



Subject card

|   |   |  |                                     |            |  |         |     |
|---|---|--|-------------------------------------|------------|--|---------|-----|
| Subject name and code                       | Guaranted Supply Systems, PG_00057703   |  |                                     |            |  |         |     |
| Field of study                              | Electrical Engineering  |  |                                     |            |  |         |     |
| Date of commencement of studies             | October 2024  | Academic year of realisation of subject                              |                                     |            | 2024/2025  |         |     |
| Education level                             | second-cycle studies  | Subject group  |                                     |            |  |         |     |
| Mode of study                               | Part-time studies   | Mode of delivery   |                                     |            | at the university  |         |     |
| Year of study                               | 1   | Language of instruction  |                                     |            | Polish   |         |     |
| Semester of study                           | 2   | ECTS credits   |                                     |            | 3.0  |         |     |
| Learning profile                            | general academic profile  | Assessment form  |                                     |            | assessment   |         |     |
| Conducting unit                             | Department of Power Electronics and Electrical Machines -> Faculty of Electrical and Control Engineering  |  |                                     |            |  |         |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor  | dr hab. inż. Jarosław Łuszcz   |                                     |            |  |         |     |
|   | Teachers  |  |                                     |            |  |         |     |
| Lesson types and methods of instruction     | Lesson type   | Lecture  | Tutorial                            | Laboratory | Project  | Seminar | SUM |
|   | Number of study hours   | 10.0   | 0.0                                 | 10.0       | 0.0  | 0.0     | 20  |
|   | 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   | 20   | 5.0                                 |            | 50.0   | 75      |     |
| Subject objectives                          | Presentation of Power Quality problems and adequate improvement solutions.  |  |                                     |            |  |         |     |
| Learning outcomes                           | Course outcome  | Subject outcome  |                                     |            | Method of verification   |         |     |
|   | [K7_W02] has an in-depth and structured knowledge of electrical measurements electrical measurements, the methods and equipment used for electrical measurements of non-electrical quantities, he/she knows the principles of testing operation tests of electrical equipment, has a structured knowledge of electricity quality issues | applies systematic knowledge in the field of power quality           |                                     |            | [SW1] Assessment of factual knowledge                                |         |     |
|   | [K7_W06] has in-depth knowledge of industrial electronics, microprocessor control systems, programmable logic systems and printed circuit design and prototyping computer-aided prototyping   | applies systematic knowledge in the field of power quality           |                                     |            | [SW1] Assessment of factual knowledge                                |         |     |
|   | [K7_U03] is able to obtain information from literature, databases and other sources, also in English, draw conclusions, formulate and fully justify opinions. substantiate opinions; is able to identify directions for further learning and implement the process of self-education  | applies systematic knowledge in the field of power quality           |                                     |            | [SU3] Assessment of ability to use knowledge gained from the subject |         |     |
|   | [K7_U02] is able to prepare and deliver a short oral presentation on a selected technical topic   | prepares a presentation on a selected topic related to power quality |                                     |            | [SU5] Assessment of ability to present the results of task           |         |     |

