Software for measurement and control equipment - course description

General information

Course name	Software for measurement and control equipment
Course ID	11.3-WE-INFP-SoMaCE-Er
Faculty	Faculty of Computer Science, Electrical Engineering and Automatics
Field of study	Computer Science
Education profile	academic
Level of studies	Erasmus programme
Beginning semester	winter term 2017/2018

Course information

Semester	6
ECTS credits to win	4
Course type	obligatory
Teaching language	english
Author of syllabus	• dr inż. Leszek Furmankiewicz

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	15	1	-	-	Credit with grade
Laboratory	30	2	-	-	Credit with grade

Aim of the course

To provide knowledge about organization of measurement systems and measurement and control systems.

To provide knowledge about structures, principles of work and properties of measurement system elements.

Forming the design skills of communication and visualization software for measurement systems and measurement and control systems

Prerequisites

Principles of programming, experiment methodology, computer network, internet applications

otu-szczegowetrecimerytoryczne>To provide knowledge about structures, principles of work and properties of measurement system elements.

Forming the design skills of communication and visualization software for measurement systems and measurement and control systems

Scope

Measurement and control systems - introduction. Classification of measuring systems. Structure and organization of measuring and control systems. Algorithm of measuring system. Selection of programming language and computer aided design tools.

Data transmission standards in measuring systems. Definition and classification of the interface. Interfaces used in measuring systems. Serial interfaces: RS - 232, RS - 422, RS - 485, Serial interface programming. Parallel interface IEEE 488: principal tags of IEEE 488 standard, bus of the interface, state of work reporting. IEEE 488.2 standard. IEEE 488.2 controller programming and IEEE 488.2 driver functions.

Data acquisition systems. Classification and basic functional blocks of the data acquisition systems. Data acquisition systems programming, description of the software functions.

SCPI standard. SCPI device model, structure of commands, trigger system, status system. Profile of commands for example devices.

Software development environments for measuring and control systems programming. Software development environments: LabWindows, LabView, Keysight Vee. VISA I/O library. Software drivers VXIplug&play. IVI drivers.

Virtual measurement instruments. The definition, structure and basic tags of virtual instruments. Virtual instruments programming. Examples of virtual instruments.

Programmable Automation Controllers (PAC). PAC in measuring and control systems as an example of B&R systems. Hardware and software architecture of PAC. Automation Studio - integrated software development environment. Process visualization in PAC.

Internet technologies in measurement and control systems. Embedded WWW servers. Hardware and software profiles of chosen embedded WWW servers.

Teaching methods

Lecture, laboratory exercises.

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form

Outcome description	Outcomesymbols	Methods of verification	The class form
Understands organization principles of measurement systems and operation principles of measurement systems elements		• an evaluation test	• Lecture
Can design visualization software for measurement systems with the application of dedicated programming environments		• an observation and evaluation of the student's practical skills	• Laboratory
Can design communication software for measurement systems based on fundamental communication interfaces		• an observation and evaluation of the student's practical skills	• Laboratory
Can select measurement systems programming tools		• an evaluation test	• Lecture

Assignment conditions

Lecture – the passing condition is to obtain a positive mark from the final test.

Laboratory – the passing condition is to obtain positive marks from all laboratory exercises to be planned during the semester.

Recommended reading

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.: C*omputer Measuring Systems*, WKiŁ, Warsaw, 2002 (in Polish)
5. Rak R., J.: *Virtual Measuring Instrument - Real Tool of Present Metrology,* Warsaw University of Technology Press, Warsaw, 2003 (in Polish)
6. Nawrocki W.: *Distributed Measuring Systems*, WKŁ, Warsaw 2006 (in Polish)
7. Bentley J. P.: *Principles of Measurement Systems*, Pearson Education Limited, Harlow, England, 2005
8. Caristi A., J.: *IEEE-488 General Purpose Instrumentation Bus Manual,* Academic Press, INC., San Diego, California, 1992
9. Johnson G.W., Jennings R.: *LabView Graphical Programming*, MacGraw-Hill, New York, 2006

Further reading

Notes

Modified by dr inż. Leszek Furmankiewicz (last modification: 08-05-2017 12:27)