FACULTY OF ELECTRICAL ENGINEERING

SUBJECT CARD

Name in Polish:	**Graficzne środowiska inżynierskie i języki programowania wizualnego**
Name in English:	**Visual Engineering Environments and Graphical Languages**
Main field of study (if applicable):	**Electrical Engineering**
Specialization (if applicable):	**Renewable Energy Systems**
Level and form of studies:	**2nd level, full-time**
Kind of subject:	**optional**
Subject code:	**ELR051230**
Group of courses:	**NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	15		30		
Number of hours of total student workload (CNPS):	30		90		
Form of crediting:	examination		crediting with grade		
For group of courses mark (X) final course:					
Number of ECTS points:	1		3		
including number of ECTS points for practical (P) classes :			3		
including number of ECTS points for direct teacher-student contact (BK) classes:	0.70		2.10		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Has the basic knowledge related to programming languages including data types and structures, operators, functions and procedures as well as objects.
2. Is computer-literate and has the high comfort level with using MS Windows operating system.
3. Is able to speak English and is familiar with English technical terminology at intermediate level required to comprehend and understand information and matters given during lectures and laboratory tutorials as well as well to communicate effectively and to discuss technical issues with lecturer as well as with other students.

SUBJECT OBJECTIVES

C1. To make a student acquainted with methodology and rules of graphical object-oriented programming language using selected development environment.

C2. To let a student acquire practical knowledge and skills required for writing computer applications using graphical programming language.

C3. Promotion of teamwork and team programming.

SUBJECT LEARNING OUTCOMES

relating to knowledge:

PEU_W01 Being able to explain and describe the concept of object-oriented graphical programming.

PEU_W02 Being able to characterize basic and advanced objects and graphical functional blocks offered by a selected visual object-oriented programming language.

relating to skills:

PEU_U01 Being able to develop an algorithm to solve computational and remote-control-related problem taking into account specific requirements of visual object-oriented programming language.

PEU_U02 Being able to implement the develop algorithm in the form of a program prepared, run, tested and optimized in the selected visual object-oriented programming language.

relating to social competences:

PEU_K01 Is open to team work idea and is determined to co-operate in a team.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours:**
Lec 1	Introductory information: basic requirements, rules and forms of credition. Review on the “visual” software packages: high-level languages, process visualization tools, integrated programming and development environments, graphical languages. Concept of object-oriented graphical programming. Objects and their mutual connections as the syntax of graphical programming. Rules of data flow, sequencing, multithreading.	2
Lec 2	Local and global variables, registers, containers, input and output terminals. Data types and structures. Data conversion and promotion/demotion rules. Functions and user objects, user objects nesting and dependency.	2
Lec 3	Basic objects and functional blocks: their classification, inputs and outputs, functionality and hints on their use.	2
Lec 4	Advanced mathematical, statistical and signal processing objects and functions. Text and binary file processing objects.	2
Lec 5	Data exchange and control of external programs: ActiveX automation, .NET compliancy, Matlab engine control, network solutions. Communication and control of external devices, control of digital communication interfaces.	2
Lec 6	Communication and device control using SCPI, VISA, ModBus. IVI device standards. Virtual instrument idea, instrument drivers. Graphical user interface and data visualization.	2
Lec 7	Principles, tips and tricks helpful in designing data processing and control programs. Efficiency and speed optimization issues. Special solutions for improving execution speed and numerical processing power, „embedded” and „real-time” applications.	2
Lec 8	Overview of selected practical applications and realizations (related e.g. to data manipulation, image processing and computer-controlled measurement and automation).	1
	Total hours:	**15**

Form of classes - laboratory		**Number of hours:**
Lab 1	Basic operations within visual engineering environment package. Program editing (loading, linking and deleting objects, creation of new user objects and user functions), edition of terminals and definition of data types. Running a program, searching for and correction of errors, preview of container content and data flow.	2
Lab 2	Practical presentation of application and operation of basic objects and functional blocks offered by the visual programming environment – students are requested to fulfill mini-programming tasks (including puzzle game, reaction speed tester, primes generator, visualize computing results, create files documenting measurements, processing of data read from a file).	16
Lab 3	Presentation of the test tasks and their allocation for student groups. Preparation of test task application: elaboration of algorithms, implementation in the visual object-oriented programming environment.	10
Lab 4	Group presentation of the application implementing the allocated test tasks. An overview and discussion of the developed algorithms and programming solutions.	2
	Total hours:	**30**

TEACHING TOOLS USED
N1. Lectures given using traditional as well as modern audiovisual techniques (including multimedia presentations).
N2. Demonstration of device functionality and operation, demonstration of software package functionality, configuration and options.
N3. Hands-on computing experience with software package during laboratory tutorials supervised by the lecturer.
N4. Consultation (with the lecturer).
N5. Team work and working on one’s own using demo version of the visual software package made available to students.

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	Oral examination.
P(W)	P=F1	
F1(L)	PEU_U01 PEU_U02	Assessment of the completed algorithm, its implementation in a selected graphical programming language and operation of the completed program.
F2(L)	PEU_K01	Assessment of the incurred workload into achievements of the student group.
P(L)	P=0,7F1+0,3F2	

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] R. Helsel, Graphical programming-a tutorial for HP Vee, Prentice Hall PTR, London, 1995.
[2] W. Tłaczała, Środowisko LabView w eksperymencie wspomaganym komputerowo, WNT, Warszawa 2002.
[3] R. H. Bishop, LabView Student edition 6i, Upper Sadle River, Prentice-Hall 2001.

SECONDARY LITERATURE:

[1] W. Winiecki, Organizacja komputerowych systemów pomiarowych. WPW, Warszawa 1997.
[2] L. U. Wells, LabView for everyone: graphical programming made even easier, Upper Saddle River, Prentice Hall 1997.
[3] related information and services provided by Agilent and National Instruments companies available at their websites.

SUBJECT SUPERVISOR

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