

| <b>STUDY MODULE DESCRIPTION FORM</b>   |  |  |
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| Name of the module/subject<br><b>Electronics and Power Electronics</b>   |  | Code<br><b>1010322311010323752</b>   |
| Field of study<br><b>Electrical Engineering</b>  | Profile of study<br>(general academic, practical)<br><b>(brak)</b> | Year /Semester<br><b>1 / 1</b>   |
| Elective path/specialty<br><b>-</b>  | Subject offered in:<br><b>Polish</b>                               | Course (compulsory, elective)<br><b>obligatory</b>   |
| Cycle of study:<br><b>Second-cycle studies</b>   | Form of study (full-time, part-time)<br><b>full-time</b>           |  |
| No. of hours<br>Lecture: <b>30</b> Classes: <b>-</b> Laboratory: <b>15</b> Project/seminars: <b>-</b>  |  | No. of credits<br><b>4</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>2 50%</b><br><b>2 50%</b>   |
| <b>Responsible for subject / lecturer:</b><br><br>dr hab. inż. Ryszard Porada, prof. nadzw.<br>email: ryszard.porada@put.poznan.pl<br>tel. 48 61 665 2360<br>Wydział Elektryczny<br>ul. Piotrowo 3A 60-965 Poznań  |  |  |
| <b>Prerequisites in terms of knowledge, skills and social competencies:</b>  |  |  |
| 1  | <b>Knowledge</b>   | It has basic knowledge from mathematics, physics, the electrotechnology, the electronics and the power electronics   |
| 2  | <b>Skills</b>  | It knows to apply the knowledge from the range of mathematics, physics, electrical engineering, electronics and power electronics                            |
| 3  | <b>Social competencies</b>   | There has the consciousness of the necessity of extending of her competences, a readiness to collection of the cooperation within the framework of the group |
| <b>Assumptions and objectives of the course:</b><br>The introduction with the operation, with properties, with characteristics and methods of analysis and designings of complex and special electronic systems and of power electronics                 |  |  |
| <b>Study outcomes and reference to the educational results for a field of study</b>  |  |  |
| <b>Knowledge:</b>  |  |  |
| 1. to use the knowledge on the subject constructions and operations of power electronics systems and their uses in chosen branches of industry - [K_W12+++]  |  |  |
| 2. to characterize advanced criteria of the analysis and the synthesis for simple and complex power electronics systems - [K_W12 +++ K_W18 ++]   |  |  |
| <b>Skills:</b>   |  |  |
| 1. to use the knowledge within the range constructions and mechanisms of action of elements and power electronics systems - [K_U03 ++ K_U06 +++]   |  |  |
| 2. to use known methods and mathematical models and computer simulations to the analysis and the evaluation of the operation of elements and advanced power electronics systems - [K_U06++ K_U12 ++]   |  |  |
| <b>Social competencies:</b>  |  |  |
| 1. Has the consciousness of the importance and the understands different aspects and results of activity of electrician engineer in this of the influence on the medium, and related to this of the responsibility for undertaken decisions - [K_K01 ++] |  |  |
| <b>Assessment methods of study outcomes</b>  |  |  |

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| <p>Lecture</p> <p>? the credit of the lecture preceded with the credit of occupations laboratory exercises and project,</p> <p>Designing work and laboratory exercises:</p> <p>? the test and awarding the knowledge of need-to-know to realization of placed problems in the given area of tasks,</p> <p>? verification skills on every exercises</p> <p>? evaluation of the knowledge and skills related to the realization of laboratory exercise, the evaluation of the report from done exercises.</p> <p>Obtaining additional points for activity during exercises, in particular way for:</p> <p>? proposing to discuss additional aspects of the subject</p> <p>? effective use of knowledge obtained during solving of given problem;</p> <p>? comments related to improve teaching material,</p> <p>? aesthetics of solved problems and reports ? within homework.</p> |                             |             |
| <b>Course description</b>  |                             |             |
| <p>Complex power electronics rectifier systems - the operation, the mathematical description, characteristics. Systems of thyristor rectifier reversing - compensatory currents and their restriction. Direct converters of the frequency (cycleconvertors). Matrix converters. Power electronics feed systems with the direct current. Feeders stabilized. AC/DC converters , resonant converters, DC/AC converters. Power electronics systems of warranted feed. Modern methods and technologies of the improvement of the quality of the feed. Active systems compensation. Converters about improved energy indicators.</p>  |                             |             |
| <p><b>Basic bibliography:</b></p> <ol style="list-style-type: none"> <li>1. Barlik R., Nowak M., Technika tyrystorowa, Wydawnictwa Naukowo-Techniczne, Warszawa 1997.</li> <li>2. Frąckowiak L., Januszewski S., Energoelektronika. Cz. 1, Półprzewodnikowe przyrządy i moduły energoelektroniczne, Wydawnictwo Politechniki Poznańskiej, Poznań 2001.</li> <li>3. Mikołajuk K., Podstawy analizy obwodów energoelektronicznych, Państwowe Wydawnictwo Naukowe, Warszawa 1998.</li> <li>4. Mohan N., Undeland N., Robins W., Power Electronics, Jon Wiley &amp; Sons Inc., New York 1999.</li> <li>5. Tunia H., Smirnow A., Nowak M., Barlik R., Układy energoelektroniczne. Obliczanie, modelowanie, projektowanie, Wydawnictwa Naukowo-Techniczne, Warszawa 1982.</li> </ol>   |                             |             |
| <p><b>Additional bibliography:</b></p> <ol style="list-style-type: none"> <li>1. Frąckowiak L., Energoelektronika. Cz. 2, Wydawnictwo Politechniki Poznańskiej, Poznań 2000.</li> <li>2. Kaźmierkowski M., Krishnan R., Blaabjerg H., Control in Power Electronics, Academic Press, Amsterdam 2002.</li> <li>3. Piróg S., Energoelektronika, Uczelniane Wydawnictwa Naukowo-Dydaktyczne AGH, Kraków 1998.</li> <li>4. Strzelecki R., Supronowicz H., Współczynnik mocy w systemach zasilania prądu przemiennego i metody jego poprawy, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2000.</li> </ol>   |                             |             |
| <b>Result of average student's workload</b>  |                             |             |
| <b>Activity</b>  | <b>Time (working hours)</b> |             |
| 1. participation in the lectures   | 30                          |             |
| 2. participation in the laboratory exercises   | 15                          |             |
| 3. participation in consultations on the lecture   | 10                          |             |
| 4. participation in consultations on the laboratory exercises  | 10                          |             |
| 5. preparation for the laboratory exercises  | 15                          |             |
| 6. preparation for the exam  | 20                          |             |
| 7. preparation for the laboratory exercises pass   | 10                          |             |
| 8. participation in the exam   | 5                           |             |
| <b>Student's workload</b>  |                             |             |
| <b>Source of workload</b>  | <b>hours</b>                | <b>ECTS</b> |
| Total workload   | 110                         | 4           |
| Contact hours  | 70                          | 2           |
| Practical activities   | 15                          | 1           |