

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Przekształtniki energoelektroniczne w przemyśle**
 Name in English: **Static converters in industry**
 Main field of study (if applicable): **Industrial Control Engineering**
 Specialization (if applicable): **Automation and Control in Electrical Power Systems**
 Level and form of studies: **2nd level, full-time**
 Kind of subject: **optional**
 Subject code: **APR012314**
 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. Knowledge of basic power electronic
2. Knowledge of power industry engineering

SUBJECT OBJECTIVES

- C1. Understanding the problems of applications of static converters in various key industry areas.
- C2. Understanding effects of a negative impact of converters on the power supply network and how to minimize their.

SUBJECT LEARNING OUTCOMES*relating to knowledge:*

- PEU_W01 Knows the basic fields of applications of static converters in the industry
- PEU_W02 Knows the ways restrictive the negative impact of converters on power supply network

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

- PEU_K01 He can think and act in a creative way

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours:
Lec 1	Basic knowledge, introduction to the lecture, the program, requirements, credit. Transforming of electricity. Historical overview.	2
Lec 2	Basic circuits static converters in the industry.	2
Lec 3	Typical industrial systems static converters low and medium power.	2
Lec 4	Typical DC drives. Examples of implementation.	2
Lec 5	Converters in AC drives. PWM inverters. Interference generated by inverters, effects and practical ways of reducing them. Examples of applications.	2
Lec 6	UPS systems. Static UPS topologies. Rotary UPSs. Selection criteria and requirements.	2
Lec 7	Power supplies electroplating. Converters in drives of mining machines.	2
Lec 8	Power supply static converters for inductive heating. Synchronous frequency multipliers.	2
Lec 9	Electrofilters power supplies. Railway traction power supply systems (substations).	2
Lec 10	Starter systems for DC and AC motors. Three phase SOFT-START systems.	2
Lec 11	Systems converters in traction vehicle.	2
Lec 12	Naturally commutating 6-pulse inverter as the basic of HVDC. High voltage directed current (HVDC).	2
Lec 13	The negative impact of static converters on the power AC network. Active filters. Passive filters. The criteria on selection.	2
Lec 14	Development trends of static converters. Summary.	2
Lec 15	Qualified test.	2
Total hours:		30

TEACHING TOOLS USED
N1. Multimedia presentation

EVALUATION OF SUBJECT LEARNING OUTCOMES 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(w)	PEU_W01 PEU_W02 PEU_K01	Colloquium (final test)
P(w)	P = F1	

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: [1] Charoy A.: Kompatybilność elektromagnetyczna - zakłócenia w urządzeniach elektronicznych, WNT, Warszawa 2000; [2] Borecki J., Stosur. M, Szkółka S.: Energoelektronika. Podstawy i wybrane zastosowania, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2008; [3] Piróg S.: Energoelektronika - negatywne oddziaływania układów energoelektronicznych na źródła energii i wybrane sposoby ich ograniczania, AGH Uczelniane Wydawnictwa Naukowo-Dydaktyczne, Kraków 1998; [4] Barlik R., Nowak M.: Poradnik inżyniera energoelektronika Tom 1 i 2, Wydawnictwo Naukowe PWN (WNT), Warszawa 2019; [5] Dmowski A.: Energoelektroniczne układy zasilania prądem stałym, WNT, Warszawa 1998; [6] Tunia H., Winiarski B.: Podstawy energoelektroniki, WNT, Warszawa 1987; [7] Bird B.M., King K.G.: An introduction to power electronics, John Wiley&Sons, 1993; [8] Dewan S.B., Slemon G.R., Straughen A.: Power Semiconductor Drives, John Wiley&Sons, 2009; SECONDARY LITERATURE: [1] Supronowicz H.: Poprawa współczynnika mocy układów przekształtnikowych, WNT, Warszawa 1981; [2] Geppart A., Smajek L.: Dobór filtrów wyższych harmonicznych w zakładach przemysłowych wyposażonych w przekształtniki tyrystorowe, Energetyka 1972, Biuletyn Instytutu Energetyki nr 11/12; [3] Tunia H., Kaźmierkowski M.: Automatyka napędu przekształtnikowego, PWN, Warszawa 1987; [4] E-Czasopismo: AUTOMATYKA, ELEKTRYKA, ZAKŁÓCENIA (https://epismo-aez.pl);

SUBJECT SUPERVISOR
Małgorzata Bielówka, malgorzata.bielowka@pwr.edu.pl