

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Evaluation of power quality</b>		Code <b>1010321371010325954</b>
Field of study <b>Electrical Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>4 / 7</b>
Elective path/specialty <b>Measurement Systems in Industry and</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>full-time</b>	
No. of hours Lecture: <b>15</b> Classes: <b>-</b> Laboratory: <b>15</b> Project/seminars: <b>-</b>		No. of credits <b>3</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>3 100%</b> <b>3 100%</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>		
<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	15	
2. Participation in laboratory exercises	15	
3. Participation in consulting with the lecturer	15	
4. Preparation to laboratory exercises and preparation of the reports	20	
5. Preparation to the credit	17	
<b>Student's workload</b>		
<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	82	3
Contact hours	42	2
Practical activities	35	1