



## Subject card

Subject name and code	High-Voltage Technologies, PG_00038376						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2023		Academic year of realisation of subject		2023/2024		
Education level	second-cycle studies		Subject group		Optional 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		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Katedra Elektrotechniki i Inżynierii Wysokich Napięć -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Piotr Leśniak				
	Teachers		dr inż. Piotr Leśniak				
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		25.0	50
Subject objectives	The aim of the course is to educate highly qualified specialists with knowledge in the construction and operation of high - voltage devices: electrical, electromechanical, power and power electronics, as well as those havingskills in conducting research on these devices.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K7_U03		- students can obtain necessary information based on the literature, - students can critically evaluate available information, - students can formulate conclusions, - students can indicate other directions for gaining information and expanding their knowledge.		[SU2] Assessment of ability to analyse information		
	K7_W11		- the student knows the types of devices: electrical, electromechanical, electricity and power electronics, - the student knows the rules for selecting the above. devices within their scope operation, - the student knows technology high voltage and can indicate their possibilities use.		[SW2] Assessment of knowledge contained in presentation		
Subject contents	Lecture:1. Comprehensive monitoring of the operation of the HV power line. Carrying out live work.2. Methods of locating damage to MV cable lines. Lightning arresters and surge arresters.3. Plasma technologies. Modern methods of ozone production.4. The use of superconductors in high voltage technology.5. Comparative analysis of the possibilities of transmitting electricity using AC and DC current.6. The impact of increasing the load capacity of a long-term HV power line on its operational parameters. GIS and enclosed switchboards with air insulation.Lab:1. Measurement and analysis of voltage distribution on insulators at alternating voltage.2. Study of the influence of temperature variability on the conduction characteristics of the semiconductor structure of the varistor.3. Measurements of the variability of the magnetic field generated in the selected working space.4. Investigation of the phenomenon of electrical discharge and the course of partial discharges in induction transformers.						
Prerequisites and co-requisites							

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	50.0%	60.0%
	Practical exercise	60.0%	40.0%
Recommended reading	Basic literature	1. Z. Flisowski: Technika wysokich napięć, WNT Warszawa 2017.  2. Ciok Z.: Procesy łączeniowe w układach elektroenergetycznych, WNT Warszawa 1983.  3. Ciok Z., Maksymiuk J., Pochanke Z., Zdanowicz L.: Badanie urządzeń energoelektrycznych, WNT, Warszawa 1992.  4. Inżynieria wysokich napięć w elektroenergetyce, t.1 i t.2. Praca zbiorowa pod red. Hanny Mościckiej - Grzesiak. Wydawnictwo Politechniki Poznańskiej, Poznań, 1999.  5. J. Maksymiuk, Z Pochanke: Obliczenia i badania diagnostyczne aparatury rozdzielczej, WNT Warszawa 2001.  6. H. D. Stryczewska: Technologie plazmowe w energetyce i inżynierii środowiska, Wydawnictwo Politechniki Lubelskiej, Lublin 2009  7. A. Wiszniewski: Przekładniki w elektroenergetyce, WNT Warszawa 1992.  8. Kamińska - Benmechernene A.: Wytwarzanie i modelowanie plazmy w plazmotronach łukowych, Wydawnictwo Politechniki Poznańskiej, Poznań, 1998.	
	Supplementary literature	1. A. Haddad, D. Warne: Advances in high voltage engineering. Institution of Electrical Engineers 2004.  2. Z. Kołaciński: Thermodynamics of short - arc plasma. PWN Warszawa 1989.  3. Kuffel E., Zaengl W.S., Kuffel J.: High Voltage Fundamentals. Newnes 2005.	
	eResources addresses	Adresy na platformie eNauczanie: Technologie Wysokonapięciowe [Niestacjonarne 2023/24] - Moodle ID: 36133 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36133">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36133</a>	
Example issues/ example questions/ tasks being completed	1. Introduce and specify the subject of the following issues: Monitoring of power line operation and work undertension performed on them.2. Discuss the methods of locating damage to MV cable lines.3. Describe what plasma technologies are and what their applications are.4. What are the possibilities of increasing the current capacity of modern power lines?5. Discuss contemporary development trends in superconductors in the power industry.6. What is the electromagnetic compatibility of HV devices used in testing and measurement technology?		
Work placement	Not applicable		