Zał. nr 4 do ZW 64/2012

FACULTY of **Computer Science and Management**/ DEPARTMENT……

SUBJECT CARD

Name in Polish: Architektura i Organizacja Komputerów
Name in English: Computer Architecture and Organization
Main field of study (if applicable): Informatics
Specialization (if applicable):
Level and form of studies: 1st/ ~~2nd*~~ level, full-time / ~~part-time~~*
Kind of subject: obligatory ~~/ optional / university-wide*~~
Subject code INZ000253Wl
Group of courses YES ~~/ NO*~~

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	60		90		
Form of crediting	Examination / ~~crediting with grade*~~	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*	Examination / crediting with grade*
For group of courses mark (X) final course	X				
Number of ECTS points	3		3		
including number of ECTS points for practical (P) classes	0		3		
including number of ECTS points for direct teacher-student contact (BK) classes	1,8		1,8		

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of computer systems organization and design of combinational and sequential circuits
2. Programming skills at a basic level

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SUBJECT OBJECTIVES

C1 Acquainting students with the architecture of modern computers, including the memory organization, and evaluation of their performance

C2 Acquisition of skills to design and construct simple combinational and sequential circuits

C3 Acquisition of programming skills in assembly language of selected processor at a basic level

C4 Acquisition of the ability to apply the principles of health and safety work

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 Knows different computer architectures including the architecture of the parallel computers

PEK_W02 Knows the computer memory organization, especially memory cache

PEK_ W03 Knows the basics of pipeline processing, including how to solve the problems associated with this type of processing

PEK_W04 Knows the basic methods of evaluating the performance of parallel computers

relating to skills:

PEK_U01 Is able to write simple programs in assembly language of selected processor

PEK_U02 Can design and build simple combinational and sequential circuits

PEK_U03 Is able to use the principles of safety and health at work

relating to social competences:

PEK_K01…

PROGRAMME CONTENT

Form of classes - lecture		**Number of hours**
Lec 1	Introduction - taxonomy of computer architectures, memory hierarchy. Harvard, Princeton and Harvard-Princeton architectures.	2
Lec 2	RISC computer organization: pipelining, cache memory, control unit.	2
Lec 3	Architecture and organization of the chosen RISC processor.	2
Lec 4	Instruction set of the chosen RISC processor, the fundamentals of assembler programming.	2
Lec 5	Working environment. Programming in assembly language I.	2
Lec 6	Programming in assembly language II.	
Lec 7	Advanced assembly programming techniques.	2
Lec 8	Memory organization, cache memory – methods if it's realization (associative, direct mapped, set-associative) – examples	2
Lec 9	Virtual memory – paging, segmentation – examples.	2
Lec 10	Pipeline processing, identification of conflicts and it's avoiding, , automatic reordering of program execution.	2
Lec 11	Delay branches, branch prediction algorithms	2
Lec 12	Multiprocessor and multicomputer systems – distributed and shared memory, vector processors.	2
Lec 13	Static and dynamic interconnection networks, used topologies, routing mechanisms.	2
Lec 14	System evaluation: performance metrics, system scalability, Amdhal's Low.	2

Lec 15	. New trends in computer architecture.	2
	Total hours	30

Form of classes - class		Number of hours
Cl 1		
Cl 2		
..		
	Total hours	

Form of classes - laboratory		Number of hours
Lab1	Presentation of lab scope, presentation of grading principles, training from health and safety at work. Familiarization with laboratory tool used for the realization of combinational and sequential circuits.	2
Lab2	Introductory laboratory - the analysis of the chosen circuit	2
Lab3	Designing of combinational circuits I	2
Lab4	Designing of combinational circuits II	2
Lab5	The analysis of systems with static hazard	2
Lab6	The analysis of the synchronous circuit	2
Lab7	The synthesis of the synchronous circuit	2
Lab8	Introduction to the lab in assembly language programming, familiarization with the working environment	2
Lab9	Implementation of a simple program in assembler, running it in different execution modes, observing the contents of the registers during program execution.	2
Lab10	Implementation of a program that uses conditional branches	2
Lab11	Familiarization with the implementation of different iteration instructions in assembly language	2
Lab12	Familiarization with arrays implementation in assembly language.	2
Lab13	Familiarization with procedures implementation in assembly language.	2
Lab14	Implementation of a program that used nested procedures.	2
Lab15	Implementation of a program with floating point operations	2
	Total hours	30

Form of classes - project		Number of hours
Proj1		
Proj2		
	Total hours	

Form of classes - seminar		Number of hours
Sem1		
Sem2		
…		
	Total hours	

TEACHING TOOLS USED

N1. Lecture supported by multimedia presentations (slideshow)
N2. SPIM and MIPS32 Simulator - http://pages.cs.wisc.edu/ ~ Larus / spim.html
N3. MARS (MIPS Assembler and Runtime Simulator) - http://courses.missouristate.edu/KenVollmar/MARS/
N4. Mounting plates allowing realization of combinational and sequential circuits

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation(F – forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1 – (lecture)	PEK_W01 PEK_W02 PEK_W03 PEK_W04	Quizzes during the lecture, student activity during the lecture, students answering on questions during lecture
F2 – (switching theory laboratory) - (Lab1- Lab7)	PEK_U01 PEK_U03	Checking of student preparation for exercise realization, assessment (points allocated) the reports of the exercises
F3 – (assembly programming laboratory) - (Lab8- Lab15)	PEK_U02 PEK_U03	Evaluation of the quality of submitted by students programs, implementation during the laboratory additional tasks formulated during the laboratory (on-line programing

P - final exam, the final assessment will be issued on the basis of partial grades (points) received from the final exam (E) and the evaluation of F1, F2, F3 as follows:

Grade = 40% * E + 10% * F1 + 25% * F2 + 25% * F3

In order to receive a positive grade from each activity is required to obtain at least 40% of the points.

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] D. Patterson, J. Hennessy, Computer Organization and design, Elsevier
[2] Technical documentation available on the Web related to MIPS, Intel and AMD processors
[3] W. Stallings, „Computer Organization and Architecture", Prentice-Hall International
[4] L. Null, J. Lobur, „The Essentials of Computer Organization and Architecture", Jones and Bartleet Pub. 2003

SECONDARY LITERATURE:

[1] D. Patterson, J. Hennessy, "Computer Architecture – a Quantitave Approach", Elsevier

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Computer Systems Architecture

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY

Informatics

AND SPECIALIZATION

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01 (knowledge)	K1INF_W08	C1	Lec1, Lec2, Lec3, Lec12, Lec13, Lec15	N1
PEK_W02	K1INF_W08	C1	Lec2, Lec8, Lec9	N1
PEK_W03	K1INF_W08	C1	Lec2, Lec10, Lec11	N1
PEK_W04	K1INF_W08	C1	Lec14	N1
PEK_U01 (skills)	K1INF_U06	C3	Lec4, Lec5, Lec6, Lec7, Lab8 – Lab15	N1, N2, N3
PEK_U02	K1INF_U06	C2	Lab1- Lab7	N4
PEK_U03	K1INF_U14	C4	Lab1 – Lab15	N2,N3,N4
PEK_K01 (competences)				

** - enter symbols for main-field-of-study/specialization educational effects

*** - from table above