



Subject card

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| Subject name and code | Electrical Equipment, PG_00038445 | | | | | | |
| Field of study | Electrical Engineering | | | | | | |
| Date of commencement of studies | October 2021 | | Academic year of realisation of subject | | 2023/2024 | | |
| Education level | first-cycle studies | | Subject group | | Obligatory subject group in the field of study Subject group related to scientific research in the field of study | | |
| Mode of study | Full-time studies | | Mode of delivery | | at the university | | |
| Year of study | 3 | | Language of instruction | | Polish | | |
| Semester of study | 5 | | ECTS credits | | 3.0 | | |
| Learning profile | general academic profile | | Assessment form | | exam | | |
| Conducting unit | Department of Electrical Power Engineering -> Faculty of Electrical and Control Engineering | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | prof. dr hab. inż. Stanisław Czapp | | | | |
| | Teachers | | prof. dr hab. inż. Stanisław Czapp dr inż. Daniel Kowalak | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 15.0 | 0.0 | 15.0 | 0.0 | 0.0 | 30 |
| | E-learning hours included: 0.0 | | | | | | |
| Learning activity and number of study hours | Learning activity | Participation in didactic classes included in study plan | | Participation in consultation hours | | Self-study | SUM |
| | Number of study hours | 30 | | 6.0 | | 39.0 | 75 |
| Subject objectives | Basic knowledge about electric devices | | | | | | |
| Learning outcomes | Course outcome | | Subject outcome | | Method of verification | | |
| | K6_U09 | | Student calculates load currents and short-circuit currents and on the base of these calculations selects electrical circuit main elements. Interprets operation of electrical switches, current and voltage transducers and overvoltage protection devices. | | [SU4] Assessment of ability to use methods and tools | | |
| | K6_W11 | | Student learns the basics of calculations related to the selection of electrical devices, taking into account the current principles of technical knowledge. | | [SW3] Assessment of knowledge contained in written work and projects | | |
| Subject contents | <p>LECTURE Current-carrying capacity. Insulation loss-of-life evaluation. Life expectancy curve. Hot-spot temperature, temperature rise. Dynamic behaviour. Rapid heating, continuous heating, heating and cooling cycles. Sustained rating, short-time and cyclic ratings, short-circuit rating. Characteristics of short-circuit currents (scc). Far-from-generator and near-to-generator short-circuit. Initial symmetrical scc, peak scc, breaking scc, thermal equivalent scc. Short-circuit impedances of electrical equipment. Limitation of scc, reactors, current-limiting breaking devices. Selection of equipment according to scc. Electrical switches. Contact configurations, switching arc and quenching technique (vacuum, gas, air). Transient recovery voltage. Selection and operation. Cased switchboards. Fault arc and immunity to fault arc. Limiting of short-circuits effects. Operation. Current and voltage transducers. Current and voltage (inductive) measurement transformers, coreless transducers (capacitive and optical included). Components, equivalent diagrams, operation in normal and overcurrent conditions. Accuracy. Connection systems. Selection and operation. Overvoltage protection devices. Valve, expulsion and varistor arresters. Components, operation, selection principles.</p> <p>LABORATORY Contacts in electric devices. Arc switching. Arcless switching. Low voltage switches. Low voltage fuses. Fault arc in cased switchboards. High voltage switches.</p> | | | | | | |

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| Prerequisites and co-requisites | No requirements | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Written exam | 50.0% | 67.0% |
| | Practical exercise | 100.0% | 33.0% |
| Recommended reading | Basic literature | 1. Kacejko P., Machowski J.: Zwarcia w systemach elektroenergetycznych. WNT, Warszawa 2013. 2. Markiewicz H.: Urządzenia elektroenergetyczne. WNT, Warszawa 2016. 3. Musiał E.: Instalacje i urządzenia elektroenergetyczne, WSP, Warszawa 2008. | |
| | Supplementary literature | 1. Maksymiuk J.: Aparaty elektryczne. WNT, Warszawa 1995. 2. Wiszniewski A.: Przekładniki w elektroenergetyce. WNT, Warszawa 1992. | |
| | eResources addresses | Adresy na platformie eNauczanie: URZĄDZENIA ELEKTRYCZNE [2023/24] - Moodle ID: 23797 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=23797 | |
| Example issues/ example questions/ tasks being completed | Task: Calculate peak short-circuit current (i_p) for selection the switch in power system. | | |
| Work placement | Not applicable | | |