FACULTY OF ELECTRICAL ENGINEERING

SUBJECT CARD

Name in Polish:	**Systemy ochrony przed zagrożeniami prądem elektrycznym**
Name in English:	**Systems of protection against electric shock**
Main field of study (if applicable):	**Electrical Engineering**
Specialization (if applicable):	
Level and form of studies:	**1st level, full-time**
Kind of subject:	**obligatory**
Subject code:	**ELR052401**
Group of courses:	**NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	15		30		
Number of hours of total student workload (CNPS):	30		60		
Form of crediting:	crediting with grade		crediting with grade		
For group of courses mark (X) final course:					
Number of ECTS points:	1		2		
including number of ECTS points for practical (P) classes :			2		
including number of ECTS points for direct teacher-student contact (BK) classes:	0.70		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 low-voltage electrical installations
3. Basic knowledge of the construction and operation of the electrical equipment and apparatus
4. Basic ability to connect the measurement circuits
5. Basic ability to use the electrical quantities meters
6. Ability to cooperate in a team
7. Ability to think and act creatively

SUBJECT OBJECTIVES

C1. Knowledge of operation rules of electric shock protection systems used in low-voltage installations
C2. Knowledge of effectiveness criteria of electric shock protection systems in low-voltage installations
C3. Knowledge of principles of low-voltage electrical installations testing

SUBJECT LEARNING OUTCOMES

relating to knowledge:

PEU_W01	Student has knowledge of the effects of electrical current on the human body
PEU_W02	Student has knowledge of the protective systems and protective measures used in low-voltage installations as well as knowledge of criteria of effectiveness of the shock protection measures in low-voltage installation
PEU_W03	Student has knowledge of the principles of testing of low-voltage electrical installations as well as knowledge of the principles of working on low-voltage electrical equipment

relating to skills:

PEU_U01	Student is able to perform the verification measurements in low-voltage electrical installations
PEU_U02	Student is able to evaluate the results of measurements and make a report for verification

relating to social competences:

PEU_K01	Student can effectively cooperate in a team performing electrical verification tests

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours:**
Lec 1	Basic definitions and designations in protection against electric shock The impact of electric current on human beings	2
Lec 2	Classes of protection of electrical equipment Degrees of protection provided by enclosures	2
Lec 3	Low-voltage networks systems The criteria of protection against electric shock	2
Lec 4	Basic protection measures used in low-voltage installations	2
Lec 5	Fault protection measures used in low-voltage installations	2
Lec 6	Main and supplementary protective equipotential bonding; earthing	2
Lec 7	Initial and periodic verification of electrical low-voltage installations The principles of safe work organization on electrical equipment	2
Lec 8	Final test	1
	Total hours:	**15**

Form of classes - laboratory		**Number of hours:**
Lab 1	Presentation of safety rules and guidelines in the laboratory. Establish the requirements for crediting. General introduction to the stand of laboratory.	2
Lab 2	Resuscitating of persons shocked by electric current	2
Lab 3	Measurement of the resistance and the continuity of protective conductors and protective equipotential bonding conductors	2
Lab 4	Measurement of insulation resistance and electric strength test of electrical installation and electrical equipment	2
Lab 5	Examination of protection by automatic disconnection of supply with overcurrent devices - technical method for measurement of fault loop impedance	2
Lab 6	Examination of protection by automatic disconnection of supply with overcurrent devices – special meters for electrical installations	2
Lab 7	Examination of protection by automatic disconnection of supply with residual current devices	2
Lab 8	The test of potential distribution on the surface of the soil in the vicinity earthing systems	2
Lab 9	Laboratory measurement of earth electrode resistance and the resistivity of soil	2
Lab 10	Measurement of insulation resistance of floors and walls	2
Lab 11	Measurement of touch voltage	2
Lab 12	Examination of the impact of TN and TT systems parameters on the electric shock hazard	2
Lab 13	Measurements of parameters, electric shock hazard and fire hazard in IT system	2
Lab 14	Measurements of the electric field distribution on the overhead line model	2
Lab 15	Additional term Laboratory crediting	2
	Total hours:	**30**

TEACHING TOOLS USED
N1. Multimedia presentation
N2. Informative lecture
N3. Introductory, short informative lecture
N4. Basic meters of electrical quantities
N5. Special meters for electrical installations

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT		
Evaluation *F – forming (during semester)* *P – concluding (at semester end)*	**Educational effect number**	**Way of evaluating educational effect achievement**
F1(W)	PEU_W01 PEU_W02 PEU_W03	presence at the lecture
F2(W)	PEU_W01 PEU_W02 PEU_W03	final test
P(W)	P = 0,25F1+ 0,75F2	
F1(L)	PEU_U01 PEU_U02 PEU_K01	activity in the laboratory
F2(L)	PEU_U01 PEU_U02	report
P(L)	P = 0,25F1+ 0,75F2	

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Markiewicz H.: Bezpieczeństwo w elektroenergetyce: zagadnienia wybrane. WNT, Warszawa 2009

SECONDARY LITERATURE:

[1] PN-IEC 60364 Instalacje elektryczne w obiektach budowlanych (norma wieloarkuszowa)
[2] PN-HD 60364 Instalacje elektryczne niskiego napięcia (norma wieloarkuszowa)
[3] Ustawa „Prawo budowlane” wraz z rozporządzeniami wykonawczymi

SUBJECT SUPERVISOR

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