

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, part-time**
 Kind of subject: **optional**
 Subject code: **ELR042476**
 Group of courses: **NO**

| | Lecture | Classes | Laboratory | Project | Seminar |
|--|----------------------|---------|------------|---------|---------|
| Number of hours of organized classes in University (ZZU): | 22 | | | | |
| Number of hours of total student workload (CNPS): | 54 | | | | |
| 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 EDUCATIONAL EFFECTS*relating to knowledge:*

- PEK_W01 Student is familiar with carrying out audits of electrical power usage.
 PEK_W02 – Student is familiar with optimization of electrical power consumption in industrial setting.
 PEK_W03 Student is familiar with economic methods behind optimization of electrical power consumption.

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

- PEK_K01 Student thinks creatively.

| PROGRAMME CONTENT | | |
|---------------------------|--|------------------|
| Form of classes - lecture | | Number of hours: |
| Lec 1 | Energy effectiveness and relevant laws. Profiles of electrical power consumption in different type of industries in Poland and chosen EU countries. | 2 |
| Lec 2 | Principles of undertaking audits of electrical energy consumption in residential, industrial and public utility buildings. | 2 |
| Lec 3 | Principles of undertaking audits of electrical energy consumption in production processes and lighting of industrial facilities. | 2 |
| Lec 4 | Identification of losses of electrical power, reactive and active power among various energy consumers (including electrical power quality issues). | 2 |
| Lec 5 | Methods of determining energy intensity of production proces. | 2 |
| Lec 6 | Analysis of possible improvements and upgrades to increase energy effectiveness of: transformer systems, electric engines, cogeneration systems etc. | 2 |
| Lec 7 | Methods of economic calculation that determine the choice of specific strategy of implementation of energy consumption improvements aimed at increasing energy effectiveness.Principles of financing of undertakings related to rationalization of energy consumption. | 2 |
| Lec 8 | Measuring systems used in auditing energy consumption and quality of electrical power. | 2 |
| Lec 9 | Modern electrical power quality and energy consumption monitoring systems for industrial consumers. Electrical power management systems. | 2 |
| Lec 10 | Examples of audits of energy consumption and lighting in residential, public utility and industrial buildings or manufacturing plants. | 2 |
| Lec 11 | Test | 2 |
| Total hours: | | 22 |

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

| EVALUATION OF SUBJECT EDUCATIONAL EFFECTS 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) | PEK_W01 PEK_W02 PEK_W03 PEK_K01 | test |
| P(w) | P=F1 | |

| PRIMARY AND SECONDARY LITERATURE |
|---|
| PRIMARY LITERATURE: Ślęk B. : Efektywność energetyczna wyznacznikiem rozwoju systemów oświetleniowych. Przegląd Elektrotechniczny, maj 2007. Zielona księga w sprawie racjonalizacji zużycia energii, czyli jak uzyskać więcej mniejszym nakładem środków. COM(2005)265 końcowy, Bruksela, 22.06.2005. |
| SECONDARY LITERATURE: Ślęk B. : Efektywność energetyczna wyznacznikiem rozwoju systemów oświetleniowych. Przegląd Elektrotechniczny, maj 2007. Zielona księga w sprawie racjonalizacji zużycia energii, czyli jak uzyskać więcej mniejszym nakładem środków. COM(2005)265 końcowy, Bruksela, 22.06.2005. |

| SUBJECT SUPERVISOR |
|---|
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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
ELR042476 - Rationalization of energy consumption
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Electrical Engineering**
AND SPECIALIZATION **Industrial Electrical Engineering**

| 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 | S2ETP_W13 | C.1 C.2 C.3 | Lec1 Lec2 Lec3 Lec6 Lec8 Lec10 | N.1 N.2 N.3 |
| PEK_W02 | S2ETP_W13 | C.2 C.4 | Lec1 Lec4 Lec5 Lec6 Lec9 | N.1 N.2 N.3 N.4 |
| PEK_W03 | S2ETP_W13 | C.1 C.2 C.5 | Lec7 | N.1 N.2 N.3 |
| PEK_K01 | K2ETK_K06 | C.3 C.5 | Lec4 Lec6 Lec10 Lec11 | N.3 N.4 |