



Subject card

Subject name and code	The fundamentals of electrotechnics 2, PG_00042012						
Field of study	Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2021/2022		
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	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			3.0		
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 Adresy na platformie eNauczenie:						
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	3.0	42.0	75		
Subject objectives	Characteristics of three-phase unbalanced systems, familiarization with power measurement methods in symmetrical and unbalanced 3-phase systems, methods of analysis of nonlinear circuits, familiarization with basic electronic components and systems, analysis of transient circuits, analysis of circuits powered by periodic non-sinusoidal voltages.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_K02		can work in a team that compiles and connects the elements of an electric circuit, measures electrical quantities, prepares reports and protocols on measurements		[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills [SK3] Assessment of ability to organize work		
	K6_W03		is able to analyze electrical circuits in dynamic states, describes circuits with differential equations, solves transient circuits described by first and second order equations, knows and understands the principle of operation of basic electronic components, analyzes non-linear circuits with electronic elements		[SW3] Assessment of knowledge contained in written work and projects		
	K6_W05		defines a three-phase circuit, determines symmetry conditions, solves simple three-phase circuits, analyzes the consequences of asymmetry of a three-phase circuit, recognizes systems for measuring active and reactive power in three-phase circuits, solving simple circuits with periodic non-sinusoidal supply		[SW3] Assessment of knowledge contained in written work and projects		

Subject contents	Three-phase circuits: unbalanced systems, power measurements in three-phase systems. Nonlinear DC circuits: linearity and non-linearity of elements and circuits, methods of analysis, iterative methods, linearization, basics of semiconductor elements operation, basic electronic components, simple electronic circuits. Transients in linear circuits: classical method of transient state analysis, forced and free components, initial conditions, circuits described by a differential equation of the first and second order. Circuits powered by periodic non-sinusoidal voltages: Fourier series, application of the superposition method, power of non-sinusoidal currents		
Prerequisites and co-requisites	Knowledge of the DC circuits theory and the theory of single-phase and three-phase symmetrical circuits		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	55.0%	70.0%
	Midterm colloquium	55.0%	30.0%
Recommended reading	Basic literature	Bolkowski S.: Elektrotechnika teoretyczna. Vol 1. Teoria obwodów elektrycznych. WNT, Warszawa 2001 Krakowski M.: Elektrotechnika teoretyczna. Tom 1. PWN, Warszawa 1999	
	Supplementary literature	Cholewicki T.: Elektrotechnika teoretyczna. Vol 1 i 2. WNT, Warszawa 1972	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Calculate current and power in given symmetrical three-phase circuit with star-connected load. 2. Calculate current and power in given symmetrical three-phase circuit with delta-connected load. 3. Calculate current and power in given three-phase four-wire circuit with asymmetrical star-connected load. 4. Calculate current and power in given three-phase three-wire circuit with asymmetrical star-connected load. 5. Calculate current and power in given three-phase three-wire circuit with asymmetrical delta-connected load. 6. Calculate currents and voltages in the transient state of the circuit described by first-order differential equation. 7. Calculate currents and voltages in the transient state of the circuit described by second-order differential equation. 8. Calculate current in a simple circuit with periodic non-sinusoidal supply. 		
Work placement	Not applicable		