STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Metrology		**1010321341010320556**
Field of study	Profile of study (general academic, practical)	Year /Semester
Electrical Engineering	**(brak)**	**2 / 4**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**
Cycle of study:	Form of study (full-time,part-time)	
First-cycle studies	**full-time**	
No. of hours		No. of credits
Lecture: **-** Classes: **-** Laboratory: **15** Project/seminars: **-**		**1**
Status of the course in the study program (Basic, major, other)	(university-wide, from another field)	
(brak)	**(brak)**	
Education areas and fields of science and art		ECTS distribution (number and %)
technical sciences		**1 100%**
Technical sciences		**1 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of mathematics, physics, electrotechnics and electronics
2	**Skills**	Ability to realize the efficient self-education in the area related to the chosen field of studies
3	**Social competencies**	Awareness of the necessity of broadening of the competencesin the field of electrical engineering and willingness to cooperate in a team

Assumptions and objectives of the course:

Knowledge of measurement methodology, attributes of modern measuring devices and equipment, principles of using analog and digital measuring devices, and evaluation of measurement results

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Ability to describe principles of methodology of electrical quantities measurements made with basic analog and digital devices - [K_W05 +++, KW_14 ++]
2. Ability to explain a principle of the proper choice of elements of a simple set for measurements of electrical quantities - [K_W05 ++, K_W19 +]

Skills:

1. Ability to use the basic electrical measuring devices in accordance with operating manuals and to explain appropriate operation of the simple measuring systems - [K_U02 ++]
2. Ability to made a simple measuring task and evaluate the inaccuracy of the obtained results - [K_U02 +]

Social competencies:

1. Ability to think and act in the enterprising way in the area of measuring engineering - [K_K03 +]

Assessment methods of study outcomes

Laboratory exercises:
- continuous estimating with the tests,
- awarding the skill increase,
- the evaluation of knowledge and skills connected with the measuring tasks and prepared reports

Getting additional points for the activity during classes, in particular:
- the efficiency of the use of acquired knowledge to solve a given problem;
- skill of the co-operation within the team practically realizing a given detailed task in the laboratory;
- remarks connected with the improvement of didactic materials;
- the aesthetic qualities of the reports

Course description

Planning and accomplishment of measuring tasks. Electromechanical and electronic measuring devices. Analog and digital measurements of electrical quantities.

Measurements of alternating voltage. Testing of a voltmeter equipped with the double-integration A/D converter. Application of analog oscciloscope in measurements. Examples of measurements of electrical quantities. Interpretation of measurement results and estimation of their inaccuracy.

Basic bibliography:

1. A. Cysewska-Sobusiak - Podstawy metrologii i inżynierii pomiarowej, Wyd. Politechniki Poznańskiej, Poznań 2010
2. A. Chwaleba, M. Poniński, A. Siedlecki - Metrologia elektryczna, wyd. 9 zm., WNT, Warszawa 2009
3. J. Rydzewski - Pomiary oscyloskopowe, WNT, Warszawa 2007
4. A. Cysewska-Sobusiak, Z. Krawiecki, A. Odon, P. Otomański, D. Turzeniecka, G. Wiczyński - Laboratorium z metrologii elektrycznej i elektronicznej, Wydawnictwo Politechniki Poznańskiej, Poznań 2000

Additional bibliography:

1. S. Bolkowski - Elektrotechnika, Wydawnictwa Szkolne i Pedagogiczne, Warszawa 2009
2. S. Tumański - Technika pomiarowa, WNT, Warszawa 2007
3. T. Zieliński - Cyfrowe przetwarzanie sygnałów. Od teorii do zastosowań, WKŁ, Warszawa 2007
4. www.bipm.org
5. www.gum.gov.pl

Result of average student's workload

Activity	Time (working hours)
1. Participation in laboratory exercises	15
2. Participation in consulting with a teacher	9
3. Preparation to laboratory exercises and preparation of the reports	15

Student's workload

Source of workload	hours	ECTS
Total workload	39	1
Contact hours	24	1
Practical activities	30	1