Metrology in mechanical and electrical I - opis przedmiotu

Informacje ogólne

Nazwa przedmiotu	Metrology in mechanical and electrical I
Kod przedmiotu	06.9-WM-ZIIP-ZL-ANG-D-16_20
Wydział	Wydział Nauk Inżynieryjno-Technicznych
Kierunek	Management and Production Engineering
Profil	ogólnoakademicki
Rodzaj studiów	drugiego stopnia z tyt. magistra inżyniera
Semestr rozpoczęcia	semestr zimowy 2023/2024

Informacje o przedmiocie

Semestr	2
Liczba punktów ECTS do zdobycia	4
Typ przedmiotu	obowiązkowy
Język nauczania	angielski
Sylabus opracował	• dr inż. Mariusz Krajewski

Formy zajęć

Forma zajęć	Liczba godzin w semestrze (stacjonarne)	Liczba godzin w tygodniu (stacjonarne)	Liczba godzin w semestrze (niestacjonarne)	Liczba godzin w tygodniu (niestacjonarne)	Forma zaliczenia
Laboratorium	30	2	-	-	Zaliczenie na ocenę
Wykład	15	1	-	-	Zaliczenie na ocenę

Cel przedmiotu

- to familiarize students with issues of a measurement teory and system of measure and standards.

- to shape skills in the development of measurement results and estimation of errors and measurement uncertainty.

- to familiarize students with the methods and instruments for measuring selected electrical quantities.

- introduction to a classification, a structure and properties of measurement systems.

Wymagania wstępne

Zakres tematyczny

Lecture:

W1: Basic concepts in metrology. Measurement scales and measurement units

W2: Selected quantity standards. Measurement methods and their accuracy

W3-4: Errors, type A and type B measurement uncertainties, corrections, measurement results. General information on mathematical modelling of objects and phenomena

W5: Measurements of selected electric quantities. Quantities characterizing electric signals. Static and dynamic properties of measurement instruments

W6: Voltages and currents measurements. Methods and systems for measuring resistance and impedance. Measurements of frequency, period, time and phase shift angle. Power measurements.

W7: Introduction to measurement systems. Measurement system definition. Classification of measurement systems. Configuring computer measurement systems. Interfaces. Examples of measurement system implementations

Lababoratory:

L1: Discussion of topics of exercises, working conditions and safety of work with measuring equipment used in the laboratory

L2-3: Direct and indirect measurements of basic electrical quantities

L3-4: Electronic oscilloscope

L5-6: Analysis of the accuracy of the measurement result.

L6-7: Modeling of phenomena and objects

L8-9: Test of static properties of measuring transducers. Test of dynamic properties of temperature sensors

L9-10: Rotation speed measurement. Force measurement

L11-12: Frequency and time measurements

L12-13: Digital voltmeter

L14-15: Working off the exercise. Passing classes

Metody kształcenia

Lecture: conventional lecture
Laboratory: laboratory exercises

Efekty uczenia się i metody weryfikacji osiągania efektów uczenia się

Opis efektu	Symbole efektów	Metody weryfikacji	Forma zajęć
Student is able to define basic concepts in metrology. Explains methods and recognizes instruments for measuring selected electrical quantities. Lists and characterizes measuring systems	• K_W18	• kolokwium	• Wykład
Student evaluats errors and measurement uncertainity. Develops measurement results.	• K_U02	• wykonanie sprawozdań laboratoryjnych	• Laboratorium

Warunki zaliczenia

Lecture – the condition for passing the course is obtaining a positive grades in written tests carried out at least once a semester.

Laboratory – to receive a final passing grade student has to receive positive grades in all laboratory exercises.

Calculation of the final grade: lecture 50% + laboratory 50%

Literatura podstawowa

1. Kularatna M.: Digital and analogue instrumentation testing and measurement. The Institution of Engineering and Technology. London 2008.

2. Webster J. G.: Electrical Measurement, Signal Processing, And Displays. CRC Press, 2004.

3. Tumanski S.: Principles of electrical measurement. Taylor & Francis, 2006.

4. Rabinovich S. G.: Evaluating Measurement Accuracy, Springer Science+Business Media, LLC 2010.

Literatura uzupełniająca

Uwagi

Zmodyfikowane przez dr inż. Mariusz Krajewski (ostatnia modyfikacja: 20-04-2023 09:51)