

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Evaluation of power quality		Code 1010324391010325954
Field of study Electrical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 5 / 9
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) part-time	
No. of hours Lecture: 9 Classes: - Laboratory: 9 Project/seminars: -		No. of credits 2
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 %) 2 100% 2 100%
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	9	
2. Participation in laboratory exercises	9	
3. Participation in consulting with the lecturer	3	
4. Preparation to laboratory exercises and preparation of the reports	32	
5. Preparation to the credit	12	
Student's workload		
Source of workload	hours	ECTS
Total workload	64	2
Contact hours	21	1
Practical activities	41	2