

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Energoszczędne technologie w przemyśle**
 Name in English: **Energy-saving technologies in industry**
 Main field of study (if applicable): **Electrical Engineering**
 Specialization (if applicable):
 Level and form of studies: **1st level, part-time**
 Kind of subject: **optional**
 Subject code: **ELR041267**
 Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	20		10		
Number of hours of total student workload (CNPS):	54		27		
Form of crediting:	crediting with grade		crediting with grade		
For group of courses mark (X) final course:					
Number of ECTS points:	2		1		
including number of ECTS points for practical (P) classes :			1		
including number of ECTS points for direct teacher-student contact (BK) classes:	1.40		0.70		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Student has knowledge on fundamental properties of materials for electrical engineering
2. Student has a general knowledge of laws and properties of electromagnetic field

SUBJECT OBJECTIVES

- C1. Acquisition of knowledge on basic technological processes applied in industry, using mainly the strong DC electric fields.
 C2. Experimental verification of physical laws in a range of chosen electrostatic phenomena and technological processes
 C3. Consolidation of traditional academic values

SUBJECT EDUCATIONAL EFFECTS*relating to knowledge:*

- PEK_W01 Student has knowledge in the area of physical processes used in chosen energy-saving industrial technologies
 PEK_W02 Student has knowledge of energy-saving technologies in industry and knows applications of phenomena appearing in the constant and low frequency electric fields used in consumer devices

relating to skills:

- PEK_U01 Student has ability of carrying out measurements in electrostatics
 PEK_U02 Student has ability of experimental results analysis and their proper interpretation

relating to social competences:

- PEK_K01 Student is able to think independently and creatively

PROGRAMME CONTENT

Form of classes - lecture		Number of hours:
Lec 1	Introduction, Description of lectures program, literature, requirements of crediting. Electric field - idea and definition	2
Lec 2	Electrostatic precipitation	2
Lec 3	Electrostatic painting	2
Lec 4	Electrostatic spraying	2
Lec 5	Electrostatic separation	2
Lec 6	Electrostatic powder coating	2
Lec 7	Electrostatic separation	2
Lec 8	Electro-spinning	2
Lec 9	Electrets - idea, technology, application	2
Lec 10	Final test	2
Total hours:		20

Form of classes - laboratory		Number of hours:
Lab 1	Experimental studies of the basic rules in electrostatics	2
Lab 2	Investigation of electrification process of materials	2
Lab 3	Investigation of electrification process of liquid droplets	2
Lab 4	Investigation of charge decay characteristics for solid dielectrics	2
Lab 5	Correction and supplementing class. Crediting	2
Total hours:		10

TEACHING TOOLS USED

- N1. Traditional lecture using a multimedia presentation
- N2. Consultations
- N3. Laboratory classes in student groups
- N4. Student's own work

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_K01	Test
P(W)	P=F1	
F1(L)	PEK_U01 PEK_U02 PEK_K01	Checking and evaluation of students preparation for the laboratory
F2(L)	PEK_U01 PEK_U02 PEK_K01	Laboratory reports evaluation
P(L)	P=0.5F1+0.5F2	

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] A. Gajewski, Procesy i technologie elektrostatyczne, PWN, Warszawa-Kraków, 2000.
- [2] B. Hilczer, J. Małecki, Elektrety i piezopolimery, PWN, Warszawa, 1992.
- [3] J. Lutyński, Elektrostatyczne odpylanie gazów, WNT, Warszawa, 1965.
- [4] J. Simoroda, J. Staroba, Elektryczność statyczna w przemyśle, WNT, Warszawa, 1965.
- [5] A. D. Moore (Ed.), Electrostatics and its application, J. Wiley & Sons, New York, 1973.
- [6] G. Luttigens, M. Glor, Understanding and controlling Static Electricity, Springer Ver., 1989.

SECONDARY LITERATURE:

Current publications and standards connected with electrostatics.

SUBJECT SUPERVISOR

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
ELR041267 - Energy-saving technologies in industry
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **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	K1ETK_ETP_W05	C.1	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9	N.1 N.2 N.4
PEK_W02	K1ETK_ETP_W05	C.1	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9	N.1 N.2 N.4
PEK_U01	K1ETK_ETP_U03	C.2	Lab2 Lab3 Lab4	N.2 N.3 N.4
PEK_U02	K1ETK_ETP_U03	C.2	Lab2 Lab3 Lab4	N.2 N.3 N.4
PEK_K01	K1ETK_K06	C.3	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lab1 Lab2 Lab3 Lab4 Lab5	N.1 N.2 N.3 N.4