

FACULTY OF ELECTRICAL  
ENGINEERING**SUBJECT CARD**

Name in Polish: **Racjonalizacja zużycia energii**  
 Name in English: **Rationalization of energy consumption**  
 Main field of study (if applicable): **Electrical Engineering**  
 Specialization (if applicable): **Industrial Electrical Engineering**  
 Level and form of studies: **2nd level, full-time**  
 Kind of subject: **optional**  
 Subject code: **ELR052416**  
 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 principles of rational power management in industrial plants.
2. Knowledge of principles of operation and design of electrical power equipment.
3. Student is able to check electrical installation and carry out basic measurements.
4. Student is able to think creatively.
5. Student is open minded and ready to follow new trends.

**SUBJECT OBJECTIVES**

- C1. Students will recognize the relevant laws related to effectiveness in the scope of generation and usage of electrical power.  
 C2. Students will recognize the issues important to rationalization of electrical energy consumption.  
 C3. Students will recognize how to carry out an audit aimed at optimization of electrical energy consumption among industrial customers.  
 C4. Students will know how to monitor electrical energy consumption and identify occurring losses.  
 C5. Students will recognize economic rationale behind saving of electrical power.

**SUBJECT LEARNING OUTCOMES***relating to knowledge:*

- PEU\_W01 Student is familiar with carrying out audits of electrical power usage.  
 PEU\_W02 Student is familiar with optimization of electrical power consumption in industrial setting.  
 PEU\_W03 Student is familiar with economic methods behind optimization of electrical power consumption.

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

- PEU\_K01 Student thinks creatively.

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours:
Lec 1	Energy effectiveness and relevant laws.	2
Lec 2	Profiles of electrical power consumption in different type of industries in Poland and chosen EU countries.	2
Lec 3	Principles of undertaking audits of electrical energy consumption in residential, industrial and public utility buildings.	2
Lec 4	Principles of undertaking audits of electrical energy consumption in production processes and lighting of industrial facilities.	2
Lec 5	Identification of losses of electrical power, reactive and active power among various energy consumers (including electrical power quality issues).	2
Lec 6	Methods of determining energy intensity of production processes.	2
Lec 7	Analysis of possible improvements and upgrades to increase energy effectiveness of: transformer systems, electric engines, cogeneration systems etc.	2
Lec 8	Methods of economic calculation that determine the choice of specific strategy of implementation of energy consumption improvements aimed at increasing energy effectiveness.	2
Lec 9	Principles of financing of undertakings related to rationalization of energy consumption.	2
Lec 10	Measuring systems used in auditing energy consumption and quality of electrical power.	2
Lec 11	Modern electrical power quality and energy consumption monitoring systems for industrial consumers. Electrical power management systems.	2
Lec 12	Examples of audits of energy consumption and lighting in residential, public utility and industrial buildings or manufacturing plants.	6
Lec 13	Test	2
Total hours:		<b>30</b>

TEACHING TOOLS USED
N1. Informative lectures N2. Multimedia presentations N3. Problem-solving lectures N4. Discussion sessions

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_W03 PEU_K01	test
P(w)	P = F1	

PRIMARY AND SECONDARY LITERATURE
<b>PRIMARY LITERATURE:</b> Ustawa o efektywności energetycznej z dnia 15 kwietnia 2011 r. (Dz. U. nr 94, poz. 551). Szurgut J., Ziębiak A., Kozioł J., Janiczek R., Kurpisz K., Chmielniak T., Wilk R.: Racjonalizacja użytkowania energii w zakładach przemysłowych. Poradnik audytora energetycznego. Wyd. Fundacja Poszanowania Energii, Warszawa 1994. Opracowanie zakresu oraz zasad wykonywania audytu energetycznego do programu „Efektywne wykorzystanie energii” NFOŚ i GW, Wyd. NFOŚ i GW, Warszawa, Marzec 2011. Wnukowska B.: Metodyka analizy i prognozowania potrzeb energetycznych odbiorców przemysłowych na rynku energii elektrycznej, monografia, Oficyna Wyd. PWR, Wrocław 2005 <b>SECONDARY LITERATURE:</b> Ślęk B.: Efektywność energetyczna wyznacznikiem rozwoju systemów oświetleniowych. Przegląd Elektrotechniczny, maj 2007. Zielona księga w sprawie racjonalizacji zużycia energii, czyli jak uzyskać więcej przy mniejszym nakładem środków. COM(2005)265 końcowy, Bruksela, 22.06.2005.

SUBJECT SUPERVISOR
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