

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Electronics - Electronic Circuits and Embedded Systems		
Type and level of studies		Undergraduate Academic Studies		
The name of the course		Digital System Architecture		
Lecturer (for lectures)		Đorđević Lj. Goran		
Lecturer/associate (for exercises)		Jovanović D. Milica		
Lecturer/associate (for OFE)		Stojanović Z. Igor		
Number of ECTS		5	Course status (obligatory/elective)	Obligatory
Prerequisites	Digital electronics			
Course objectives	The course objective is to teach students with basic principles of digital systems design with emphasis on a hardware description language approach.			
Course outcomes	At the end of this course, students are expected to use techniques, skills and modern engineering tools for digital systems design including: a) simulation of hardware description language-based digital systems designs through electronic design automation software; b) synthesize digital systems designs suitable for implementation on programmable device technologies.			
Course outline				
Theoretical teaching	Introduction to principles of digital circuits and systems design. Overview of design implementation technologies. Programmable device technologies: PLA, CPLD, and FPGA, design flow, electronic design automation software and development tools. Introduction to VHDL: VHDL code structure, design styles, VHDL design units. Lexical elements and objects: data types, signals, variables and arrays, data conversion, operators and attributes. Concurrent statements: WHEN, SELECT, and GENERATE, conceptual diagrams, and synthesis of concurrent code. Sequential code: process, sequential statements IF, CASE, and LOOP, synthesis of sequential code, sequential code for combinational and sequential circuits. Finite state machines: state diagram, algorithmic state machines, state coding, VHDL design of finite state machine. Package and components: statements PACKAGE and COMPONENT, structural and hierarchical design. Functions and procedures			
Practical teaching (exercises, OFE, study and research)	Nine problem sets regarding digital system desing using VHDL will be assigned during the semester:1) understanding FPGA design flow; 2) design entry using schematic editor; 3) VHDL simulation and synthesis; 4) using concurrent statements; 5) using sequential statements; 6) VHDL design of finite state machines; 7) structural design in VHDL; 8) using packages and libraries; 9) using functions and procedures			
Textbooks/references				
1	V. A.			
2	P.P. Chu, „RTL Hardware Design Using VHDL, Coding for Efficiency, Portability, and Scalability“, John Wiley & Sons, Inc. Hoboken, New Jersey, 2006.			
3	Goran Lj. Djordjevic, „Microsystem architectures“, Faculty of Electronic Engineering, Nis, 2009. (in serbian)			
4				
5				
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	1	1	0	0
Teaching methods	Lectures, exercises, laboratory exercises, homework, consultations			
Grade (maximum number of points 100)				
Pre-exam duties		Points	Final exam	Points
Activity during lectures			Written exam	25
Exercises		30	Oral exam	25
Colloquia		20		
Projects				