GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	High Voltage Engineering, PG_00042177		
Field of study	Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2022/2023
Education level	first-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
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	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 hab. inż. Marek Olesz	
	Teachers	dr inż. Daniel Kowalak dr hab. inż. Marek Olesz dr inż. Piotr Leśniak	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	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	30	3.0	17.0	50

Subject objectives

Knowledge of the phenomena occurring in high-voltage insulation systems

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_U05	The student is able to assess the technical condition of electrical insulation in high-voltage networks	[SU4] Assessment of ability to use methods and tools
K6_W09	The student has basic skills enabling the selection of measuring equipment and safety carrying out basic measurements of high-voltage devices	[SW1] Assessment of factual knowledge

Subject contents

LECTURE Dielectrics, ionisation processes in gases, forms of dischargs, corona, impuls air strength, effect of field distribution, polarity, symmetry, dimensions, time and frequency on electric strength of gases. Compressed gases. Liquid dielectrics, electric strength, mechanisms of breakdown and applications. Solid dielectrics, mechanisms of breakdown, partial discharges, degradation, dielectric strength of composed insulation systems, surface and gliding discharges. Insulators, application, design, effect of field distribution and humidity, design of HV power cables and terminations. Lightning, basic parameters, overvoltages. Principles and methods of lightning protection, co-ordination of insulation. Principles of diagnostics of insulation. LABORATORY Measurement of AC, DC and impuls high voltages. Effect of voltage distribution on discharge form in air at AC, DC and impuls voltages. Effect of ambient conditions on electric strength of air. Insulator testing in dry conditions and under rain. Insulating oil testing. Study of wave transmission in long lines.

Prerequisites and co-requisites

knowledge of fundamentals: ordinary and partial differential equations, integral calculus, electromagnetic field theory, kinetic-molecular theory of gases, thermodynamics, atomic structure

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
	60.0%	60.0%
	60.0%	40.0%

Recommended reading

Basic literature	E. Kuffel, W.S. Zaengl and J. Kuffel, High Voltage Engineering Fundamentals. 2000.
Supplementary literature	M S Naidu and V Kamaraju, High Voltage Engineering,

	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	1. List and describe deionization processes in gases, 2. Discuss the development Townsend discharge mechanism, 3. What the Paschen law says, 4. What is the phenomenon of corona discharges, 5. Influence of polarity of the electrodes on static spark gap in gases, 6. Electrical properties electronegative gases, 7. Breakdown mechanisms of insulating liquids, 8. Discuss the gliding discharge mechanism, 9. Typical structures bushings and methods of preventing gliding discharges, 10. Discuss the structure of modern medium voltage power cables, 11. Discuss the characteristic parameters of the lightning stroke, 12. Propagation of waves voltage power lines, 13. Characterize types of lightning overvoltages in power networks, 14. Discuss the basic principles and lightning protection measures used in the power system, 15. Discuss the methods of measurement of high AC and DC voltages.	
Work placement	Not applicable	