exposures and hazards occurring in electrical systems			[SK5] Assessment of ability to solve problems that arise in practice		
	[K6_W03] knows the basics of automation and automatic regulation, knows the principles of the selection of electrical devices, drive systems and their control	solves simple linear DC circuits; solves simple linear 1-phase and 3-phase sinusoidal current circuits			[SW3] Assessment of knowledge contained in written work and projects		

Subject contents	<p>Course content – lecture</p> <p>Electric field intensity and electric potential, electric capacity, resistance of a conductor, magnetic field intensity and magnetic induction, inductance, electromagnetic induction. Linear DC circuits: electric circuit components, energy and power of electric current, Kirchhoffs laws, superposition, Thevenins theorem. Nonlinear DC circuits: linearity and nonlinearity of elements and circuits, methods of analysis, iterative methods, linearization, basics of semiconductor elements operation, basic electronic components, simple electronic circuits. AC circuits: ideal R, L, C components in the AC circuit, phasor solution, complex impedance, complex Kirchhoffs laws, phasor diagrams, active, reactive and complex power, complex Thevenin theorem, symmetrical 3-phase circuits, circuits with magnetic coupling, transformer. Transients in linear circuits: classical method of transient state analysis, transient and steady state components, initial conditions, circuits described by a differential equation of 1st and 2nd order.</p>			
	<p>Course content – exercises</p> <p>Flat capacitor, circuits with capacitances. Linear DC circuits: Kirchhoff's laws, superposition principle, Thevenin's theorem. Nonlinear DC circuits: analysis methods, iterative methods, linearization. Sinusoidal current circuits, phasor method, complex impedance, Kirchhoff's laws in complex form, phasor diagrams, Thevenin's theorem in complex form, symmetrical three-phase circuits, resonance, magnetically coupled circuits, transformer.</p>			
	<p>Course content – laboratory</p> <ol style="list-style-type: none"> 1. Linear DC Circuits 2. Nonlinear DC Circuits 3. Single-Phase AC Circuits 4. Three-Phase Circuits 5. Circuits with Operational Amplifiers 6. Resonant Circuits 			
Prerequisites and co-requisites				
Assessment methods and criteria	Subject passing criteria		Passing threshold	Percentage of the final grade
	Written exam		55.0%	70.0%
	Tests during the semester		55.0%	30.0%
Recommended reading	Basic literature		Ceraolo M., Poli D.: Fundamentals of Electric Power Engineering: From Electromagnetics to Power Systems, Wiley-IEEE Press 2014	
			Alexander C., Sadiku M.: Fundamentals of Electric Circuits, McGraw-Hill	
	Supplementary literature		Hayt W., Kemmerly J., Phillips J., Durbin S.: Engineering Circuit Analysis, McGraw-Hill 2019	
	eResources addresses			
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Calculate the currents in DC circuit. 2. Calculate the currents in AC circuit. 3. Calculate the resonant frequency of circuit. 4. Calculate the resonant frequency of the circuit. 5. Calculate current and power in given symmetrical three-phase circuit with star-connected load. 6. Calculate current and power in given symmetrical three-phase circuit with delta-connected load. 7. Calculate current and power in given three-phase four-wire circuit with asymmetrical star-connected load. 8. Calculate current and power in given three-phase three-wire circuit with asymmetrical star-connected load. 9. Calculate current and power in given three-phase three-wire circuit with asymmetrical delta-connected load. 			
Practical activities within the subject	Not applicable			

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