FACULTY OF ELECTRICAL ENGINEERING

SUBJECT CARD

Name in Polish:	**Energoelektronika 2**
Name in English:	**Power electronics 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:	**APR013208**
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):			30		
Form of crediting:			crediting with grade		
For group of courses mark (X) final course:					
Number of ECTS points:			1		
including number of ECTS points for practical (P) classes :			1		
including number of ECTS points for direct teacher-student contact (BK) classes:			0.70		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. He can explain the principle of operation and has a basic knowledge of models of power semiconductor devices.
2. It has a basic knowledge of the topology and the principle of operation of power electronic converters. Understand the physical principles of operation of static converters.
3. Able to perform basic measurements of electrical devices using analog and digital oscilloscope.
4. He can verify the results of laboratory measurements with theoretical knowledge.
5. He can elaborate laboratory test results.

SUBJECT OBJECTIVES

C1. The acquisition by the student practical ability to combine power electronics systems.
C2. To acquaint the student with real parameters selected, the basic power semiconductor devices.
C3. Acquiring basic skills to apply the measurement technique for determining the characteristics of static power converters.
C4. To acquaint the student with the characteristics of the real power electronics converters.
C5. Acquiring the ability to develop research results, their interpretation and critical evaluation.

SUBJECT LEARNING OUTCOMES

relating to knowledge:

relating to skills:

PEU_U01	He can combine basic measurement systems for power converters.
PEU_U02	It can determine the basic static characteristics of the selected power converters.
PEU_U03	He can verify the results of the measurements with theoretical knowledge and critically evaluate the knowledge of the mathematical models of converters.

relating to social competences:

PEU_K01	It shows concern for the execution of his duties.

PROGRAMME CONTENT		
Form of classes - laboratory		**Number of hours:**
Lab 1	Introduction. The organization of classes. Conditions of gaining credit. Health and safety instructions. Acquaint students with the basic apparatus.	2
Lab 2	The test parameters of thyristors.	2
Lab 3	The test of one-phase regulators AC.	2
Lab 4	The test of three-phase regulators AC.	2
Lab 5	Research thyristor chopper DC.	2
Lab 6	Study one-pulse rectifier.	2
Lab 7	Study 2-pulse rectifier.	2
Lab 8	The study three-pulse and a six-pulse rectifier.	2
Lab 9	The study of resonant inverter.	2
Lab 10	Test of the three-phase thyristor inverter with phase commutation.	2
Lab 11	The test three-phase source voltage inverter in cooperation with the AC mains.	2
Lab 12	Research the step-down converter.	2
Lab 13	Research of three -phase inverter with pulse width modulation.	2
Lab 14	Test of systems control and triggering for thyristors.	2
Lab 15	Summary of the laboratory. Credit classes.	2
	Total hours:	**30**

TEACHING TOOLS USED
N1. Laboratory exercises performed on specialized laboratory positions.
N2. Self-preparation for laboratory classes.
N3. Consultation.

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT		
Evaluation *F – forming (during semester)* *P – concluding (at semester end)*	**Educational effect number**	**Way of evaluating educational effect achievement**
F1(L)	PEU_U01 PEU_K01	Check preparation for classes.
F2(L)	PEU_U02 PEU_U03 PEU_K01	Activity in the conduct of laboratory measurements.
F3(L)	PEU_U02 PEU_U03 PEU_K01	Grade for the reports performed.
P(L)	P=0,25F1+0,25F2+0,2F3	

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] L. Pawlaczyk, Z. Załoga Energoelektronika. Ćwiczenia laboratoryjne. Oficyna Wydawnicza Politechniki Wrocławskiej 2005.
[2] Barlik R., Nowak M.: Technika tyrystorowa. Warszawa WNT 1994.
[3] Januszewski S., Świątek H., Zymmer K.: Półprzewodnikowe przyrządy mocy. Warszawa WKŁ 1999.
[4] Frąckowiak L., Januszewski S.,: Energoelektronika część 1. Wydawnictwo Politechniki Poznańskiej.2001.
[5] Frąckowiak L.: Energoelektronika część 2. Wydawnictwo Politechniki Poznańskiej.1998.

SECONDARY LITERATURE:

[1] Piróg S.: Energoelektronika. Kraków Wydawnictwo AGH 2006.
[2] Tunia H., Winiarski B.: Podstawy energoelektroniki. Warszawa WNT 1987.
[3] Barlik R., Nowak M. :Poradnik inżyniera energoelektronika. Warszawa WNT 2013.

SUBJECT SUPERVISOR

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