



Subject card

Subject name and code	Quality of Electric Energy , PG_00016901						
Field of study	Electrical Engineering						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2023/2024		
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	2	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Power Electronics and Electrical Machines -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jarosław Łuszcz					
	Teachers	dr hab. inż. Jarosław Łuszcz					
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	4.0	41.0	75		
Subject objectives	Power Quality assessment skills Power quality measurements skills						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K7_U08	the the student has the ability to assess the power quality			[SU2] Assessment of ability to analyse information		
	K7_W02	the student has the systematized knowledge in the field of electricity quality issues			[SW3] Assessment of knowledge contained in written work and projects		
	K7_U05	the student has the ability to measure the power quality and evaluate the results			[SU1] Assessment of task fulfilment		
	K7_K02	the student is aware of the effects of poor energy quality			[SK5] Assessment of ability to solve problems that arise in practice		
Subject contents	Methods of power quality indices defining. Sources of harmonics and inter-harmonics in power system. Influence of power electronics converters on power quality. Methods of power quality improvement - passive and active filtering. Simulation analysis of non-linear load on voltage quality. Analysis of exemplary power quality long-term-recording data.						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria	Passing threshold			Percentage of the final grade		
	Analysis and test report	50.0%			25.0%		
	Midterm colloquium	50.0%			25.0%		
	Semester/diploma dissertation	50.0%			50.0%		

Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Kowalski Z.: Jakość energii elektrycznej. Wyd. Politechniki Łódzkiej 2007. 2. Strzelecki R., Benysek G.: Power Electronics in Smart Electrical Energy Networks. Springer 2008. 3. Strzelecki R., Supronowicz H.: Współczynnik mocy w systemach zasilania prądu przemiennego i metody jego poprawy. Wyd. Politechniki Warszawskiej 2007. 4. A. Kempki: Elektromagnetyczne zaburzenia przewodzone w układach napędów przekształtnikowych. Oficyna Wydawnicza Uniwersytetu Zielonogórskiego 2005. 5. R. Smoleński: Conducted Electromagnetic Interference (EMI) in Smart Grids. Springer 2012. 6. Gregorio Romero Rey and Luisa Martinez Muneta (Ed.) Power Quality Harmonics Analysis and Real Measurements Data . , Croatia : InTech, 2011. 7. Ahmed Zobaa, Mario Manana Canteli and Ramesh Bansal: Power Quality Monitoring, Analysis and Enhancement. InTech 2011.
	Supplementary literature	<ol style="list-style-type: none"> 1. Baggini A.: Handbook of Power Quality. John Wiley & Sons 2008. 2. Benysek G.: Improvement in the Quality of Delivery of Electrical Energy using Power Electronics Systems. Springer 2007. 3. Hanzelka Z., Bień A.: Power quality application guide : harmonics, interharmonics. European Copper Institute, Brussels 2004.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Analysis of long term record of power quality indices	
Work placement	Not applicable	