



## Subject card

Subject name and code	Guaranteed Supply Systems, PG_00057703						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2022/2023		
Education level	second-cycle studies	Subject group					
Mode of study	Part-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						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	0.0	10.0	0.0	0.0	20
	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	20		5.0		50.0	75
Subject objectives	Explanation of problems related to powering electrical devices in conditions of insufficient quality of electricity and presentation of modern technical solutions preventing the effects of improper power supply.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K7_W01	Orderly knowledge in the field of the quality of powering electrical devices.			[SW1] Assessment of factual knowledge		
	K7_W02	Understanding the basic problems of the quality of electricity affecting the correct operation of electrical devices.			[SW1] Assessment of factual knowledge		
	K7_U03	Ability to use available literature sources and to solve problems related to powering electrical devices.			[SU2] Assessment of ability to analyse information		
	K7_U02	Ability to present research results.			[SU5] Assessment of ability to present the results of task		
Subject contents	Basic parameters of power quality, quality and continuity of AC and DC power supply. The quality of voltage in the public grid, the causes and effects of poor power quality. Powered systems with increased reliability and power quality. Technical requirements for uninterruptible power supply systems (UPS). Automatic reserve switching systems (ATS). Power generators and dynamic systems. Overview of technologies used in uninterruptible power supplies (UPS). Uninterruptible power supplies (UPS), power generators and ATS systems as elements of the SZG. Redundancy in uninterruptible power systems. Modern and traditional energy storage used in UPS. Modern technical solutions used in UPS. Elements of designing uninterruptible power supply systems.						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Task realisation		60.0%		50.0%		
	Reports on activities		60.0%		50.0%		

Recommended reading	Basic literature	PN-EN 62040-3 Systemy bezprzerwowego zasilania (UPS)  Sutkowski T. Rezerwowe i bezprzerwowe zasilanie w energię elektryczną, urządzenia i układy. COSiW 2009. Wiatr J., Miegoń M. Zasilacze UPS oraz baterie akumulatorów w układzie zasilania gwarantowanego. DW MEDIUM 2008 Julian Wiatr: Zespoły prądowórcze w układach awaryjnego zasilania obiektów budowlanych. Zeszyty dla elektryków - nr 3 Iwan K., Musznicki P., Guziński J., Łuszcz J. Podstawy energoelektroniki. Laboratorium, Biblioteka Cyfrowa PG, ISBN 978-83-7348-398-9 , Rok wydania: 2011
	Supplementary literature	Emadi A., Nasiri A., Bekiarov S. Uninterruptible Power Supplies. CRC Press 2004. Knight W., King A. Uninterruptible Power Supplies. MCGRAW HILL BOOK 2002 Platts J., Aubyn J., Uninterruptible Power Supplies. IET 1992
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Rules for the selection of uninterruptible power supplies to the requirements of powered devices.  Principles of cooperation of emergency power supplies with power generators.	
Work placement	Not applicable	