

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Maszyny elektryczne 2**
 Name in English: **Electrical machines 2**
 Main field of study (if applicable): **Industrial Control Engineering**
 Specialization (if applicable):
 Level and form of studies: **1st level, full-time**
 Kind of subject: **obligatory**
 Subject code: **APR013103**
 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 :			2		
including number of ECTS points for direct teacher-student contact (BK) classes:			1.40		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Students knows principles during electrical energy transformation (power loss, heating and cooling).
2. Students has knowledge about construction, parameters, properties and characteristics of transformers, induction machines and DC machines.
3. Students has knowledge about magnetic fields in electrical machines.
4. Student is able to recognize of electrical machines :transformers, AC machines (induction machines and synchronous machines).
5. Student is able to explain principles of operation of transformers and induction and synchronous machines.
6. Student is able to explain characteristics and properties of transformers and induction and synchronous machines.
7. Student is able to explain principles of operation, phenomena, characteristics and properties of shunt, series and compound DC machines.

SUBJECT OBJECTIVES

- C1. To familiarize the students with basic knowledge about physical phenomena in transformers and AC and DC electrical machines, their parameters, properties and characteristics.
- C2. To skill the students with measurement techniques to determine characteristics and parameters of transformers
- C3. To skill the students with measurement techniques to determine characteristics and parameters of induction and synchronous machines
- C4. To skill the students with measurement techniques to determine characteristics and parameters of shunt and series DC machines

SUBJECT LEARNING OUTCOMES*relating to knowledge:**relating to skills:*

- PEU_U01 Students knows how to determine and interpret parameters, properties and characteristics of induction and synchronous machines.
 PEU_U02 Students knows how to determine and interpret parameters, properties and characteristics of shunt and series DC machines
 PEU_U03 Students are able to apply the principles of safety operation of electrical circuits, register the measurements results and prepare reports.

relating to social competences:

- PEU_K01 Student are able to correctly identify and resolve dilemmas related with the profession.

PROGRAMME CONTENT		
Form of classes - laboratory		Number of hours:
Lab 1	Introduction, safety instructions.	2
Lab 2	Three-phase transformer investigation	3
Lab 3	Parallel work of transformers	3
Lab 4	Determination of induction motor characteristics by power losses.	3
Lab 5	AC three-phase generator- characteristics	3
Lab 6	AC three-phase generator directly connected to mains	3
Lab 7	Synchronous motor investigation	3
Lab 8	DC shunt motor characteristics	3
Lab 9	DC series motor characteristics	3
Lab 10	DC shunt generator investigation	3
Lab 11	Grading	1
Total hours:		30

TEACHING TOOLS USED
N1. Laboratory with measurement test stands

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(L)	PEU_U01 PEU_U02 PEU_U03 PEU_K01	Laboratory preparation
F2(L)	PEU_U01 PEU_U02 PEU_U03 PEU_K01	laboratory activity
F3(L)	PEU_U01 PEU_U02 PEU_U03 PEU_K01	reports
P(L)	$P=0,3 \cdot F1 + 0,3 \cdot F2 + 0,4 \cdot F3$	

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. [3] Antal L., Janta T., Zieliński P.: Maszyny elektryczne. Ćwiczenia laboratoryjne. Of. Wyd. PWr, Wrocław 2001.
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.

SUBJECT SUPERVISOR
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