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 **technical sciences**		ECTS distribution (number and %) **3 100%**

Responsible for subject / lecturer:

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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

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.

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.

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.

Course description

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.

Basic bibliography:

1. H. Markiewicz, Instalacje elektryczne, WNT, Warszawa 2000
2. F. Łasak, Pomiary w instalacjach elektrycznych o napięciu do 1kV, zeszyt 23/2009
3. F. Łasak, Błędy popełniane przy badaniach i pomiarach elektrycznych, Warszawa 2006
4. E. Musiał, Pomiary odbiorcze i eksploatacyjne zapewniające bezpieczeństwo przy urządzeniach elektroenergetycznych, 2010
5. A. Urbanek, Ilustrowany leksykon teleinformatyka, Warszawa 2001

Additional bibliography:

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

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