

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, full-time**
 Kind of subject: **obligatory**
 Subject code: **ELR053102**
 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. 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 physical principles, construction, parameters, properties and characteristics of synchronous machines.

SUBJECT LEARNING OUTCOMES*relating to knowledge:*

- PEU_W01 Students knows principles during electrical energy transformation (power loss, heating and cooling) Students has knowledge about construction, parameters, properties and characteristics of transformers.
 PEU_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.
 PEU_W03 Students has knowledge about construction of synchronous machines.

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

- PEU_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.	2
Lec 3	Transformers: phenomena, constructions, work principles, basic properties and characteristics (idle-running, short-circuit state, load state), equivalent circuit	3
Lec 4	Three-phase transformers, construction, group connection, parallel work, voltage regulation, current and voltage transformers.	3
Lec 5	Magnetic fields in electrical machines: types of field, field generation, magnetic circuits, excitation winding.	3
Lec 6	Induction machines: construction, equivalent circuit, electromagnetic circuit.	3
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.	4
Lec 10	Induction voltage regulator and phase shifter, electrical shaft.	3
Lec 11	Synchronous motors: construction, motor and generator work state.	2
Lec 12	Synchronous generators: MMF (excitation, leakage flux), magnetic field formation, equivalent circuit.	2
Lec 13	Grading.	1
Total hours:		30

TEACHING TOOLS USED
N1. Lecture with multimedia presentation.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT		
Evaluation <i>F - forming (during semester) P - concluding (at semester end)</i>	Educational effect number	Way of evaluating educational effect achievement
F1(w)	PEU_W01 PEU_W02 PEU_W03 PEU_K01	writing and oral tests
P(w)	P=F1	

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: [1] Plamitzer A., Maszyny elektryczne, WNT, Warszawa 1989 [2] Latek W: Zarys maszyn elektrycznych. WNT W-wa 1974 r. SECONDARY LITERATURE: [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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