

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Energoelektronika 2**
 Name in English: **Power electronics 2**
 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: **ELR042304**
 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. Basic knowledge of the behavior of the basic elements of electrical circuits with various types of current and voltage stimulus.
2. It has a basic knowledge of a Fourier series . Unable to correctly apply the knowledge in the metrology of electrical quantities in nonlinear circuits

SUBJECT OBJECTIVES

- C1. Familiarize students with the basic topology and characteristics of power electronic systems.
 C2. Familiarize students with research methodology of nonlinear systems.
 C3. Student awareness of the positives and negatives from the use of power electronic systems
 C4. The sophistication of the ability to apply measurement techniques in nonlinear circuits.
 C5. Deepening skills of execution of complex measurements in the team

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

- PEK_U01 He can use the theoretical knowledge about the topology and characteristics of power electronic systems
 PEK_U02 Is able perform appropriate tests model power electronics systems.
 PEK_U03 It can determine the negative effects of the power electronic systems on the AC network.

relating to social competences:

- PEK_K01 It has a ability to work in a team.

PROGRAMME CONTENT		
Form of classes - laboratory		Number of hours:
Lab 1	Introduction to laboratory. Safety regulations. Rules for laboratory passing. Exercises plan. Familiarizing with the positions of laboratory stands. Principles of measurement of electrical quantities in linear and nonlinear circuits. Overview of typical system monitoring voltage and current waveforms. Discussion of harmonic measurements with analyzers and selective nanovoltmeter.	2
Lab 2	Control circuits and trigger of SCR thyristors.	2
Lab 3	1- and 2- pulse uncontrolled rectifier.	3
Lab 4	1- and 2- pulse controlled rectifier.	2
Lab 5	3- and 6- pulse uncontrolled rectifier.	2
Lab 6	3- and 6- pulse controlled rectifier.	2
Lab 7	Single phase AC power regulator.	2
Lab 8	The McMurray inverter.	2
Lab 9	Step-down DC/DC regulator.	2
Lab 10	Step-up DC/DC regulator.	2
Lab 11	Examination the effects of the negative impact of converters on the AC network.	2
Lab 12	Examination the effectiveness of passive filters. TCAD Computer simulation.	2
Lab 13	PWM inverter.	2
Lab 14	Systems with a reduced negative impact on the AC network.	2
Lab 15	Conclusions.	1
Total hours:		30

TEACHING TOOLS USED
N1. Check the predisposition in the form of short tests N2. Discussion of the scope of research N3. Discussion of the measurement methods and physical model N4. Implementation of the Protocol of the research N5. Execution of test reports including analysis of results.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation <i>F - forming (during semester)</i> <i>P - concluding (at semester end)</i>	Educational effect number	Way of evaluating educational effect achievement
F1(L)	PEK_U01 PEK_U02 PEK_U03 PEK_K01	Activity
F2(L)	PEK_U01 PEK_U02 PEK_U03	Short tests
F3(L)	PEK_U01 PEK_U02 PEK_U03 PEK_K01	Test reports
P(L)	$P = 0,2 F1 + 0,6 F2 + 0,2 F3$	

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: [1] Borecki J., Stosur. M, Szkółka S., Energoelektronika. Podstawy i wybrane. zastosowania, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2008. [2] Tunia H., Winiarski B. ,Podstawy energoelektroniki, WNT Warszawa 1980. [3] Barlik R., Nowak M., Technika tyrystorowa, WNT Warszawa 1994. [4] Piróg S., Energoelektronika - negatywne oddziaływania układów energoelektronicznych na źródła energii i wybrane sposoby ich ograniczania, AGH Uczelniane Wydawnictwa Naukowo-Dydaktyczne, Kraków 1988. SECONDARY LITERATURE: [1] Piróg S., Energoelektronika. Układy o komutacji twardej, AGH Uczelniane Wydawnictwa Naukowo-Dydaktyczne, Kraków 1988. [2] Barlik R., Poradnik inżyniera energoelektronika, WNT, Warszawa 1998

SUBJECT SUPERVISOR

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**MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
ELR042304 - Power electronics 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_U30	C.1 C.2 C.3	Lab2 Lab3 Lab4 Lab5 Lab6 Lab7 Lab8 Lab9 Lab10 Lab11 Lab12 Lab13 Lab14	N.1 N.2 N.3 N.4 N.5
PEK_U02	K1ETK_U30	C.4	Lab2 Lab3 Lab4 Lab5 Lab6 Lab7 Lab8 Lab9 Lab10 Lab11 Lab12 Lab13 Lab14	N.4 N.5
PEK_U03	K1ETK_U30	C.3	Lab11 Lab12 Lab14	N.3 N.4 N.5
PEK_K01	K1ETK_K05	C.5	Lab1 Lab15	N.2