Faculty of Electrical Engineering / ELECTRONICS, TELECOMMUNICATIONS AND COMPUTERS / BASICS OF COMPUTER ENGINEERING I

Course:	BASICS OF COMPUTER ENGINEERING I			
Course ID	**Course status**	**Semester**	**ECTS credits**	**Lessons** (Lessons+Exercises+Laboratory)
96	Mandatory	1	5	2+1+1
Programs	ELECTRONICS, TELECOMMUNICATIONS AND COMPUTERS			
Prerequisites	No prerequisites required.			
Aims	Introduction to basics of modern computer systems: basics of logical decision making, processing and storing data in a computer, basic functional units of a computer system, as well as basics of a computer design. Furthermore, on laboratory exercises students will be familiarized with basic digital systems.			
Learning outcomes	After passing the exam, it is expected that the student will be able to: 1. recognize numbers written in different systems (binary, octal, hex, BCD, decimal) and perform their conversion; 2. calculate the result of basic arithmetical operations in these various systems; 3. describe in details different formats of data in binary computer (unsigned and signed integers, decimal numbers with fixed and floating point, alphanumeric characters and instructions); 4. interpret the basic postulates, rules and theorems of Boolean algebra, describe the logical expression by Boolean function and find its minimal form; 5. analyze the function of basic and derived logic circuits and switching networks; 6. design basic digital systems - binary adder, multiplexer and decoder, and analyze their functioning; 7. recognize and describe memory elements according to the technology of their production, the most important characteristics (capacity and access time) and hierarchical organization of the general purpose computer system; 8. design high-capacity memory using memory chips with smaller capacity; 9. analyze the operation of the processor and its microprogramming control unit.			
Lecturer / Teaching assistant	Professor Milutin Radonjić, PhD – teacher Boris Marković, M.Sc. – teaching assistant			
Methodology	Lectures, exercises and laboratory exercises, individual work on practical tasks, consultations.			
Plan and program of work				
Preparing week	Preparation and registration of the semester			
I week lectures	Introductory lesson. Numeral systems: binary, octal, hexadecimal. Binary addition.			
I week exercises	Numeral systems: binary, octal, hexadecimal. Binary addition.			
II week lectures	Binary subtraction, multiplication and division. Data format. BCD code. BCD code arithmetic. Character coding.			
II week exercises	Binary subtraction, multiplication and division. BCD code arithmetic.			
III week lectures	Boolean algebra and basic logic elements. Switching functions. Boolean terms and polynomials.			
III week exercises	Boolean algebra and basic logic elements. Switching functions. 1st homework.			
IV week lectures	Logic circuit minimization. Karnaugh maps. Switching logic networks. 1st homework submission.			
IV week exercises	Logic circuit minimization. Karnaugh maps.			
V week lectures	Basic digital systems: basic memory elements – latch and flip flop, timing diagrams.			
V week exercises	Basic digital systems: basic memory elements – latch and flip flop, timing diagrams.			
VI week lectures	Basic digital systems: registers, binary adder/subtractor/multiplikator.			
VI week exercises	Basic digital systems: registers, binary adder/subtractor/multiplikator. 2nd homework.			
VII week lectures	Midterm exam. 2nd homework submission.			
VII week exercises	Midterm exam.			
VIII week lectures	Basic digital systems: comparator, decoder, encoder, multiplexer, demultiplekser.			
VIII week exercises	Basic digital systems: decoder, multiplexer.			
IX week lectures	Memories. Internal construction of RAM. Organization of high capacity RAMs.			
IX week exercises	Basic digital systems: multiplexer, demultiplekser. Organization of high capacity RAMs. 3rd homework.			
X week lectures	Concurrent memory decoding. Memories with magnetic, optical and mechanical media. Memory hierarchy. Submission of 3rd homework.			
X week exercises	Organization of high capacity RAMs. 4th homework.			

XI week lectures	Central processing unit. Control word. Submission of 4th homework.
XI week exercises	Central processing unit. Control word.
XII week lectures	CPU control. Microprogram examples.
XII week exercises	CPU control. Microprogram examples. 5th homework.
XIII week lectures	An example of a simple computer.
XIII week exercises	An example of a simple computer.
XIV week lectures	Correctional midterm exam.
XIV week exercises	Correctional midterm exam.
XV week lectures	Final exam. Submission of 5th homework.
XV week exercises	Final exam.
Student workload	Working hours structure: 2 hours for teaching 1 hour for exercises 1 hour for laboratory exercises 2 hours and 40 minutes for individual work, including consultations.

Per week	**Per semester**
5 credits x 40/30=6 hours and 40 minuts 2 sat(a) theoretical classes 1 sat(a) practical classes 1 excercises **2 hour(s) i 40 minuts** of independent work, including consultations	Classes and final exam: **6 hour(s) i 40 minuts x 16 =106 hour(s) i 40 minuts** Necessary preparation before the beginning of the semester (administration, registration, certification): **6 hour(s) i 40 minuts x 2 =13 hour(s) i 20 minuts** Total workload for the subject: **5 x 30=150 hour(s)** Additional work for exam preparation in the preparing exam period, including taking the remedial exam from 0 to 30 hours (remaining time from the first two items to the total load for the item) **30 hour(s) i 0 minuts** Workload structure: **106 hour(s) i 40 minuts (cources), 13 hour(s) i 20 minuts (preparation), 30 hour(s) i 0 minuts (additional work)**
Student obligations	Lessons attendance is mandatory for students, as well as doing home and laboratory exercises and exams.
Consultations	After lessons.
Literature	Lj. Stanković, V.N. Ivanović, M. Radonjić, Basics of Computer Engineering, Podgorica 2016. M. Radonjić, Basics of Computer Engineering 1 - solved problems, Podgorica 2016.
Examination methods	The forms of knowledge testing and grading: - Laboratory exercises carry 10 points. - The midterm exam carries 60 points. - The final exam carries 30 points. The student gets the passing grade by collecting 50 points at least.
Special remarks	
Comment	

Grade:	F	E	D	C	B	A
Number of points	less than 50 points	greater than or equal to 50 points and less than 60 points	greater than or equal to 60 points and less than 70 points	greater than or equal to 70 points and less than 80 points	greater than or equal to 80 points and less than 90 points	greater than or equal to 90 points