

FACULTY OF ELECTRICAL  
ENGINEERING**SUBJECT CARD**

Name in Polish: **Maszyny elektryczne 1**  
 Name in English: **Electrical Machines 1**  
 Main field of study (if applicable): **Electrical Engineering**  
 Specialization (if applicable):  
 Level and form of studies: **1st level, part-time**  
 Kind of subject: **obligatory**  
 Subject code: **ELR043162**  
 Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	20				
Number of hours of total student workload (CNPS):	108				
Form of crediting:	crediting with grade				
For group of courses mark (X) final course:					
Number of ECTS points:	4				
including number of ECTS points for practical (P) classes :					
including number of ECTS points for direct teacher-student contact (BK) classes:	2.80				

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

1. Student knows and understands basic principles of electrical circuits, computation methods in linear AC electrical circuits.
2. Students knows basic principles of electromagnetic field.
3. Student is able to analyze linear AC electrical circuits in steady state.
4. Student is able to assess physical quantities.
5. Student is aware of significance engineer work effects, its influence on the environment, and responsibility of decision making.
6. Student is aware of their own responsibility for their work and a willingness to comply with the principles of technical university graduate.

**SUBJECT OBJECTIVES**

- C1. Basic knowledge about physical phenomena during electrical energy transformation.  
 C2. Knowledge about physical principles, construction, parameters, properties and characteristics of transformers.  
 C3. Knowledge about physical principles, construction, parameters, properties and characteristics of induction machines.  
 C4. Knowledge about construction of synchronous machines.

**SUBJECT EDUCATIONAL EFFECTS***relating to knowledge:*

- PEK\_W01 Students knows principles during electrical energy transformation (power loss, heating and cooling) Students has knowledge about construction, parameters, properties and characteristics of transformers.  
 PEK\_W02 Student has knowledge about generation and formation of magnetic field in magnetic circuit of electrical machines. PEK\_W04 Students has knowledge about construction, parameters, properties and characteristics of induction motors.  
 PEK\_W03 Students has knowledge about construction of synchronous machines.

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

- PEK\_K01 Student is able to identify and solve problems of engineering.

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours:
Lec 1	Introduction. Literature. Basic principles of electrical engineering.	1
Lec 2	Basic constructions, principles and phenomena during electrical energy transformation.	1
Lec 3	Transformers: phenomena, constructions, work principles, basic properties and characteristics (idle-running, short-circuit state, load state), equivalent circuit.	2
Lec 4	Three-phase transformers, construction, group connection, parallel work, voltage regulation, current and voltage transformers.	2
Lec 5	Magnetic fields in electrical machines: types of field, field generation, magnetic circuits, excitation winding.	1
Lec 6	Induction machines: construction, equivalent circuit, electromagnetic torque.	2
Lec 7	Induction machines: characteristic, rated parameters, motor and generator work state.	2
Lec 8	Single-phase motors: construction, properties, characteristics i rated parameters	1
Lec 9	Induction machines: phenomena during starting, speed regulation and braking.	3
Lec 10	Induction voltage regulator and phase shifter, electrical shaft.	1
Lec 11	Synchronous motors: construction, motor and generator work state.	1
Lec 12	Synchronous generators: MMF (excitation, leakage flux), magnetic field formation, equivalent circuit.	2
Lec 13	Grading	1
Total hours:		<b>20</b>

TEACHING TOOLS USED
N1. Lecture with multimedia presentation.

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	writing and oral tests
P(w)	P=F1	

PRIMARY AND SECONDARY LITERATURE
<b>PRIMARY LITERATURE:</b> [1] Plamitzer A., Maszyny elektryczne, WNT, Warszawa 1989 [2] Latek W: Zarys maszyn elektrycznych. WNT W-wa 1974 r. <b>SECONDARY LITERATURE:</b> [1] Dąbrowski M. Projektowanie maszyn prądu przemiennego, WNT Warszawa 1994 [2] Dąbrowski M. Konstrukcja maszyn elektrycznych, WNT W-wa 1978 [3] Jezierski E.: Transformatory WNT Wa-wa 1983 r. [4] Latek W.: Maszyny elektryczne w pytaniach i odpowiedziach. WNT Wa-wa 1978 r. [5] Bajorek Z.: Maszyny elektryczne. WNT 1976 r. [6] Zawilak J., Uzwojenia przełączalne maszyn elektrycznych prądu przemiennego, Wyd. PWr. Wrocław 1986

SUBJECT SUPERVISOR
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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT  
**ELR043162 - Electrical Machines 1**  
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_W30	C.1 C.2	Lec1 Lec2 Lec3 Lec4	N.1
PEK_W02	K1ETK_W30	C.1 C.3 C.4	Lec5 Lec6 Lec7 Lec8 Lec9	N.1
PEK_W03	K1ETK_W30	C.1 C.4	Lec10 Lec11 Lec12	N.1
PEK_K01	K1ETK_K08	C.2 C.3	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec13	N.1