

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Nowoczesne aparaty elektryczne**
 Name in English: **Modern electrical devices**
 Main field of study (if applicable): **Electrical Engineering**
 Specialization (if applicable): **Electrical Power Engineering**
 Level and form of studies: **2nd level, full-time**
 Kind of subject: **optional**
 Subject code: **ELR042412**
 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. Student is able to discriminate between low and high voltage, and selected parameters of devices, electrical appliances and electrical installations for normal operating conditions and disturbance.
2. Student knows phenomena occurring at the switching operations, including electric arc phenomena and surges.
3. Understands the legal aspects and effects of engineering activities.
4. He can think and act in a creative way.

SUBJECT OBJECTIVES

- C1. Knowledge of the design and construction of modern switching devices low and high voltage.
 C2. Knowing the possibility of using modern switching devices in power systems and networks.
 C3. Student realizes in the tendencies of development of electrical devices.
 C4. Student understands the need for learning and skills for life

SUBJECT EDUCATIONAL EFFECTS*relating to knowledge:*

- PEK_W01 Student has in-depth knowledge of the design and operation of modern switching devices construction of low and high voltage.
 PEK_W02 Student has knowledge of the application of modern switching devices installations and distribution systems.
 PEK_W03 Student realizes in the tendencies of development of electrical devices.

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

- PEK_K01 Student understands the need for learning and skills for life.

| PROGRAMME CONTENT | | |
|---------------------------|---|------------------|
| Form of classes - lecture | | Number of hours: |
| Lec 1 | The classification, functions and rating of modern electrical devices. | 2 |
| Lec 2 | Modern solutions used in backup electrical power systems | 2 |
| Lec 3 | Modern installation of reactive power compensation. | 2 |
| Lec 4 | Modern measuring equipment used in industrial plants and electrical power engineering plants. | 2 |
| Lec 5 | Switching interferences generated by modern electrical equipment. | 2 |
| Lec 6 | Ways that restrict the switching effect- computer simulation ATP/EMTP, MATLAB. | 2 |
| Lec 7 | Materials used in modern electrical devices. | 2 |
| Lec 8 | Simulation programs used in the design of modern electrical devices. | 2 |
| Lec 9 | Modern electrical equipment with modular structures. | 2 |
| Lec 10 | Remote operation of modern electrical devices | 2 |
| Lec 11 | Electronics control of characteristics time-current of the circuit breaker. | 2 |
| Lec 12 | The impact of modern electrical devices on the environment. | 2 |
| Lec 13 | Reliability of modern electrical devices. | 2 |
| Lec 14 | Diagnosis of modern electrical devices | 2 |
| Lec 15 | Final test | 2 |
| Total hours: | | 30 |

| TEACHING TOOLS USED |
|------------------------------|
| N1. Multimedia presentation. |
| N2. Lecture information |

| 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: [1] J. Maksymiuk J, Nowicki J: Aparaty elektryczne. Oficyna wydawnicza Politechniki Warszawskiej, Warszawa, 2014 |
| SECONDARY LITERATURE: [1] Markiewicz H: Urządzenia Elektroenergetyczne. PWN, Warszawa 2016 [2] Turan Gonen: Electrical Power Transmission System Engineering: Analysis and Design, May 14, 2014 by CRC Press |

| SUBJECT SUPERVISOR |
|---|
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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
ELR042412 - Modern electrical devices
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Electrical Engineering**
AND SPECIALIZATION **Electrical Power 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 | S2EEN_W13 | C.1 C.2 | Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec9 | N.1 N.2 |
| PEK_W02 | S2EEN_W13 | C.2 | Lec6 Lec7 Lec8 Lec10 Lec11 Lec12 Lec13 | N.1 N.2 |
| PEK_W03 | S2EEN_W13 | C.3 | Lec14 Lec15 | N.1 N.2 |
| PEK_K01 | K2ETK_K06 | C.4 | Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15 | N.1 N.2 |