

| <b>STUDY MODULE DESCRIPTION FORM</b>  |  |  |
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| Name of the module/subject<br><b>(-)</b>  |  | Code<br><b>1010311261010316900</b>   |
| Field of study<br><b>Electrical Engineering</b>   | Profile of study<br>(general academic, practical)<br><b>(brak)</b> | Year /Semester<br><b>3 / 6</b>   |
| Elective path/specialty<br><b>Networks and Electric Power Systems</b>   | Subject offered in:<br><b>polish</b>                               | Course (compulsory, elective)<br><b>obligatory</b>   |
| Cycle of study:<br><b>First-cycle studies</b>   | Form of study (full-time, part-time)<br><b>full-time</b>           |  |
| No. of hours<br>Lecture: <b>1</b> Classes: <b>-</b> Laboratory: <b>2</b> Project/seminars: <b>-</b>   |  | No. of credits<br><b>3</b>   |
| Status of the course in the study program (Basic, major, other)<br><b>(brak)</b>  |  | (university-wide, from another field)<br><b>(brak)</b>   |
| Education areas and fields of science and art<br><b>technical sciences</b><br><b>Technical sciences</b>   |  | ECTS distribution (number and %)<br><b>3 100%</b><br><b>3 100%</b>   |
| <b>Responsible for subject / lecturer:</b><br>dr inż. Bogdan Staszak<br>email: bogdan.staszak@put.poznan.pl<br>tel. +48 616 652 635<br>Wydział Elektryczny<br>ul. Piotrowo 3A 60-965 Poznań   |  | <b>Responsible for subject / lecturer:</b><br>dr inż. Andrzej Kwapisz<br>email: andrzej.kwapisz@put.poznan.pl<br>tel. +48 616 652 2559<br>Wydział Elektryczny<br>ul. Piotrowo 3A 60-965 Poznań |
| <b>Prerequisites in terms of knowledge, skills and social competencies:</b>   |  |  |
| <b>1</b>  | <b>Knowledge</b>   | Knows the basic mathematical models of electrical power devices , knows the power system operating conditions, know technology of electrical power generation, transmission and distribution   |
| <b>2</b>  | <b>Skills</b>  | Has ability to model some elements of the power system, is able to create applications using structured and object-oriented programming methods  |
| <b>3</b>  | <b>Social competencies</b>   | Can organize and participate in team work  |
| <b>Assumptions and objectives of the course:</b><br>Knowledge of methods and programs for design, develop and operation of the power grid, knowledge methods of measurement and analysis used in the electrical power engineering   |  |  |
| <b>Study outcomes and reference to the educational results for a field of study</b>   |  |  |
| <b>Knowledge:</b><br>1. Has knowledge of programming and use of software tools for engineering tasks - [K_W08 ++]<br>2. He the knowledge on the implementation of energy measurements in objects using digital technology - [K_W11 ++]<br>3. He knows the structure of the power system and the phenomenas accompanying to generation, transmission and distribution of electrical energy - [K_W24 +++] |  |  |
| <b>Skills:</b><br>1. He can use the software tools in the process of supporting the operation of the power grid - [K_U10 ++]<br>2. Is able to create procedures, algorithms and computer programs to aid the design and operation of the power grid - [K_U22 +]   |  |  |
| <b>Social competencies:</b><br>1. Understands the importance of the impact of engineer jobs for environmental and the associated liability - [K_K02 ++]   |  |  |
| <b>Assessment methods of study outcomes</b>   |  |  |

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| <p>Lecture<br/> evaluation of the knowledge and skills on the basis of written tests,<br/> classroom activity rewarding.</p> <p>Laboratory:<br/> tests and written tests,<br/> evaluation of knowledge and skills related to the accomplishment practice task,<br/> evaluation of report from performed exercise.</p> <p>Obtainment of extra points for the activity in the classroom, in particular for:<br/> effectiveness of the application of acquired knowledge during studies,<br/> ability to work within a team performing the detailed practice task in the laboratory,<br/> contribution to the achievement of the tasks.</p> |                             |             |
| <b>Course description</b>  |                             |             |
| <p>Programs for computer aided power network design (equipment selection, drawing diagrams). The use of phasor and synchrophasor to assess the state of the grid. Measurement methods used to determine the operating parameters of the power system, measurement data acquisition, analysis and visualization the results of measurements of electrical and non-electrical quantities. The use of database systems for grid inventory</p>   |                             |             |
| <b>Basic bibliography:</b>   |                             |             |
| <ol style="list-style-type: none"> <li>1. Kujarczyk Sz., Nowoczesne metody obliczeń elektroenergetycznych sieci rozdzielczych, WNT, 1997</li> <li>2. Kulczycki J., Optymalizacja struktur sieci elektroenergetycznych. Wybrane metody obliczeń, WNT, 1990</li> <li>3. Tomaszewski M., red. Bartodziej G., Problemy rozległych awarii sieci elektroenergetycznych, Wydawnictwo NOWA ENERGIA, 2010</li> <li>4. Wiśniewski Z., Red. Przanowski W., Brodziński W., Projektowanie sieci elektroenergetycznych (Tom 1, 2 i 3), Wydawnictwo PŁ, 1979</li> </ol>   |                             |             |
| <b>Additional bibliography:</b>  |                             |             |
| <b>Result of average student's workload</b>  |                             |             |
| <b>Activity</b>  | <b>Time (working hours)</b> |             |
| 1. participation in class lectures   | 9                           |             |
| 2. participation in laboratory classes   | 18                          |             |
| 3. participate in the consultations on the lecture   | 4                           |             |
| 4. participate in the consultations on the laboratory  | 4                           |             |
| 5. preparation laboratory reports  | 9                           |             |
| 6. preparation to the laboratory classes   | 4                           |             |
| 7. preparation of home work  | 4                           |             |
| 8. prepare for the completion of laboratory  | 3                           |             |
| 9. completion of laboratory classes  | 2                           |             |
| 10. preparation for the completion of lecture classes  | 4                           |             |
| 11. completion of lecture classes  | 2                           |             |
| 12. student's selfmanaged work   | 10                          |             |
| <b>Student's workload</b>  |                             |             |
| <b>Source of workload</b>  | <b>hours</b>                | <b>ECTS</b> |
| Total workload   | 73                          | 3           |
| Contact hours  | 39                          | 1           |
| Practical activities   | 52                          | 1           |