Digital measurement systems - opis przedmiotu

Informacje ogólne

Nazwa przedmiotu	Digital measurement systems
Kod przedmiotu	06.5-WE-ELEKTP-DigMeasS-Er
Wydział	Wydział Informatyki, Elektrotechniki i Automatyki
Kierunek	Elektrotechnika
Profil	ogólnoakademicki
Rodzaj studiów	Program Erasmus pierwszego stopnia
Semestr rozpoczęcia	semestr zimowy 2019/2020

Informacje o przedmiocie

Semestr	6
Liczba punktów ECTS do zdobycia	4
Typ przedmiotu	obieralny
Język nauczania	angielski
Sylabus opracował	• dr inż. Leszek Furmankiewicz

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	-	-	Zaliczenie na ocenę
Laboratorium	30	2	-	-	Zaliczenie na ocenę

Cel przedmiotu

- To provide knowledge about: the measurement systems organization, principle of operation and characteristics of measurement systems elements.
- To provide knowledge about the communication standards used in wired and wireless measurement systems.
- Forming skills in the area of software designing for measurement systems.
- Forming skills in the area of hardware structure designing of simple measurement systems and measurement and control systems.

Wymagania wstępne

Metrology, Measurement transducers, Electronic measurement instruments.

Zakres tematyczny

Measuring systems - introduction. Definition, classification, basic tasks, basic configurations, kinds of transmission, methods of transmission coordination, functional blocks of measuring and control systems. Data acquisition systems. Destination of data acquisition systems, configurations, basic functional blocks: conditioning system, multiplexer, measuring amplifier, isolating amplifier, filters. Data acquisition cards, basic functional blocks of the cards. Programming of data acquisition cards . Interfaces of measuring systems: Definition of interface, classification of interfaces, interfaces used in measuring systems. Serial interfaces: RS -232, RS -422, RS -485, serial interfaces programming. Parallel interface IEEE 488: principal tags of IEEE 488 standard, bus of the interface, types of devices. IEEE 488.2 standard. Requirement relating to controller requirements relating to devices, word of status, synchronization of devices. VXI standard. Principal tags of VXI, card chassis, bus of VXI. PXI standard. Principal tags of PXI, card chassis, bus of PXI. SCPI standard. SCPI device model, structure of commands, trigger system, status system. Profile of commands for Example devices. Digital industrial nets. Net: MODBUS, PROFIBUS, PROFInet, CAN. Wireless measuring systems. GSM technology in measuring systems. Radiomodems. BlueTooth and ZigBee standards. Virtual measurement instruments. Definition, structure and basic tags of virtual instruments. Programming of virtual instruments. Metrological and computer characteristics of virtual instruments. Measuring systems programming. Programming of measuring systems using software development environments. Characteristics of integrated environments: LabWindows, LabView, Agillent Vee. VISA library. Visualization systems. Structure of company computer system, functions of SCADA, measuring and control instruments in SCADA, design of visualization systems. Examples of SCADA applications.Design and starting of measuring systems. General principles of design. Task analysis, consolidation of requirements, stages of design. Starting of hardware and starting of software. Failure of measuring systems.

Metody kształcenia

Lecture, laboratory exercises.

Efekty uczenia się i metody weryfikacji osiągania efektów uczenia się

Opis efektu	Symbole efektów	Metody weryfikacji	Forma zajęć
Can design communication software for measurement systems based on fundamental communication interfaces		• bieżąca kontrola na zajęciach • obserwacje i ocena umiejętności praktycznych studenta	• Laboratorium

Opis efektu	Symboleefektów	Metody weryfikacji	Forma zajęć
Can design visualization software for measurement systems with the application of dedicated programming environments		• bieżąca kontrola na zajęciach • obserwacje i ocena umiejętności praktycznych studenta	• Laboratorium
Understands organization principles of measurement and measurementcontrol systems		• test końcowy	• Wykład

Warunki zaliczenia

Lecture – obtaining a positive Grade in written or oral Exam.

Laboratory – the main condition to get a pass are sufficient marks for all exercises and tests conducted during the semester.

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

Literatura podstawowa

1. Winiecki W.: The Organization of Computer Measuring Systems. Warsaw University of Technology Press, Warsaw, 1997 (in Polish).

2. Mielczarek W.: Measuring Instruments and Systems with SCPI Compatibility, Helion, Gliwice 1999 (in Polish).

3. Lesiak P., Świsulski D.: Computer Measuring Technique in Examples, PAK, Warsaw, 2002 (in Polish).

4. Nawrocki W.: Computer Measuring Systems, WKiŁ, Warsaw, 2002 (in Polish).

5. Nawrocki W.: Distributed Measuring Systems, WKŁ, Warsaw 2006 (in Polish).

6. Pietrusiewicz K., Dworak P.: Programmable Automation Controllers PAC. Nakom, Poznań, 2007. (in Polish).

7. Nawrocki W.: Measurement Systems and Sensors. Artech House Publishers, 2005.

8. Bentley J. P.: Principles of Measurement Systems, Pearson Education Limited, Harlow, England, 2005.

9. Caristi A., J.: IEEE-488 General Purpose Instrumentation Bus Manual, Academic Press, INC., San Diego, California, 1992.

Literatura uzupełniająca

1. Lesiak P., Świsulski D.: Computer Measuring Technique in Examples, PAK, Warsaw, 2002 (in Polish).

2. Johnson G.W., Jennings R.: LabView Graphical Programming, MacGraw-Hill, New York, 2006.

Uwagi

Zmodyfikowane przez dr inż. Leszek Furmankiewicz (ostatnia modyfikacja: 28-10-2019 11:32)