

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>(-)</b>		Code <b>1010314481010328886</b>
Field of study <b>Power Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>4 / 8</b>
Elective path/specialty <b>Sustainable Development of Power</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>part-time</b>	
No. of hours Lecture: <b>18</b> Classes: <b>-</b> Laboratory: <b>9</b> Project/seminars: <b>-</b>		No. of credits <b>4</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>4 100%</b> <b>4 100%</b>
<b>Responsible for subject / lecturer:</b>  dr hab. inż. Grzegorz Wiczyński email: grzegorz.wiczyński@put.poznan.pl tel. 616652639 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Basic knowledge in the scope of algebra, mathematical analysis, physics, electrotechnics, electronics, computer science and metrology.
2	<b>Skills</b>	Ability to the efficient self-education in the area concerning the subject
3	<b>Social competencies</b>	Awareness of the necessity of competencies broadening and ability to show readiness to submit cooperation in a team
<b>Assumptions and objectives of the course:</b> Knowledge of basic problems with evaluation of power quality.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. Ability to explain the principles and techniques measuring signals acquisition for applications in industry and biomedical engineering - [K_W03 ++] 2. Ability to characterize the importance and application possibilities of the modern measuring systems - [K_W05 +]		
<b>Skills:</b> 1. Ability to work independently and as a team in design and construction companies, laboratories, research and industrial centres - [K_U05 ++] 2. Ability to design the measuring systems creatively, using possibilities offered by new technologies, taking into account limitations concerned with present level of knowledge and technique - [K_U09 +, K_U22 +]		
<b>Social competencies:</b> 1. Ability to think and act enterprisingly in the area of measuring systems to be used in industry - [K_K01 +] 2. Understanding the need of broad popularization of the knowledge in the scope of simple and complex measuring systems - [K_K05 +]		
<b>Assessment methods of study outcomes</b>		

<p>Lectures:</p> <ul style="list-style-type: none"> <li>- evaluation of the knowledge with the tests related to the content of lectures (test, computational and problem questions), awarding marks in laboratory exercises)</li> <li>- continuous estimation in all classes (awarding attendance in lectures, activity and quality of perception).</li> </ul> <p>Laboratory exercises:</p> <ul style="list-style-type: none"> <li>- continuous estimating with the tests,</li> <li>- awarding the skill increase,</li> <li>- the evaluation of knowledge and skills connected with the measuring tasks and prepared reports</li> </ul>		
<b>Course description</b>		
<p>Updating 2017:</p> <p>Methods of education are orientated to students to motivate them to participate actively in education process by discussion and reports.</p> <p>Lectures:</p> <p>Multimedia presentations expanded by examples shown on a board. Activity of students is taken into consideration in final students evaluation. Theoretical questions are presented in the exact reference to the practice.</p> <p>Laboratory:</p> <p>Detailed reviewing of particular exercises reports. Realization of laboratory tasks in teams, taking into account the specific computational experiments covering:</p> <ul style="list-style-type: none"> <li>- Current legal and standard status of evaluation of power quality in power grid - definitions, terms, quantities, units (standard point of view).</li> <li>- Flickermeter ? construction and application.</li> <li>- Metrological and useful attributes and testing of the modern systems for evaluation of power quality.</li> <li>- Examples of power quality analysers.</li> <li>- Evaluation of power quality based on results of measurements recorded in power grid.</li> <li>- Inaccuracy of measurements of the quantities describing power quality.</li> </ul>		
<p><b>Basic bibliography:</b></p> <ol style="list-style-type: none"> <li>1. S. Bolkowski, Elektrotechnika, Wyd. Szkolne i Pedagogiczne, Warszawa 2009.</li> <li>2. Z. Kowalski, Jakość energii elektrycznej, WPL, Łódź 2007</li> </ol>		
<p><b>Additional bibliography:</b></p> <ol style="list-style-type: none"> <li>1. G. Wiczyński, Badanie wahań napięcia w sieciach elektrycznych, Seria Rozprawy, nr 438, Wyd. Politechniki Poznańskiej, Poznań 2010</li> <li>2. Dokument harmonizacyjny HD 60027-1:2004, CENELEC 2004.</li> <li>3. Aktualne Rozporządzenie Ministra Gospodarki w sprawie szczegółowych warunków przyłączenia podmiotów do sieci elektroenergetycznych, ruchu i eksploatacji tych sieci, normy dotyczące kompatybilności elektromagnetycznej: PN-EN 50160, PN-EN 61000-4-30, PN-EN 61000-4-15, PN-EN 61000-4-7</li> </ol>		
<b>Result of average student's workload</b>		
<b>Activity</b>	<b>Time (working hours)</b>	
1. Participation in lectures	18	
2. Participation in laboratory exercises	9	
3. Participation in consulting with the lecturer	3	
4. Preparation to laboratory exercises and preparation of the reports	35	
5. Preparation to the credit	32	
<b>Student's workload</b>		
<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	97	4
Contact hours	47	2
Practical activities	24	1