COURSE DESCRIPTION CARD - SYLLABUS

Course name
Metrology

Course

Field of study
Electrical Engineering
Area of study (specialization)
-
Level of study
First-cycle studies
Form of study
full-time
Year/Semester
2/3
Profile of study
general academic
Course offered in
Polish
Requirements
compulsory

Number of hours

Lecture
15
Laboratory classes
30
Other (e.g. online)
0
Tutorials
0
Projects/seminars
0

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:
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Prerequisites

Basic knowledge of mathematics, physics, electrotechnics, electronics and metrology. Ability to realize the efficient self-education in the area related to the chosen field of studies. Awareness of the necessity of broadening of the competencesin the field of electrical engineering and willingness to cooperate in a team.

Course objective

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

Course-related learning outcomes

Knowledge

1. Ability to describe principles of methodology of electrical quantities measurements made with basic analog and digital devices.

2. Ability to explain a principle of the proper choice of elements of a simple set for measurements of electrical quantities

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.

2. Ability to made a simple measuring task and evaluate the inaccuracy of the obtained results

Social competences

1. Ability to think and act in the enterprising way in the area of measuring engineering.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: Assessment of the knowledge demonstrated on the written or oral exam in the field of the lectures content. Passing threshold: 50% of points. Rewarding grades from laboratory exercises and the presence, activity and quality of perception during the lecture.

Laboratory: Assessment of classes on the basis of:
- tests and bonuses for knowledge necessary to implement the problems posed in the area of laboratory tasks,
- continuous assessment during each class
- rewarding the increase in the ability to use the learned rules and methods,
- assessment of knowledge and skills related to the implementation of the measurement task, assessment of the report on the performed exercise.

Programme content

Lectures: Methods of education are orientated to students to motivate them to participate actively in education process by discussion and reports. 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

Laboratory: Methods of education are orientated to students to motivate them to participate actively in education process by discussion and reports. 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

Teaching methods

Lectures: Multimedia presentations expanded by examples shown on a board.

Laboratory: Multimedia presentations expanded by examples shown on a board and realization of experiments

Bibliography

Basic

1. A. Cysewska-Sobusiak - Podstawy metrologii i inżynierii pomiarowej, Wyd. Politechniki Poznańskiej, Poznań 2010.

2. A. Chwaleba, M. Poniński, A. Siedlecki - Metrologia elektryczna, WNT, Warszawa 2014.

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.

5. P. Otomański, Z. Krawiecki: Wykorzystanie środowiska LabVIEW do oceny niepewności rozszerzonej wyniku pomiaru rezystancji, Pomiary Automatyka Kontrola nr 12/2011, str. 1561 – 1563, 2011.

6. P. Otomański, M. Lepczyk: Niepewność rozszerzona jako miara niedokładności w pomiarach wybranych wielkości elektrycznych, Poznan University of Technology Academic Journals, Electrical Engineering, vol. 89, pp. 249 – 258, 2017.

7. Hulewicz A., Rozwiązania układowe oraz parametry detektorów wartości szczytowej, Elektronika, nr 7 2014, s. 149-153.

8. Hulewicz A., Krawiecki Z., Narzędzia statystyczne w procesie normalizacji wyników pomiarów, Poznan University of Technology Academic Journals, Electrical Engineering No 88, Computer Applications in Electrical Engineering 2016, Poznan 2016, s. 251-260.

Additional

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. T. Skubis, Podstawy metrologicznej interpretacji wyników pomiarów, Wydawnictwo Politechniki Śląskiej, Gliwice, 2004

5. Międzynarodowy Słownik Podstawowych i Ogólnych Terminów Metrologii, Główny Urząd Miar, Warszawa, 1996

6. www.bipm.org

7. www.gum.gov.pl

Breakdown of average student's workload

	Hours	ECTS
Total workload	110	4,0
Classes requiring direct contact with the teacher	60	2,0
Student's own work (literature studies, preparation for laboratory classes~~/tutorials~~, preparation for ~~tests/~~exam~~, project preparation~~) [1]	50	2,0

[1] delete or add other activities as appropriate