

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Evaluation of power quality		Code 1010321371010325954
Field of study Electrical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 4 / 7
Elective path/specialty Measurement Systems in Industry and	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 15 Classes: - Laboratory: 15 Project/seminars: -		No. of credits 3
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 3 100% 3 100%
Responsible for subject / lecturer: dr hab. inż. Grzegorz Wiczyński email: grzegorz.wiczyński@put.poznan.pl tel. 616652639 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge in the scope of algebra, mathematical analysis, physics, electrotechnics, electronics, computer science and metrology.
2	Skills	Ability to the efficient self-education in the area concerning the subject
3	Social competencies	Awareness of the necessity of competencies broadening and ability to show readiness to submit cooperation in a team
Assumptions and objectives of the course: Knowledge of basic problems with evaluation of power quality.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 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 +]		
Skills: 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 +]		
Social competencies: 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 +]		
Assessment methods of study outcomes		

<p>Lectures:</p> <ul style="list-style-type: none"> - evaluation of the knowledge with the tests related to the content of lectures (test, computational and problem questions), awarding marks in laboratory exercises) - continuous estimation in all classes (awarding attendance in lectures, activity and quality of perception). <p>Laboratory exercises:</p> <ul style="list-style-type: none"> - continuous estimating with the tests, - awarding the skill increase, - the evaluation of knowledge and skills connected with the measuring tasks and prepared reports 		
Course description		
<p>Updating 2017: Methods of education are orientated to students to motivate them to participate actively in education process by discussion and reports.</p> <p>Lectures: 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: 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"> - Current legal and standard status of evaluation of power quality in power grid - definitions, terms, quantities, units (standard point of view). - Flickermeter ? construction and application. - Metrological and useful attributes and testing of the modern systems for evaluation of power quality. - Examples of power quality analysers. - Evaluation of power quality based on results of measurements recorded in power grid. - Inaccuracy of measurements of the quantities describing power quality. 		
<p>Basic bibliography:</p> <ol style="list-style-type: none"> 1. S. Bolkowski, Elektrotechnika, Wyd. Szkolne i Pedagogiczne, Warszawa 2009. 2. Z. Kowalski, Jakość energii elektrycznej, WPL, Łódź 2007 		
<p>Additional bibliography:</p> <ol style="list-style-type: none"> 1. G. Wiczyński, Badanie wahań napięcia w sieciach elektrycznych, Seria Rozprawy, nr 438, Wyd. Politechniki Poznańskiej, Poznań 2010 2. Dokument harmonizacyjny HD 60027-1:2004, CENELEC 2004. 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 		
Result of average student's workload		
Activity	Time (working hours)	
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	
Student's workload		
Source of workload	hours	ECTS
Total workload	82	3
Contact hours	42	2
Practical activities	35	1