FACULTY OF ELECTRICAL ENGINEERING

SUBJECT CARD

Name in Polish:	**Komputerowe zarządzanie systemami pomiarowymi**
Name in English:	**Measurement systems management**
Main field of study (if applicable):	**Electrical Engineering**
Specialization (if applicable):	**Industrial Electrical Engineering**
Level and form of studies:	**2nd level, full-time**
Kind of subject:	**optional**
Subject code:	**ELR053308**
Group of courses:	**NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	30		15		
Number of hours of total student workload (CNPS):	60		30		
Form of crediting:	examination		crediting with grade		
For group of courses mark (X) final course:					
Number of ECTS points:	2		1		
including number of ECTS points for practical (P) classes :			1		
including number of ECTS points for direct teacher-student contact (BK) classes:	1.40		0.70		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. He has a basic knowledge of metrology and measurement units, knows basic metrological characteristics of measuring instruments, are knowledgeable about the design of measurement known calculation methods used in developing the measurement results.
2. He has a basic knowledge of the measurement technique.
3. He knows the concepts of programming in C / C + +
4. He is able to do basic measurements of electrical devices using analog and digital oscilloscope. Can set on the basis of measurements of nonlinear characteristics of the elements. Able to present the results in the form of numerical tables and graphics to make their interpretations and draw conclusions
5. He can write C/C++ program

SUBJECT OBJECTIVES

C1. Acquisition of knowledge in the field of architecture test and measurement systems, in particular the underlying hardware and software systems in high-level languages.

C2. Understanding the methodology for designing a control and measurement systems.

C3. Learning how the practical implementation of measurement systems computer managed by an integrated software environment and includes standard interfaces and measuring instruments

C4. Acquisition and consolidation of social skills including emotional intelligence skills involving the cooperation of a group of students with a view to effective problem solving. Responsibility, honesty and fairness in the procedure observance force in academia and society

SUBJECT LEARNING OUTCOMES

relating to knowledge:	
PEU_W01	He has knowledge of the architecture of test and measurement systems.
PEU_W02	He has extensive knowledge in the construction of hardware layer and system programming in high level languages.
PEU_W03	He or she kows and understands the design methodology of control and measurement systems
relating to skills:	
PEU_U01	He has skills practical implementation of measurement systems computer managed by an integrated development environment dedicated
PEU_U02	Can design position measurement testująco containing standard interfaces and devices.
PEU_U03	He or she has skills practical implementation of virtual measurement systems
relating to social competences:	
PEU_K01	He or she is aware of their own responsibility for their work and a willingness to comply with the principles of teamwork. He searches information and its critical analysis, properly identifies and resolves the dilemmas of working in the profession

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours:**
Lec 1	Metrology and Measurement Systems Computer elementary functions. The structure and organization of measurement systems	2
Lec 2	Structure and Operation of digital measuring instruments - multimeter, oscilloscope	2
Lec 3	Logic analizer, spectrum analizer	2
Lec 4	Direct Digital Synthesis Generator and arbitrary waveform generator	2
Lec 5	Serial Interfaces in Measurement systems	2
Lec 6	GPIB (IEEE-488) Interface	2
Lec 7	Wireless network in measurement systems, USB and FireWire (IEEE 1394).	2
Lec 8	VME, VXI and PXI Standard	2
Lec 9	Software of measurement systems - an integrated software environment, discussion of the workings of graphical interfaces	2
Lec 10	SCPI model of instrument	2
Lec 11	Programming measurement systems using a dedicated library VISA and SCPI commands.	2
Lec 12	Distributed measurement and control systems	2
Lec 13	Data acquisition board – block diagram and programming	2
Lec 14	Sensors and signal transducers	2
Lec 15	Measurement synchronization	2
	Total hours:	**30**

Form of classes - laboratory		**Number of hours:**
Lab 1	Presentation of the safety rules and principles of assessment laboratory. Presentation of the laboratory	1
Lab 2	Introduction to the programming environment, VISA and window that allows you to send and receive messages from the measuring devices. Construction of the device ID. Grammar and statement SCPI commands	2
Lab 3	Introduction to the SCPI command tree of oscilloscope and generator or DMM and Power supply. Control the instruments using a instrument Driver or Direct I / O	2
Lab 4	The SCPI status reporting system of devices. Setting masks and registers - handling of oscilloscope and generator or DMM and power supply errors	2
Lab 5	Implementation of the task - automatic determination of filter frequency characteristics or voltage-current characteristic of electronic devices	2
Lab 6	Programming the daq board- part 1. use Daq assistant for data acquisition from the analog-to-digital converter	2
Lab 7	Programming the daq board – part2: setting parameters of data acquisition, triggering sampling result caching, write data to the file	2
Lab 8	Programming a multifunction dac board: Use counters, digital inputs and outputs and analog outputs	2
	Total hours:	**15**

TEACHING TOOLS USED
N1. Traditional Lecture with audio-visual techniques
N2. Laboratory run in the traditional manner of exercises + student groups, a report

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT		
Evaluation *F – forming (during semester)* *P – concluding (at semester end)*	**Educational effect number**	**Way of evaluating educational effect achievement**
F1(W)	PEU_W01 PEU_W02 PEU_W03	Exam
P(W)	P=F1	
F1(L)	PEU_U01 PEU_U02 PEU_U03 PEU_K01	Average assessment of implementation of tasks during laboratory classes
P(L)	P=F1	

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] Winiecki W., Organizacja komputerowych systemów pomiarowych, Oficyna wydawnicza Politechniki Warszawskiej, Warszawa 1997.
[2] Mielczarek W.- Urządzenia pomiarowe i systemy kompatybilne ze standardem SCPI – Helion 1999
[3] Nawrocki W.- Rozproszone systemy pomiarowe- WKŁ 2006
[4] Świsulski D- Komputerowa technika pomiarowa. Oprogramowanie wirtualnych przyrządów pomiarowych w LabVIEW – PAK 2005
[5] Świsulski D- Komputerowa technika pomiarowa w przykładach – PAK 2002
[6] Tłaczała W.: Środowisko LabVIEW w eksperymencie wspomaganym komputerowo. WNT, Warszawa 2002

SECONDARY LITERATURE:

[1] Winiecki W., Nowak J., Stanik S.: Graficzne zintegrowane środowiska programowania do projektowania komputerowych systemów pomiarowo-kontrolnych. Wyd. Mikom, Warszawa 2001.
[2] Bogusz J..: Lokalne interfejsy szeregowe w systemach cyfrowych – Wydawnictwo BTC, Warszawa 2004
[3] Mielczarek W. Szeregowe interfejsy cyfrowe, Helion, Gliwice 1993;
[4] Mielczarek W -USB : uniwersalny interfejs szeregowy, Helion, Gliwice 2005.
[5] Mielczarek W - Szeregowy interfejs cyfrowy FireWire : standardy IEEE 1394,. Wydawnictwo Politechnik Śląskiej, Gliwice 2010
[6] Daniluk A.- USB : praktyczne programowanie z Windows API w C++ Helion, Gliwice 2009

SUBJECT SUPERVISOR

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