

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Measurements in electrical installations		Code 1010311361010315999
Field of study Electrical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 3 / 6
Elective path/specialty Distribution Devices and Electrical	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: - Classes: - Laboratory: 30 Project/seminars: 15		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		ECTS distribution (number and %)
Responsible for subject / lecturer: prof. dr hab. inż. Aniela Kamińska-Benmechernene email: Aniela.Kaminska@put.poznan.pl tel. 61 665 2584 Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge on electrical engineering, electrical metrology, electrical devices and its safety using, ergonomics.
2	Skills	Able to perform simple measurement of electrical quantities and presented the results graphically, read electrical wiring schemes.
3	Social competencies	A sense of the need to broaden the competence and willingness to work together in a team.
Assumptions and objectives of the course: Knowledge of rules and requirements of measurements in electrical installation. Experiment planning and skill purchase to design of testing set-up. Selection of measurement instrument, realization of test set-up, researches performing and results analyzing.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. He has ordered knowledge of the methodology of measurements and properties and operation of modern measuring equipment, know the elements of the theory of errors and the uncertainty of measurement results - [K_W05++]		
Skills: 1. He can choose the appropriate method and use the measuring devices (analogue and digital) to perform the calculation of basic measurable characteristic electrical engineering - [K_U14++] 2. Applies the principles of safety and health at work - [K_U21+]		
Social competencies: 1. Correctly identifies and resolves dilemmas related to the profession - [K_K06+]		
Assessment methods of study outcomes		

<p>Design exercises: Assessment: -of knowledge of the objectives and scope of measurements realization in electrical installation, -to develop test set-up, experiment planning and select measurement instrument, -to perform analyze of measurement and testing results.</p> <p>Laboratory exercises: Assessment of: -experiment planning, -experimental set-up and devices selection, -experiment carry out and analyzing of results using modern methods and software, -measurement accuracy analysis, physical and mathematical description and conclusions.</p> <p>Getting extra points for the activity during seminar, and in particular for: -teamwork developing set-up for testing electrical installation, -teamwork implementation of the extended experiment, -the use of modern methods to describe measurement results, mathematical and physical analysis and proposing the extended conclusions.</p>	
Course description	
<p>Principles of measurements in electrical installations. Methods and measurement instruments used in receiving and maintenance testing of electrical devices and installations. Testing of measures protection against electric shock in LV installations. Building Telecommunication Cabling testing: testing models (channel, basic link and permanent link), scope and testing parameters, uncertainty of results. Designing of set-up for investigation and testing electrical devices and installations. Update 2017: measurement and visualization in the KNX system Applied methods of education: lectures with multimedia presentation, interactive lecture with questions to student group and initiation of discussion</p>	
<p>Basic bibliography:</p> <ol style="list-style-type: none"> 1. H. Markiewicz, Instalacje elektryczne, WNT, Warszawa 2012 2. F. Łasak, Wykonywanie odbiorczych i okresowych sprawdzeń w instalacjach elektrycznych niskiego napięcia (nowelizacja styczeń 2014 r.) http://sep.com.pl/opracowania/opracowania_wykonywanie_pomiarow.pdf 3. F. Łasak, Zmiany w wymaganiach dotyczących ochrony przeciwporażeniowej i sprawdzania instalacji niskiego napięcia, wynikające z norm oraz błędy popełniane przy sprawdzaniu instalacji http://www.sep.gliwice.pl/WPIS_13/TEKST/KONF_04_13/7_f_lasak.pdf 4. E. Musiał, Pomiary odbiorcze i eksploatacyjne zapewniające bezpieczeństwo przy urządzeniach elektroenergetycznych, 2010 5. A. Urbanek, Ilustrowany leksykon teleinformatyka, Warszawa 2001 	
<p>Additional bibliography:</p> <ol style="list-style-type: none"> 1. PN-HD 60364-6:2008 Instalacje elektryczne niskiego napięcia 2. Ustawa z dnia 11 maja 2001r. Prawo o miarach (Dz.U.2004.243.2441- tekst jednolity z późn. zm.) 3. Rozporządzenie Ministra Infrastruktury z dnia 12 kwietnia 2002 r. w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie (Dz.U. 2002. 75. 69, zmiana Dz.U. 2009. 56. 461) 4. PN-EN 50346 Technika informatyczna. Instalacja okablowania. Badanie zainstalowanego okablowania 5. L. Muszyński, A. Kamińska, Pomiary i wizualizacja światła dziennego w systemie KNX, Przegląd Elektrotechniczny, Vol. 2017, No 10, 2017 	
Result of average student's workload	
Activity	Time (working hours)
1. participation in the project activities	15
2. participation in the laboratory exercises	15
3. participation in the consulting on the project and laboratory exercises	4
4. preparation of test set-up, selection of devices and measurement instruments	12
5. preparation to the laboratory exercises	4
6. preparation of practical exercises report	10
7. preparation to the written test	16
8. participation in the test	0
Student's workload	

Source of workload	hours	ECTS
Total workload	78	3
Contact hours	36	2
Practical activities	52	3