

Metrology - opis przedmiotu

Informacje ogólne	
Nazwa przedmiotu	Metrology
Kod przedmiotu	06.2-WE-ELEKTP-Metrol-Er
Wydział	Wydział Nauk Inżynieryjno-Technicznych
Kierunek	Elektrotechnika
Profil	ogólnoakademicki
Rodzaj studiów	Program Erasmus pierwszego stopnia
Semestr rozpoczęcia	semestr zimowy 2021/2022

Informacje o przedmiocie	
Semestr	4
Liczba punktów ECTS do zdobycia	4
Typ przedmiotu	obowiązkowy
Język nauczania	angielski
Sylabus opracował	• prof. dr hab. inż. Ryszard Rybski

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
Wykład	30	2	-	-	Egzamin
Laboratorium	30	2	-	-	Zaliczenie na ocenę

Cel przedmiotu

- To familiarize students with measurement methods and construction, principles of operation of analog and digital measuring instruments for selected electrical quantities
- Shaping among students skills in performing simple measurement tasks and developing and interpreting measurement results
- To familiarize with the classification, construction and characteristics of measurement systems

Wymagania wstępne

Fundamentals of electrical engineering, Fundamentals of electronics, Fundamentals of metrology

Zakres tematyczny

Analog, analog-to-digital and digital-to-analog signal processing. Principle of operation and metrological properties of basic analog function operators. Sampling and quantizing. Sample and hold, analog-to-digital and digital-to-analog converters.

Measurements of voltages and currents. Electronic voltmeters and digital voltmeters. Zero measurement method: Compensation measurement of voltage and current. Comparative methods.

Methods and systems for measuring resistance and impedance. Technical methods. DC and AC bridges methods. Transformer bridges. Unbalanced bridges.

Measurements of frequency, period, time and angle of phase shift. Analog and digital methods of measurement and period and frequency. Digital frequency meters and phase meter.

DC and AC power and energy measurements in single- and three-phase systems.

Principle of power and energy measurement. Electrodynamometer wattmeter. Voltage and current measurement transformer. Electronic power measuring instruments. Measurement of active and reactive power in three-phase systems. Electronic energy meters.

Registration of electrical signals. Analog and digital oscilloscope. Signal recorders for measuring signals.

Testing of electrotechnical materials, semiconductors and dielectrics. Measurement of the properties of magnetic materials.

Computer measuring systems. General characteristics of measuring systems. Types and configurations of computerized measuring systems. Basic functional blocks of computer measurement systems: measurement cards, intelligent sensors. Interfaces.

Metody kształcenia

Lecture: conventional lecture, problem lecture, discussion

Laboratory: working with source document, group work, laboratory exercises

Efekty uczenia się i metody weryfikacji osiągnięcia efektów uczenia się

Opis efektu	Symbole efektów Metody weryfikacji	Forma zajęć
Student is able to use measuring instruments and perform simple measurement tasks and interpret measured results	<ul style="list-style-type: none"> bieżąca kontrola na zajęciach sprawdzian 	<ul style="list-style-type: none"> Laboratorium
Student is able to choose the method and measuring instruments for simple measurement tasks	<ul style="list-style-type: none"> bieżąca kontrola na zajęciach sprawdzian 	<ul style="list-style-type: none"> Laboratorium
Student can explain the principle of operation of analog and digital measuring instruments intended for measuring basic electrical quantities	<ul style="list-style-type: none"> egzamin - ustny, opisowy, testowy i inne 	<ul style="list-style-type: none"> Wykład
Student can present and characterize the basic types and configurations of measurement systems	<ul style="list-style-type: none"> egzamin - ustny, opisowy, testowy i inne 	<ul style="list-style-type: none"> Wykład

Warunki zaliczenia

Lecture – the credit is given for obtaining 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 provided for in the laboratory syllabus.

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

Literatura podstawowa

1. Tumanski S.: Principles of electrical measurement. Taylor & Francis, 2006
2. Bhargawa S.C: Electrical measuring instruments and measurements. CRC Press, 2012
3. Vetelino J., Reghu A.: Introduction to sensors. CRC Press, 2010
4. Fraden J.: Handbook of modern sensors. Springer, 2016.

Literatura uzupełniająca

1. Skubis T.: Fundamentals of measurement results metrological interpretation. Published by Silesian University of Technology, Gliwice, 2004 (in Polish)

Uwagi

Zmodyfikowane przez dr hab. inż. Paweł Szcześniak, prof. UZ (ostatnia modyfikacja: 08-07-2021 21:49)

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