

FACULTY OF ELECTRICAL  
ENGINEERING**SUBJECT CARD**

Name in Polish: **Systemy ochrony przeciwporażeniowej w obiektach wysokiego napięcia**  
 Name in English: **Electric shock protection systems in high-voltage installations**  
 Main field of study (if applicable): **Electrical Engineering**  
 Specialization (if applicable): **Electrical Power Engineering**  
 Level and form of studies: **2nd level, full-time**  
 Kind of subject: **optional**  
 Subject code: **ELR052411**  
 Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	30				
Number of hours of total student workload (CNPS):	60				
Form of crediting:	crediting with grade				
For group of courses mark (X) final course:					
Number of ECTS points:	2				
including number of ECTS points for practical (P) classes :					
including number of ECTS points for direct teacher-student contact (BK) classes:	1.40				

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Knowledge of the basic principles of electrical engineering
2. Basic knowledge of the construction of electrical installations
3. Basic knowledge of the construction and operation of the electrical equipment and apparatus
4. Basic ability to use the electrical quantities meters
5. Ability to think and act creatively

**SUBJECT OBJECTIVES**

- C1. Knowledge of the threats posed by the high-voltage equipment and high-voltage installations  
 C2. Knowledge of construction of electric shock protection systems in high-voltage equipment and high-voltage installations  
 C3. Knowledge of effectiveness criteria of electric shock protection systems in high-voltage installations and high-voltage equipment  
 C4. Knowledge of principles of verification of high-voltage installations

**SUBJECT LEARNING OUTCOMES***relating to knowledge:*

- PEU\_W01 Student has knowledge of the threats to human beings posed by the high-voltage equipment  
 PEU\_W02 Student has knowledge of the protective systems and protective measures used in high-voltage installations and knows the criteria of their effectiveness  
 PEU\_W03 Student has knowledge of the principles of testing of high-voltage installations and knows the principles of working on high-voltage electrical equipment

*relating to skills:**relating to social competences:*

- PEU\_K01 Student understands the need for learning and skills development

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours:
Lec 1	Legal acts for protection against electric shock in high voltage installations	2
Lec 2	The impact of electric current on human beings. Electrical accidents on high voltage - causes of hazards and their probability	2
Lec 3	General rules for the prevention of electric shock in the high-voltage objects. General electrical safety criteria	2
Lec 4	Principles for design and construction of earthing systems in high-voltage power objects. Rules for combining and separating of earthing systems	2
Lec 5	Effect of the way of grounding the neutral point in transmission and distribution lines to the electric shock hazard	2
Lec 6	Basic protection and fault protection measures used in substations	2
Lec 7	Basic protection and fault protection measures used in power lines	2
Lec 8	Measurement of earth resistance, earth voltage, prospective touch voltage and touch voltage in high-voltage installations	2
Lec 9	Protective equipment and safety signs	2
Lec 10	The principles of safe work organization on high-voltage electrical equipment	2
Lec 11	Rules for live wire work technology	2
Lec 12	Static and surge properties of earthing systems	2
Lec 13	Principles of lightning and surge protection of power lines and substations	2
Lec 14	Protection against electromagnetic fields generated by electrical power objects	2
Lec 15	Final test	2
Total hours:		<b>30</b>

TEACHING TOOLS USED
N1. Multimedia presentation
N2. Informative lecture

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT		
Evaluation <i>F - forming (during semester)</i> <i>P - concluding (at semester end)</i>	Educational effect number	Way of evaluating educational effect achievement
F1(w)	PEU_W01 PEU_W02 PEU_W03 PEU_K01	Final test
P(w)	P=F1	

PRIMARY AND SECONDARY LITERATURE
<b>PRIMARY LITERATURE:</b> [1] Jabłoński W.: Ochrona przeciwporażeniowa w urządzeniach elektroenergetycznych niskiego i wysokiego napięcia, WNT, Warszawa 2008 [2] Jabłoński W.: Zapobieganie porażeniom elektrycznym w urządzeniach elektroenergetycznych w.n., WNT, Warszawa 1992 <b>SECONDARY LITERATURE:</b> [1] Ustawa „Prawo budowlane” wraz z rozporządzeniami wykonawczymi [2] Rozporządzenie Ministra Gospodarki z dnia 28.03.2013 r. w sprawie bezpieczeństwa i higieny pracy przy urządzeniach energetycznych [3] PN-E-05115:2002 Instalacje elektroenergetyczne prądu przemiennego o napięciu wyższym od 1 kV [4] PN-EN 50341-1:2013-03 Elektroenergetyczne linie napowietrzne prądu przemiennego powyżej 1 kV. Część 1: Wymagania ogólne. Specyfikacje wspólne

SUBJECT SUPERVISOR
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