Erasmus Course
Computer Architectures
Description

Vasil Levski National Military University
Doc.: ES/2018/08
Date: 14-09-2019
Origin: BG VELIKO02

Country BULGARIA	Institution Vasil Levski National Military University	Course **Computer Architectures**	ECTS **6.0**
Service **All** Languages **English, Bulgarian**	Minimum Qualification for Lecturers • English: Common European Framework of Reference for Languages (CEFR) Level B1 or NATO STANAG 6001 Level 2. • Adequate pedagogical and psychological competences. • Computer engineer qualification diploma.		
Prerequisites for international participants: • English: Common European Framework of Reference for Languages (CEFR) Level B1 or NATO STANAG Level 2. • Knowledge of Operational Systems.	Goal of the Course: • Learn the Computer design and architectures. • Knowledge of the main features of computer systems. • Learn the computer architectures of the most contemporary classes •Learn the computer organization basics, performance measurement technologies. • Ability to assemble computer systems and do minor fixes.		

Learning outcomes	Knowledge	• Trends in computer systems development and basic methods for computer performance evaluation. • Knowledge of the processor organization with von Neumann's architecture; the principles of scalar, superscalar and parallel architectures and the realization of local parallelism. • Organization of instructions execution and addressing in processors. • Organization of the registry and the main memory, the common mechanisms for organizing and managing the cache memory. • Virtual organization of memory and interaction between the different levels in the hierarchical memory model. • Different architectural solutions in organizing the inter-system data exchange. • Bus-Bridge and hub architecture of the I/O system and interfaces for exchange of information flows. • Architectural characteristics of parallel systems and cloud architectures. • Particularities in organizing parallel calculations in multiprocessor systems.
	Skills	• Able to design the composition and install the main components of a "personal computer" machine. • Able to test and diagnose specific hardware capabilities of different computer architectures based on user needs. • Solve practical problems related to the full functioning of the technological base of different types of computer architectures. • Able to evaluate and draw conclusions about the performance of computer systems in different configurations. • Develop their ability to independently explore problematic issues in the conceptual and technological evolution of computer architectures using information sources. Summarizing the results.

Original: Computer Systems and Technology Department, Artillery, Air Defense and CIS Faculty
Date:__-__-_____
Revised by: Artillery, Air Defense and CIS Faculty Dean - Col. Assoc. Prof. Dilyan Dimitrov
Date:__-__-_____

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Competences	• Describe the principles of von Neumann's architecture. • Capacity to analyze and solve hardware computer troubles. • Capacity to assemble, configure and disassemble desktop computer systems. • Able to provide the required level of security of stored data in terms of access and protection of information. • Able to evaluate computer performance and reliability status of a computer system in different operational environment.

Verification of learning outcomes

- **Tests**: At the end of each topic of the course, students must complete specific theoretical or practice quiz.
- **Exam:** A course exam after completing all the classes.

Course Details		
Main Topic	**Recommended WH**	**Details**
Fundamentals of Design and Analysis in Computer Architectures	14	• Fundamentals of structural design and analysis in computer architectures Database management systems • Processor. Organization and management of processors and ALU • Memory. Organization, main memory management and cache • Analysis of individual architectural classes. Examples of real systems of each class. • Practice Quiz 1
Organization of the implementation of instructions in computer architectures	16	• Addressing methods in computer systems • Organization of the implementation of the instructions in the processors. Parallel execution of the instructions. • Pipeline organization of the instructions. Superscalar Processing • Structure and operating principle of different types of processors. Trends in technology development • Practice Quiz 2
Architectural solutions for system data exchange	16	• Architectural solutions for system data exchange • Organization of the I/O system. Architecture of a self-configuring peripheral system • Bus-Bridge architecture of the I/O system. Hub architecture of the I/O system • Types of system buses. Structure of the motherboard. Installing components of a computer system • BIOS • Practice Quiz 3
Performance of computer systems. Cloud architectures	14	• Performance of computer systems. Multiprocessor systems • Measurement and modeling methods to determine the performance of computer systems • Ware-house Scale Computers and Cloud Architectures • Practice Quiz 4
Additional hours to increase the learning and skills outcomes		
Total	60	

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