

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: **ELR042411**  
 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 EDUCATIONAL EFFECTS***relating to knowledge:*

- PEK\_W01 Student has knowledge of the threats to human beings posed by the high-voltage equipment  
 PEK\_W02 Student has knowledge of the protective systems and protective measures used in high-voltage installations and knows the criteria of their effectiveness  
 PEK\_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:*

- PEK\_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 EDUCATIONAL EFFECTS 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)	PEK_W01 PEK_W02 PEK_W03 PEK_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
Janusz Konieczny, janusz.konieczny@pwr.edu.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT  
**ELR042411 - Electric shock protection systems in high-voltage installations**  
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Electrical Engineering**  
AND SPECIALIZATION **Electrical Power Engineering**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)	Subject objectives	Programme content	Teaching tool number
PEK_W01	S2EEN_W13	C.1	Lec2 Lec3 Lec4 Lec10 Lec13 Lec14	N.1 N.2
PEK_W02	S2EEN_W13	C.2 C.3	Lec1 Lec4 Lec5 Lec6 Lec7 Lec8	N.1 N.2
PEK_W03	S2EEN_W13	C.3 C.4	Lec1 Lec8 Lec9 Lec10 Lec11 Lec12	N.1 N.2
PEK_K01	K2ETK_K01	C.1 C.2 C.3 C.4	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15	N.1 N.2