



## Subject card

Subject name and code	Quality of Electric Energy (PQ I), PG_00036792						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2023/2024		
Education level	first-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	6		ECTS credits		4.0		
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						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	0.0	60
	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	60		5.0		35.0	100
Subject objectives	Presentation of the issues related to the quality of electricity in an industrial environment.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_U09		The student is able to select power equipment for various load modes.		[SU1] Assessment of task fulfilment		
	K6_W10		The student knows the principles of processing, use and rational use of electrical energy		[SW1] Assessment of factual knowledge		
	K6_K01		Knowledge of sources of specialist knowledge extending the scope of the course content.		[SK5] Assessment of ability to solve problems that arise in practice		
	K6_K05		He can organize work in accordance with the principles of safety rules.		[SK3] Assessment of ability to organize work		
Subject contents	Power quality indices. Standardization requirements. Reasons for the degradation of energy quality. Sources of harmonic distortions. The effects of poor energy quality.						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Task realisation		60.0%		100.0%		

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