


Discipline	MICROPROCESSORS Code: 20 summer semester	
Specialty	SOFTWARE AND INTERNET TECHNOLOGIES	
ECTS credits: 6	Form of assessment: Continuous assessment	
Lecturer	Assoc. prof. PhD Eng. / scientific title/ Zhejno Zhejnov /name/ Room 407TB Phone: +359878148156 E-mail: zh_viv@tu-varna.bg	
Department	COMPUTER SCIENCE AND ENGINEERING	
Faculty	<i>FACULTY OF COMPUTER SCIENCIES AND AUTOMATION</i>	
<p>Learning objectives:</p> <p>The discipline “Microprocessors” is meeting the students in the specialty “Software and Internet Technologies”, Bachelor's degree with the concepts and principles on the microprocessor technique. It is examining the evolution, the spheres for application on the different kinds contemporary microprocessors surnames. The students discuss the popular architectures Intel and ARM. They study presenting the data, the structure on operating devices, the bus organization of the microprocessor system, the main methods for exchange on data, the system of machine commands. The programming model of the microprocessors and peripherals schemes are discussed. The students are learning the registry composition, the interrupt system, I/O system, the addressing modes. During the laboratory exercises they are studying the Assembly language for Intel and ARM microprocessors. Algorithms are discussing, which are the base of linear, branched and cyclic programs. The assembly language programs are writing and then are translating and debugging, using standard software tools. The subroutine technique and input-output exchange of data are used.</p>		
CONTENTS:		

Training Area	Hours lectures	Hours lab. exercises
Development of microelectronic technologies for microprocessor technology. Intel microprocessor architecture timeline. Parameters. ARM architecture.	4	
Internal structure and features of ARM microprocessors. Memory organization. Standard interfaces. Programming model of the microprocessor. Registers, flags and conditional execution. Groups of commands. Operands. Addressing modes. Types of instructions. Interrupts. External interface and interrupt system.	4	
Structure of an Intel microprocessor system. Basic devices and connections. Algorithm of functioning. Internal busses. Programming model of the processor. Types of registers, purpose and classification. Address space organization. Segment registers and forming the effective address. Flags. Modes of operation. SIMD instructions.	4	
Composition, purpose and control of the system bus. Data exchange with the memory. Types of system cycles. Input-output exchange organization. Types of interrupts. Interrupt acknowledge system loop. Interrupt vectors table.	4	
A system of machine commands. Format of machine commands. Addressing modes.	4	
Structure of the FPU. Data formats. Executable operations. Flags. Formats of machine commands for floating point operations. Kinds of memory. Structure of ROM, SRAM, DRAM and control signals. Timing diagrams of memory operations.	4	
Control of the exchange with the peripheral. Structure of a system with a DMA controller. Interface devices for serial and parallel exchange. Organization of the exchange. Application. Standard interfaces in PC and ARM kit.	4	
Development of microprocessor systems. 64-bit architectures. Perspectives and trends for the development of microprocessors.	2	
Programming model of the IA-32 microprocessor. Addressing modes. Data formats. Memory structure. Microprocessor instruction set.		2
ARM microprocessor. Programming model, instruction types and addressing modes. Data representation. Memory structure. ARM instruction set.		2
Creation, translation and execution of an assembly language program. Development tools. Program structure. Debugging and run the program.		2
Data transfer. Change the number format. Arithmetic commands. Linear programs.		2
Program flow control instructions. Unconditional and conditional execution. Branched programs. Cycles.		2
Arrays and structures in the Assembler. Bit manipulation instructions. Programs with loops.		2
First control work.		2
String instructions. Operations on character strings.		2
Arithmetic tasks and data structures processing.		2

Subroutines. Pass the parameters. Stack and stack operations.		2
Input-output instructions. Interrupts. System device programming.		2
External programs. Multi-module programs. Assembler and high-level programming languages.		2
Second control work		2
MMX instructions for IA-32. NEON coprocessor for ARM. Array tasks.		2
Control of GPIO pins in ARM kit. Assembly language program for LED blinking. Sound generation in PC.		2
TOTAL: 45 h	15	30