| Subject contents   | <p>LECTURE</p> <p>Power quality parameters related to power supply continuity.<br/> Causes and effects of power supply discontinuity.<br/> Uninterruptible power supply systems (UPS) - standardization requirements, classification.<br/> Topologies used in uninterruptible power supply systems.<br/> Generators.<br/> Power supply systems with redundancy.<br/> Batteries used in UPS systems.<br/> Modern energy storage devices.</p> <p>LABORATORY</p> <p>Measurements of power quality parameters in the laboratory power supply network.<br/> Testing of power quality parameters in power supply systems with an uninterruptible power supply during various operating modes.<br/> Testing of dynamic parameters of the uninterruptible power supply.</p> |   |                               |                          |                   |                               |              |       |       |            |       |       |
|--|---|---|-------------------------------|--------------------------|-------------------|-------------------------------|--------------|-------|-------|------------|-------|-------|
| Prerequisites and co-requisites                          |   |   |                               |                          |                   |                               |              |       |       |            |       |       |
| Assessment methods and criteria                          | <table border="1" data-bbox="448 501 1487 539"> <thead> <tr> <th data-bbox="448 501 794 539">Subject passing criteria</th> <th data-bbox="794 501 1141 539">Passing threshold</th> <th data-bbox="1141 501 1487 539">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 539 794 568">Test reports</td> <td data-bbox="794 539 1141 568">50.0%</td> <td data-bbox="1141 539 1487 568">50.0%</td> </tr> <tr> <td data-bbox="448 568 794 607">Colloquium</td> <td data-bbox="794 568 1141 607">50.0%</td> <td data-bbox="1141 568 1487 607">50.0%</td> </tr> </tbody> </table>  |   |                               | Subject passing criteria | Passing threshold | Percentage of the final grade | Test reports | 50.0% | 50.0% | Colloquium | 50.0% | 50.0% |
|  | Subject passing criteria  | Passing threshold   | Percentage of the final grade |                          |                   |                               |              |       |       |            |       |       |
|  | Test reports  | 50.0%   | 50.0%                         |                          |                   |                               |              |       |       |            |       |       |
| Colloquium   | 50.0%   | 50.0%   |                               |                          |                   |                               |              |       |       |            |       |       |
| Test reports   | 50.0%   | 50.0%   |                               |                          |                   |                               |              |       |       |            |       |       |
| Colloquium   | 50.0%   | 50.0%   |                               |                          |                   |                               |              |       |       |            |       |       |
| Recommended reading                                      | Basic literature  | <p>Iwan K., Musznicki P., Guziński J., Łuszcz J. Podstawy energoelektroniki. Laboratorium, Biblioteka Cyfrowa PG, ISBN 978-83-7348-398-9 , Rok wydania: 2011.<br/> J. Wiatr, M. Orzechowski, M. Miegoń, A. Przasnyski, Poradnik projektanta systemów zasilania awaryjnego i gwarantowanego, Eaton 2008.</p>   |                               |                          |                   |                               |              |       |       |            |       |       |
|  | Supplementary literature  | <p>J. Wiatr i B. Wiewiórowska-Paradowska, <i>Zasilanie budynków użyteczności publicznej oraz budynków mieszkalnych w energię elektryczną: zasilacze UPS i baterie akumulatorów oraz metodyka ich doboru, układy pomiarowe zużytej energii</i>. Warszawa: Grupa MEDIUM, 2024.<br/> M. Świerżewski, <i>Zasilanie awaryjne i bezprzerwowe urządzeń elektrycznych</i> . Warszawa: Wiedza i Praktyka, 2021.</p> <p>T. Sutkowski, <i>Rezerwowe i bezprzerwowe zasilanie w energię elektryczną. Urządzenia i układy, COSiW SEP 2007</i>.<br/> J. Wiatr, M. Miegoń. <i>Zasilacze UPS oraz baterie akumulatorów w układzie zasilania gwarantowanego</i>. DW MEDIUM, 2008.<br/> J. Wiatr, i in., <i>Zespoły prądotwórcze i zasilacze UPS w układach zasilania budynków w energię elektryczną</i>. Grupa MEDIUM, 2015.<br/> PN-EN 62040-3 <i>Systemy bezprzerwowego zasilania (UPS)</i><br/> A. King, W. Knight. <i>Uninterruptible Power Supplies</i>. MCGRAW HILL BOOK CO, 2002.</p> |                               |                          |                   |                               |              |       |       |            |       |       |
|  | eResources addresses  | Adresy na platformie eNauczanie:  |                               |                          |                   |                               |              |       |       |            |       |       |
| Example issues/ example questions/ tasks being completed |   |   |                               |                          |                   |                               |              |       |       |            |       |       |
| Work placement   | Not applicable  |   |                               |                          |                   |                               |              |       |       |            |       |       |

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