

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): **Control Engineering and Robotics**
 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: **ARR042314**
 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 EDUCATIONAL EFFECTS*relating to knowledge:*

- PEK_W01 Knows the basic fields of applications of static converters in the industry
- PEK_W02 Knows the ways restrictive the negative impact of converters on power supply network

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

- PEK_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 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(w)	PEK_W01 PEK_W02 PEK_K01	Qualified test
P(w)	P = F1	

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Barlik R., Poradnik inżyniera energoelektronika, WNT, Warszawa 1998.
- [2] Charoy A., Kompatybilność elektromagnetyczna – zakłócenia w urządzeniach elektronicznych, WNT, Warszawa 2000.
- [3] Dmowski A., Energoelektroniczne układy zasilania prądem stałym, WNT, Warszawa 1998.
- [4] Piróg S., Energoelektronika – negatywne oddziaływania układów energoelektronicznych na źródła energii i wybrane sposoby ich ograniczania, AGH Uczelniane Wydawnictwa Naukowo-Dydaktyczne, Kraków 1988.
- [5] Tunia H., Winiarski B., Podstawy energoelektroniki, WNT, Warszawa 1980.
- [6] Borecki J., Stosur. M, Szkółka S., Energoelektronika. Podstawy i wybrane zastosowania, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2008.
- [7] B.M.Bird & K.G.King “Power electronics”; 1983 John Wiley&Sons.
- [8] S.B.Dewan, G.R. Slemon, A. Straughen, “ Power Semiconductor Drives” ; 1984 John Wiley&Sons
- [9] Charoy Alain. , Compatibilite electromagnetique. Parasites et perturbations des electroniques. 4. Alimentation, foudre et remedes Regles et consails d’instalation, Dunod, Paris 1992

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,
<http://www.elektro-innowacje.pl>

SUBJECT SUPERVISOR

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
ARR042314 - Static converters in industry
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Control Engineering and Robotics**
AND SPECIALIZATION **Automation and Control in Electrical Power Systems**

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_W01	S2ASE_W14	C.1	Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec12	N.1
PEK_W02	S2ASE_W14	C.2	Lec13	N.1
PEK_K01	K2AiR_K06	C.1 C.2	Lec1 Lec14 Lec15	N.1