

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Układy przekształtnikowe- zastosowania**
 Name in English: **Static convertors - applications**
 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: **APR012315**
 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 basic areas of industry
 C2. Knowledge of practical converters systems in typical branches of industry
 C3. 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 contemporary static converters used in the power industry

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

- PEU_K01 He can think and act creatively

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. Capabilities, advantages, disadvantages.	2
Lec 3	AC regulators of small and medium power. Powertools. Converters in the household hardware.	2
Lec 4	Practical system converters for lighting controls. Examples of implementation. Cataloguing data.	2
Lec 5	Converters for AC motors. Power filters. Shielding. EMC legislation. Classes of disruptions. Examples of applications.	2
Lec 6	Static and rotating power UPS systems large and medium-load power. Practical applications. Overview of all systems.	2
Lec 7	AC and DC converters for welding equipment. Electric arc furnaces.	2
Lec 8	Converters for induction heating. Converters for plating industry.	2
Lec 9	Power supplies for Electrofilters. Systems for temperature control.	2
Lec 10	Contactless switches. Hybrid switches. SOFT-START systems. Typical data and parameters.	2
Lec 11	Contemporary drives for rail vehicle.	2
Lec 12	Hight voltage directed current (HVDC). FACTS AC transmission systems.	2
Lec 13	The negative impact of static converters on the power AC network. Static synchronous series compensator (SSSC). Passive filters. The criteria on selection. Practical STATCOM systems.	2
Lec 14	Converters with a reduced negative effect. Overview of the polish market of static converters. Trends.	2
Lec 15	Colloquium (final test).	2
Total hours:		30

TEACHING TOOLS USED

N1. Multimedia presentations

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(w)	PEU_W01 PEU_W02 PEU_K01	Colloquium (final test)
P(w)	P=F1	

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Charoy Alain: 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] Catalogs of converters from selected manufacturers;

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