



Subject card

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|---|--|--|------------------------------|-------------------------------------|--|------------|-----|
| Subject name and code | Quality of Electric Energy, PG_00038377 | | | | | | |
| Field of study | Electrical Engineering | | | | | | |
| Date of commencement of studies | October 2023 | Academic year of realisation of subject | | | 2023/2024 | | |
| Education level | second-cycle studies | Subject group | | | Optional subject group Subject group related to scientific research in the field of study | | |
| 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 | Power Quality assessment skills Power quality measurements skills | | | | | | |
| Learning outcomes | Course outcome | Subject outcome | | | Method of verification | | |
| | K7_W02 | Knowledge in the field of power quality. | | | [SW1] Assessment of factual knowledge | | |
| | K7_U08 | Is able to assess the power quality. | | | [SU1] Assessment of task fulfilment | | |
| | K7_U05 | Is able to measure power quality. | | | [SU1] Assessment of task fulfilment | | |
| | K7_K02 | Understanding the influence of power quality on the electromagnetic environment. | | | [SK5] Assessment of ability to solve problems that arise in practice | | |
| Subject contents | Methods of power quality indices defining. Sources of harmonics and inter-harmonics in power system. Influence of power electronics converters on power quality. Methods of power quality improvement - passive and active filtering. Simulation analysis of non-linear load on voltage quality. Analysis of exemplary power quality long-term-recording data. | | | | | | |
| Prerequisites and co-requisites | | | | | | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | | | Percentage of the final grade | | |
| | Semester/diploma dissertation | 50.0% | | | 50.0% | | |
| | Analysis and test report | 50.0% | | | 25.0% | | |
| | Midterm colloquium | 50.0% | | | 25.0% | | |

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| Recommended reading | Basic literature | <ol style="list-style-type: none"> 1. Kowalski Z.: Jakość energii elektrycznej. Wyd. Politechniki Łódzkiej 2007. 2. Strzelecki R., Benysek G.: Power Electronics in Smart Electrical Energy Networks. Springer 2008. 3. Strzelecki R., Supronowicz H.: Współczynnik mocy w systemach zasilania prądu przemiennego i metody jego poprawy. Wyd. Politechniki Warszawskiej 2007. 4. A. Kempki: Elektromagnetyczne zaburzenia przewodzone w układach napędów przekształtnikowych. Oficyna Wydawnicza Uniwersytetu Zielonogórskiego 2005. 5. R. Smoleński: Conducted Electromagnetic Interference (EMI) in Smart Grids. Springer 2012. 6. Gregorio Romero Rey and Luisa Martinez Muneta (Ed.) Power Quality Harmonics Analysis and Real Measurements Data . , Croatia : InTech, 2011. 7. Ahmed Zobaa, Mario Mañana Canteli and Ramesh Bansal: Power Quality Monitoring, Analysis and Enhancement. InTech 2011. |
| | Supplementary literature | <ol style="list-style-type: none"> 1. Baggini A.: Handbook of Power Quality. John Wiley & Sons 2008. 2. Benysek G.: Improvement in the Quality of Delivery of Electrical Energy using Power Electronics Systems. Springer 2007. 3. Hanzelka Z., Bień A.: Power quality application guide : harmonics, interharmonics. European Copper Institute, Brussels 2004. |
| | eResources addresses | Adresy na platformie eNauczanie: |
| Example issues/ example questions/ tasks being completed | Analysis of long term record of power quality indices | |
| Work placement | Not applicable | |