

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Miernictwo wysokonapięciowe i diagnostyka izolacji**
 Name in English: **High Voltage Measurement and diagnostics of insulation**
 Main field of study (if applicable): **Electrical Engineering**
 Specialization (if applicable): **Industrial Electrical Engineering**
 Level and form of studies: **2nd level, full-time**
 Kind of subject: **obligatory**
 Subject code: **ELR041103**
 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. Basic knowledge of high-voltage technique and electrical metrology

SUBJECT OBJECTIVES

- C1. Gaining theoretical knowledge in the range of high-voltage metrology
 C2. Gaining theoretical knowledge in the range of selected diagnostic test methods of materials and high voltage insulation systems

SUBJECT EDUCATIONAL EFFECTS*relating to knowledge:*

- PEK_W01 The Student has specialized knowledge on measurement of high voltages and currents in high voltage circuits.
 PEK_W02 The Student has specialized knowledge on of partial discharge measurement in high voltage circuits
 PEK_W03 The Student has specialized knowledge of the various diagnostic test methods high voltage insulation

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

- PEK_K01 The Student will gain knowledge about any risks to personnel and equipment

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours:
Lec 1	Introduction to high voltage measurement technology. Technical standard PN / IEC 60060-1,2.	2
Lec 2	Direct measurement methods of high voltage.	2
Lec 3	Measurement of high DC voltage. High voltage divider, cooperation of capacitance voltage divider with measurement transformer.	2
Lec 4	Measurements of surge voltage.	2
Lec 5	Measurement methods of peak voltage value.	2
Lec 6	Measurement methods of surge currents.	2
Lec 7	Partial discharges measurement systems - measurement of apparent charge, calibration of apparent charge measurement systems.	2
Lec 8	Elaboration of high voltage tests results.	2
Lec 9	Aims and diagnostic test methods of high voltage electrical equipment.	2
Lec 10	Voltage tests of insulation, test systems.	2
Lec 11	Measurements of partial discharges in tests diagnostic of high voltage insulation - acoustic tests, the location of partial discharges.	2
Lec 12	Diagnosis of high voltage overhead insulation.	2
Lec 13	Tests of the resistance indicators of insulation and dielectric loss characteristics	2
Lec 14	Diagnostic tests of the power transformers - the physicochemical study of power transformer insulation oil.	2
Lec 15	Diagnosis of high voltage surge protection devices. Test.	2
Total hours:		30

TEACHING TOOLS USED
N1. Lectures with presentation.
N2. Individual learning

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation <i>F – forming (during semester) 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	Grading final test.
P(w)	P=F1	

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: E.Kuffel, W.S. Zaengel, J. Kuffel: High Voltage Engineering Fundaments, Elsevier, 2000
SECONDARY LITERATURE:

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
ELR041103 - High Voltage Measurement and diagnostics of insulation
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Electrical Engineering**
AND SPECIALIZATION **Industrial Electrical 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	S2ETP_W04	C.1	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec8	N.1 N.2
PEK_W02	S2ETP_W04	C.1	Lec7 Lec8 Lec11	N.1 N.2
PEK_W03	S2ETP_W04	C.2	Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15	N.1 N.2
PEK_K01	K2ETK_K03 K2ETK_K06	C.1 C.2	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15	N.1 N.2