



Subject card

Subject name and code	High-Voltage Technologies, PG_00038376						
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			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	Department of Mechatronics and High Voltage Engineering -> 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						
Technologie Wysokonapięciowe [Niestacjonarne 2022/23] - Moodle ID: 28546 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28546							
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 teaching subject is to train highly qualified specialists with expertise in the construction and operation of high-voltage electrical equipment, , as well as electrical equipment research.						
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		- students have knowledge about elements of power substations, - students have knowledge about the rules to select devices and equipment of power substations, - students have knowledge about high voltage technologies, - students can indicate potential ways of their applications.		[SW2] Assessment of knowledge contained in presentation		
Subject contents	<p>Lecture Gas insulated switchboard (GIS) and switchboard with aerial isolation. Lightning arresters and surge limiters. Current and voltage transformers - inductive, capacitive and optical . HVDC devices. Gas (SF6) and vacuum technology. High-voltage switching engineering. High-voltage marine systems. Plasma technologies.</p> <p>Laboratory</p> <ol style="list-style-type: none"> 1. Quenching of HV electrical arc. 2. The transformation of large currents by measurement current transformers. 3. Short-circuits tests of HV apparatuses. 4. High voltage effects in model of HV transmission lines. 5. Measurement of partial discharge in measure current and voltage transformers. 						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Practical exercise	60.0%	40.0%
	Written exam	50.0%	60.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Ciok Z.: Procesy łączeniowe w układach elektroenergetycznych, WNT, Warszawa, 1983. 2. Ciok Z., Maksymiuk J., Pochanke Z., Zdanowicz L.: Badanie urządzeń energoelektrycznych, WNT, Warszawa 1992. 3. Kamińska-Benmechene A.: Wytwarzanie i modelowanie plazmy w plazmotronach łukowych, Wydawnictwo Politechniki Poznańskiej, Poznań, 1998. 4. Inżynieria wysokich napięć w elektroenergetyce, t.1 i t.2. Praca zbiorowa pod red. Hanny Mościckiej-Grzesiak. Wydawnictwo Politechniki Poznańskiej, Poznań, 1999. 	
	Supplementary literature	<ol style="list-style-type: none"> 1. Haddad A., Warne D.: Advances in High Voltage Engineering. Institution of Electrical Engineers 2004. 2. Kołaciński Z.: Thermodynamics of short-arc plasma. PWN, Warszawa, 1989. 3. Kuffel E., Zaengl W.S., Kuffel J.: High Voltage Fundamentals. Newnes 2005. 4. Maksymiuk J., Pochanke Z.: Obliczenia i badania diagnostyczne aparatury rozdzielczej, WNT, Warszawa 2001. 5. Wiszniewski A.: Przekładniki w elektroenergetyce, WNT, Warszawa 1992. 	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Properties and production process of SF6 gas, the phenomenon of thermal expansion. 2 Construction of SF6 insulated switchgear. 3. The phenomenon of superconductivity, production technology and applications of superconductors. 4. Discuss the legal documents relating to the work under voltage. 5. Methods of work under voltage - discuss the development trends. 6 The use of semiconductor in HV systems – discuss the development trends. 		
Work placement	Not applicable		