

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Sterowanie obciążeniami elektrycznymi**
 Name in English: **Load management**
 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: **obligatory**
 Subject code: **ARR042514**
 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

- The student has mastered a basic knowledge on electrical engineering (active and reactive power, active and reactive energy, power compensation, power factor, voltage, current).

SUBJECT OBJECTIVES

- C1. To acquaint students with the demand management.
 C2. To acquaint students with the knowledge on electrical tariffs and tariff policy.
 C3. A student will acquire practical knowledge and skills of efficient, rational and efficient use of electricity.

SUBJECT EDUCATIONAL EFFECTS*relating to knowledge:*

- PEK_W01 - The student has mastered knowledge on principles of saving energy, energy efficiency and rational use of energy.
 PEK_W02 He has knowledge of the importance and methods of formulation of the loads.
 PEK_W03 The student has knowledge on a tariff policy.

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

- PEK_K01 The student is aware of the need for economical and rational use of energy.

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours:
Lec 1	Presentation of the course, requirements and a method of assessment, description of definitions of key concepts. Presentation of the structure of the polish energy sector and presentation of the principles of the functioning energy markets in terms of balancing power and energy.	2
Lec 2	Presentation of: EU energy policy, the Polish energy policy.	2
Lec 3	Presentation of EU directive on rationalization of electricity and Energy Efficiency Act	2
Lec 4	Analysis of load charts (load shape), analysis of a power ordered.	1
Lec 5	Energy management - methods, energy management tools.	2
Lec 6	Saving electricity - from design to use.	3
Lec 7	Energy management in an enterprise.	2
Lec 8	A reactive power in a power system, loss of electricity.	2
Lec 9	Rational use of electricity in industrial company and households.	1
Lec 10	Lighting - a description of type of sources, a lighting control and development trends, an aspect of efficiency of electricity use.	2
Lec 11	Programs DSR, a tariff's policy.	2
Lec 12	A role of tariffs in the DSM - the impact of tariffs on loads.	2
Lec 13	Smart grid.	2
Lec 14	The use of smart grid in the field of electricity load shaping.	3
Lec 15	Final test.	2
Total hours:		30

TEACHING TOOLS USED
N1. Informative lecture, multimedia presentations.

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_W03 PEK_K01	Test
P(w)	P=F1	

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: <p>[1] Billewicz K., Smart Metering. Inteligentny system pomiarowy. Warszawa, PWN 2011.</p> <p>[2] Billewicz K., Smart Grids - inteligentne sieci elektroenergetyczne. IMD Anna Korba, 2015, cz. 1, cz. 2.</p> <p>[3] Wilczyński A., Systemy taryfowe jako narzędzia ekonomicznego sterowania zapotrzebowaniem na moc i energię elektryczną. Prace Naukowe Instytutu Energoelektryki, Politechnika Wrocławska, seria monografie nr 85 (25), Wrocław 1990.</p> <p>[4] Malko J., Wilczyński A.: Oszczędne, racjonalne czy efektywne użytkowanie energii elektrycznej. Energetyka 9/2007, s. 607-612.</p> <p>[5] Wilczyński A., Racjonalne użytkowanie energii w przedsiębiorstwie. [w] Racjonalność w funkcjonowaniu organizacji: gospodarka-społeczeństwo, Oficyna Wydawnicza PWSZ w Nysie, 2009, ss.80-93</p> SECONDARY LITERATURE: <p>[1] DYREKTYWA PARLAMENTU EUROPEJSKIEGO I RADY 2012/27/UE z dnia 25 października 2012 r. w sprawie efektywności energetycznej, zmiany dyrektyw 2009/125/WE i 2010/30/UE oraz uchylenia dyrektyw 2004/8/WE i 2006/32/WE</p> <p>[2] Ustawa o efektywności energetycznej z dnia 15 kwietnia 2011 r., Dziennik Ustaw Nr 94/5569, poz., 551.</p> <p>[3] Ustawa Prawo energetyczne z dnia 10 kwietnia 1997 Dr.z.U. z 1997 r. Nr 54, poz. 348, z późniejszymi zmianami.</p>

SUBJECT SUPERVISOR
Artur Wilczyński, artur.wilczynski@pwr.edu.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
ARR042514 - Load management
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_W10	C.1 C.2 C.3	Lec3 Lec4 Lec5 Lec6 Lec7 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14	N.1
PEK_W02	S2ASE_W10	C.1 C.3	Lec1 Lec2 Lec3 Lec4 Lec5	N.1
PEK_W03	S2ASE_W10	C.2	Lec2 Lec3 Lec5 Lec8 Lec11 Lec12	N.1
PEK_K01	K2AiR_K04	C.1 C.3	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15	N.1