COURSE DESCRIPTION CARD - SYLLABUS

Course name
Metrology [N1Eltech1>Metr2]

Course

Field of study
Electrical Engineering

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
20

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

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:

Learning outcomes presented above are verified as follows:
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

Programme content

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 osccilloscope 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	4,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	65	2,00