Bialystok University of Technology									
Field of study	**Computer Science**							**Degree level and programme type**	**Engineer's degree full-time programme**
Specialization/ diploma path	**---**							**Study profile**	academic
Course name	**Computer Organization and Architecture**							**Course code**	**FCS-00011**
								Course type	obligatory
Forms and number of hours of tuition	L	C	LC	P	SW	FW	S	**Semester**	3
	30				30			**No. of ECTS credits**	**6**
Entry requirements	Digital Circuit Engineering (FCS-00056),								
Course objectives	Course delivers the basic understanding of computer organization: roles of processors, main memory, and input/output devices. Understanding the concept of programs as sequences of machine instructions. Understanding the relationship between assembly language and machine language; development of skill in assembly language programming. Understanding simple data path and control designs for processors. Understanding memory organization, including cache structures and virtual memory schemes. Course include basic machine architecture and design, central processing unit, pipelining, machine representation of instructions and data, addressing techniques, I/O and interrupts, memory organization, and execution of instructions at machine level. Several laboratory assignments will provide hands-on experience on some of the above topics.								
Course content	Lectures History of Calculation and Computer Architecture. Harvard-Princeton Architecture. Complex Instruction Set: programming model and Stack, GPR Architectures. CISC, RISC and x86 family. Simple Instruction Pipelining. Pipeline Hazards Advanced Superscalar Architectures Multilevel Memories - Technology Cache (Memory) Performance Optimization, Cache Coherence and (MPP, UMA, NUMA, MP, SMP). Virtual Memory. I/O and interrupts. VLIW/EPIC: Intel IA-64 Hands-on exercises Principles of using watchdog functionality, programing of alphanumeric LCD display, programing of timers (timers), programing of uart serial communication, programing of ADC, programing of 1-wire serial communication								
Teaching methods	lecture problem, programming, project method,								
Assessment method	The objectives of this course is to teach critical thinking and how to communicate technical concepts in the area of computer systems. These objectives will be met through lectures with final examination and challenging assignments at laboratory and the project classes. Methods for assessing: 1: Traditional writing exam. 2: Team-based assignments (in lab exercises) in which an effective student interaction and effective work-load sharing is required .								

Symbol of learning outcome	**Learning outcomes**	**Reference to the learning outcomes for the field of study**
LO1	should be able to define the concept of computer system architecture and organization, espesially in term of such components as CPU micro-architecture, memory, I/O.	K_W02 K_W03 K_W06
LO2	should be able to jude the performance of computer architectuer affected by a very wide range of design choices	K_W03 K_K04
LO3	should be able to specify and design the simple organization and architecture of the computer system.	K_W03 K_U06 K_U14
LO4	should be able to implement the simple organization and architecture of the computer system with used of the microcontolres and its starting kits board	K_U05 K_U11 K_U14 K_K03
LO5	should be able to write assemble assembly language programs, assemble into machine a cross assembler utility and download and run their program on the training boards that will provide solutions real-world control problems.	K_U05
LO6	should be able to use Technical Document	K_W14 K_U13

Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	Writing quizzes will be held in class with exact dates determined during the semester.	L
LO2	Writing quizzes will be held in class with exact dates determined during the semester.	L
LO3	Preparing, attending lab and demonstrating to your lab instructor that you have completed the work	Lab
LO4	Preparing, attending lab and demonstrating to your lab instructor that you have completed the work	Lab
LO5	Preparing, attending lab and demonstrating to your lab instructor that you have completed the work. Project report, results and discussion	Lab
LO6	Preparing, attending lab and demonstrating to your lab instructor that you have completed the work. Project report, results and discussion.	Lab

Student workload (in hours)	**No. of hours**
Calculation	
1 - Attendance at lectures -	30
2 - Attendance at laboratories -	30
3 - Preparation for hands on activities -	40
4 - Performance of projects task -	30
5 - Participation in student-teacher sessions -	8
6 - Preparation for the assessment -	10
7 - Presence during assessment -	2
TOTAL:	**150**

Quantitative indicators	**HOURS**	**No. of ECTS credits**

Student workload – activities that require direct teacher participation		70 (5)+(1)+(2)+(7)	2.8
Student workload – practical activities		110 (4)+(3)+(2)+(6)	4.4
Basic references	1. William Stallings, Computer Organization and Architecture: Designing for Performance, Prentice Hall Eighth Edition 2. HENNESSY J.L., PATTERSON D.A., Computer Architecture. A Quantitative Approach, San Mateo CA, Morgan Kaufmann. 3. PATTERSON D.A., HENNESSY J.L., Computer Architecture. Hardware-Software Interface, San Mateo CA, Morgan Kaufmann, 1998.		
Supplementary references	1. Computer Systems: A Programmer’s Perspective, Randal E. Bryant and David O’Hallaron, 2nd Ed, Prentice Hall, 2011		
Organisational unit conducting the course	Department of Digital Media and Computer Graphics	**Date of issuing the programme**	
Author of the programme	dr inż. Mirosław Omieljanowicz	Feb. 17, 2022	

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW – field work,S – seminar