

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Napęd elektryczny 2**
 Name in English: **Electrical Drive 2**
 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: **ELR043263**
 Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):			10		
Number of hours of total student workload (CNPS):			54		
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

- Has a basic knowledge in the field of electrical machines, their construction, way of operation, knows equivalent schemes, mathematical models and basic characteristics of DC and AC motors.
- Has a basic knowledge on the basic low voltage apparatus, their parameters and applications indifferent electrical systems.
- Has a basic knowledge on description of linear control systems, their performance and analysis.
- Is able to use the knowledge of differential and integral calculus in the problems connected with the engineering studies
- Can solve the problems related to the analysis of linear controlled systems; knows how to use the proper mathematical methods for time-domain analysis of controlled plants.
- Is able to use the known measurement methods to connect, put into the operation and test the designed measurement system, can analyze and evaluate the measurement results.
- Understands the necessity of taking part in student laboratories and exercises to obtain new knowledge and skills.

SUBJECT OBJECTIVES

- The acquisition of practical knowledge and skills for connection, putting into operation and testing of the electrical motor drives and elaboration of their static and dynamical characteristics.
- Familiarizing students with application of previously known measurement techniques for testing of the DC and AC motor drives.
- Acquisition and fixing the social competences related to work in teams, solving engineering problems together; responsibility, honesty and fairness, observance of manners which are obligatory for academia and society.

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

PEK_U01 Can choose the suitable low voltage electric apparatus for given electrical drive of different power.

PEK_U02 Can realize the measurements of static and dynamical characteristics of different DC and AC electrical drive.

relating to social competences:

PEK_K01 Student can act independently and cooperate within a group working on a complex engineering project.

PROGRAMME CONTENT		
Form of classes - laboratory		Number of hours:
Lab 1	Introduction, presentation of the laboratory stands and safety requirements. Repetition the basic rules of application of analog and digital measurement devices. Forming of characteristics of DC motor with separate excitation in different operation modes.	2
Lab 2	Testing of DC motor drive controlled by bidirectional static converter. Testing of DC series motor drive controlled by DC chopper.	2
Lab 3	Testing of the electrical starting systems for the squirrel-cage and wounded-rotor induction motors.	2
Lab 4	Testing of the induction motor drive supplied from the voltage inverter – scalar control, vector control.	2
Lab 5	Testing of the drive systems with BLDC motor. Assessment with grade.	2
Total hours:		10

TEACHING TOOLS USED
N1. Laboratory exercises in student groups; testing of student knowledge with short test before laboratory exercises.
N2. Assessment of the laboratory exercises by reports.

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(L)	PEK_U01 PEK_U02 PEK_K01	Activity during laboratory exercises (including grades obtaining during short tests).
F2(L)	PEK_U01 PEK_U02 PEK_K01	Preparation of the report.
P(L)	$P=0,3 \cdot F1 + 0,7 \cdot F2$	

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: [1] Napęd elektryczny, praca zbiorowa pod red. Z. Grunwalda, WNT, 1987 [2] Napęd elektryczny – laboratorium, praca zbiorowa pod red. T. Orłowskiej-Kowalskiej, Oficyna Wyd. P.Wr., 2000
SECONDARY LITERATURE: [1] W. Leonhard, Control of Electrical Drives, Springer Verlag, 1990

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT ELR043263 - Electrical Drive 2 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_U01	K1ETK_U28	C.1 C.2 C.3	Lab1 Lab2 Lab3 Lab4 Lab5	N.1 N.2
PEK_U02	K1ETK_U28	C.1 C.2 C.3	Lab1 Lab2 Lab3 Lab4 Lab5	N.1 N.2
PEK_K01	K1ETK_K05	C.3	Lab1 Lab2 Lab3 Lab4 Lab5	N.1 N.2