

FACULTY OF ELECTRICAL  
ENGINEERING**SUBJECT CARD**

Name in Polish: **Urządzenia elektryczne 1**  
 Name in English: **Electrical Devices 1**  
 Main field of study (if applicable): **Electrical Engineering**  
 Specialization (if applicable):  
 Level and form of studies: **1st level, part-time**  
 Kind of subject: **obligatory**  
 Subject code: **ELR042361**  
 Group of courses: **NO**

|  | Lecture     | Classes | Laboratory | Project | Seminar |
|--|-------------|---------|------------|---------|---------|
| Number of hours of organized classes in University (ZZU):                        | 20          |         |            |         |         |
| Number of hours of total student workload (CNPS):                                | 81          |         |            |         |         |
| Form of crediting:   | examination |         |            |         |         |
| For group of courses mark (X) final course:                                      |             |         |            |         |         |
| Number of ECTS points:   | 3           |         |            |         |         |
| including number of ECTS points for practical (P) classes:                       |             |         |            |         |         |
| including number of ECTS points for direct teacher-student contact (BK) classes: | 2.10        |         |            |         |         |

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Student has a knowledge of range of the basis of electrical engineering, determines the parameters of the alternating current (AC) circuits and the direct current (DC) circuits.
2. Student has a knowledge of the range basis of physics, in particular he understands mechanisms of the heat conduction and functioning of the simple machines.

**SUBJECT OBJECTIVES**

- C1. Knowledge of the principles of classification of electrical apparatus and their basic technical parameters.  
 C2. Distinguishing between environmental and maintenance exposures of electric power devices.  
 C3. Understanding the principles of calculating short-circuit currents in networks and electric power installations for selection of electric devices.  
 C4. Acquisition of knowledge of solving tasks and problems, which is useful in the choice of electrical equipment in electrical installation.  
 C5. Understanding the principles of construction and operation of electrical devices used in electrical installations.  
 C6. Acquisition of knowledge of the extinguishing manners of the electrical arc in high voltage circuit-breakers.  
 C7. Acquisition of knowledge of the extinguishing manners of the electrical arc in low and high voltage circuit-breakers.  
 C8. Acquisition of knowledge of the supplying and the distributive networks .in industrial and municipal buildings.  
 C9. Strengthening the skill of individual deepening of knowledge.

**SUBJECT EDUCATIONAL EFFECTS***relating to knowledge:*

- PEK\_W01 Student has a knowledge of a subject of climatic and the environment stresses of electrical power engineering equipment as well as conditions of their operation and is able to explain the consequences of a work current and a short-circuit current in electrical apparatus and installations and calculate of characteristic parameters of the short-circuit current in order to choice of electrical equipment in installations.
- PEK\_W02 Student is able to explain a constructional aspects as well as operation of electrical apparatuses and electrical power engineering devices used in electrical installations and power networks and to describe the power supplies used for industrial and municipal facilities and basic principles of improving the reliability of power supply of various buildings and he has knowledge about basic rules of design of electrical installations.
- PEK\_W03 Student is able to describe the classification of voltages and of high voltages devices and explain the range of the constructional aspect of high voltage circuit-breakers as well as of the extinguish manners of electrical arc.

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

- PEK\_K01 The student has an established ability to independently learning.

| PROGRAMME CONTENT         |  |                  |
|---------------------------|--|------------------|
| Form of classes - lecture |  | Number of hours: |
| Lec 1                     | Classification of electrical power engineering devices. Levels of the nominal voltages in the network as well as nominal voltages of insulation of the low voltage and high voltage electric power devices. Climatic and the environment stresses. Classes of the electromagnetic environment.                       | 2                |
| Lec 2                     | Short-circuit in electrical power engineering systems: flows of the short-circuit currents, short-circuits near the generator as well as far away from the generators. Impedance of elements of electrical power engineering systems. Calculation of the short-circuit currents according to Polish Standards (PNE). | 2                |
| Lec 3                     | Thermal and dynamic influence of the operation currents and of the short-circuits currents.  | 2                |
| Lec 4                     | Electrical switching arc. Extinguishing of electrical arc in a direct and in an alternating current circuits. Low-voltage switches – fundamental parameters and classification.  | 2                |
| Lec 5                     | Low-voltage switches: hand operation, contactors and circuit breakers. Construction, operation and basic parameters.   | 2                |
| Lec 6                     | Fundamental elements of low-voltage installations. Electrical conductors.  | 2                |
| Lec 7                     | Rules of a over-current protection of receivers. Rules of a over-current protection of wires in electrical installation. Choice of conductors in electrical installation.  | 2                |
| Lec 8                     | High voltage power engineering circuit breakers. General rules of construction. Manners of extinguishing of electrical arc in high voltage circuit breakers.   | 2                |
| Lec 9                     | General classification of electrical power substations. Division, main and auxiliary circuits in substations. Electric power switchgears. Power transformers and power autotransformers.   | 2                |
| Lec 10                    | Supply and distribution of electrical energy in industrial and municipal buildings. The reliability of the power supply. Redundant power systems. Restitution automation.  | 2                |
| Total hours:              |  | <b>20</b>        |

| TEACHING TOOLS USED         |
|-----------------------------|
| N1. Multimedia lecture.     |
| N2. Personal consultations. |

| EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT   |  |  |
|---|--|--|
| Evaluation<br><i>F – forming (during semester)</i><br><i>P – concluding (at semester end)</i> | Educational effect number                | Way of evaluating educational effect achievement |
| F1(w)   | PEK_W01<br>PEK_W02<br>PEK_W03<br>PEK_K01 | Written or oral exam.                            |
| P(w)  | P=F1                                     |  |

| PRIMARY AND SECONDARY LITERATURE   |
|--|
| <b>PRIMARY LITERATURE:</b><br>[1] Markiewicz H., Urządzenia elektroenergetyczne, Wyd. 4, WNT, Warszawa 2015;<br>[2] Markiewicz H., Instalacje elektryczne, Wyd. 8, WNT, Warszawa, current edfition |
| <b>SECONDARY LITERATURE:</b><br>[1] Selected Polish Standards recommended by the teacher.  |

| SUBJECT SUPERVISOR                                  |
|---|
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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT  
**ELR042361 - Electrical Devices 1**  
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **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                    | K1ETK_W28<br>K1ETK_W29  | C.2                             | Lec1<br>Lec2<br>Lec3  | N.1<br>N.2           |
| PEK_W02                    | K1ETK_W28<br>K1ETK_W29  | C.3<br>C.7                      | Lec4<br>Lec5<br>Lec6<br>Lec7  | N.1<br>N.2           |
| PEK_W03                    | K1ETK_W28<br>K1ETK_W29  | C.1<br>C.4<br>C.5<br>C.6<br>C.8 | Lec8<br>Lec9<br>Lec10   | N.1<br>N.2           |
| PEK_K01                    | K1ETK_K04   | C.9                             | Lec1<br>Lec2<br>Lec3<br>Lec4<br>Lec5<br>Lec6<br>Lec7<br>Lec8<br>Lec9<br>Lec10 | N.1<br>N.2           |