



## Subject card

Subject name and code	Advanced Power Systems, PG_00069140						
Field of study	Electrical Engineering, Automation, Robotics and Control Systems						
Date of commencement of studies	February 2025		Academic year of realisation of subject		2025/2026		
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 -> Wydział Politechniki Gdańskiej						
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	15.0	0.0	15.0	15.0	0.0	45
	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	45		5.0		25.0	75
Subject objectives	Transfer of knowledge about innovative technologies used in power supply systems for electrical devices and control systems.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_K06] is aware of the impact of engineering activities on the quality of applied solutions and the environment		assesses the impact of poor energy quality on the electromagnetic environment		[SK5] Assessment of ability to solve problems that arise in practice		
	[K7_W02] has a structured knowledge of the application of information systems to improve the reliability, efficiency, speed and mobility of control and management systems		applies systematic knowledge in the field of electric power quality issues		[SW1] Assessment of factual knowledge		
	[K7_W06] has an extended knowledge of the design of automation components and devices, control and decision support systems control and decision support systems and complex mechatronic systems		applies systematic knowledge in the field of power quality issues for devices		[SW1] Assessment of factual knowledge		

Subject contents	<p>Lecture:</p> <p>Introduction to power quality. AC and DC power grids. Device interference and power quality problems. Impact of power quality on devices and control systems. Power quality improvement methods. Power quality monitoring and analysis. Uninterruptible power supply and battery backup systems. Power supply for critical infrastructure and autonomous systems. Integration of renewable energy sources and smart grids. Innovative power supply technologies: energy from the environment and wireless transfer.</p> <p>Laboratory:</p> <p>Real-time measurements of power quality. Analysis of recorded power quality parameters. Study of harmonic distortions generated by devices. Study of harmonic distortions generated by power electronic converters. Study of the effectiveness of selected methods of improving the power quality of devices Study of uninterruptible power supply systems.</p> <p>Project:</p> <p>Literature study in the field of modern power supply systems.</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Semester project report	50.0%	50.0%
	Laboratory reports	50.0%	25.0%
	Active participation in classes	50.0%	25.0%
Recommended reading	Basic literature	Hanzelka, Zbigniew, Jakość dostawy energii elektrycznej: zaburzenia wartości skutecznej napięcia. Komitet Elektrotechniki Polskiej Akademii Nauk. Kraków: Wydawnictwa AGH, 2013.	
		Wasiak, Irena; Pawelek, Ryszard. <i>Jakość zasilania w sieciach z generacją rozproszoną</i> . Red. . Warszawa: Wydawnictwo Naukowe PWN, 2015, ISBN 978-83-01-18945-7	
	Supplementary literature	R. C. Dugan, M. F. McGranaghan, S. Santoso, H. W. Beaty 2012: Electrical Power Systems Quality, 3th edition, The McGraw-Hill Companies, Inc., NY, USA, 2012, ISBN 978-0071761550.	
		Baggini, A.B. Handbook of Power Quality; Wiley Online Library: Hoboken, NJ, USA, 2008; ISBN 9780470065617.	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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