Specification for the book of courses

Study program	Electrical Engineering and Computer Science		
Module	Electronics		
Type and level of studies	Undergraduate Academic Studies		
The name of the course	Digital Electronics		
Lecturer (for lectures)	Đorđević Lj. Goran, Đošić M. Sandra		
Lecturer/associate (for exercises)	Jovanović D. Milica		
Lecturer/associate (for OFE)	Stojanović Z. Igor, Jovanović D. Borisav		
Number of ECTS	6	**Course status (obligatory/elective)**	Obligatory
Prerequisites			
Course objectives	The course objectives are: a) to teach students with fundamentals of digital system design with emphasis on techniques and methods for analysis and synthesis of combinational and sequential digital circuits, b) to introduce students with basics of memory circuits, programmable logic devices, and data converters.		
Course outcomes	At the end of this course, students should be able to: a) analyse and design combinational and sequential digital circuits by using formal method and basic principles of digital design, b) model simple combinational and sequential digital circuits by using hardware description language, and c) implement simple digital systems in FPGA technology.		
Course outline			
Theoretical teaching	Logic gates and combinational logic networks: logic levels and digital signals, basic logic gates, logic expressions and combinational networks, Boolean algebra, and algebraic manipulation of Boolean expressions. Implementation technologies: MOSFET as switch, CMOS inverter, CMOS logic gates, programmable logic devices (PLA, PAL, and ROM). Combinational building blocks: decoder, multiplexer, encoder, priority encoder, demultiplexer. Arithmetic circuits: half-adder, full-adder, ripple-carry adder, carry look-ahead adder, ripple carry multiplier, array multiplier. Modeling of combinational digital circuits in hardware description language (VHDL). Letches and flip-flops: SR and D latch, master-slave flip-flops, edge triggered flip-flops. Registers: storage register, shift registers, asynchronous and synchronous counters. Sequential circuits: analysis and synthesis of sequential circuits, algorithmic state machine. Modeling of sequential digital circuits in hardware description language. Memory components: RAM (SRAM and DRAM), and ROM. Data conversion: characteristics of data converters, basic architectures of D/A and A/D converters.		
Practical teaching (exercises, OFE, study and research	Practical lectures includes eight laboratory assignments. Each assignment involves: a) the design, modelling and simulation of a module or feature of a digital component, and b) implementation of the module in FPGA by using schematic editor and/or hardware description language.		
Textbooks/references			
1	R.J. Tocci, N. S.Widmer, G. L. Moss, Digital Systems: Principles and Applications, 11th ed., Pearson, July 17, 2010.		
2	S.Brown, Z.Vranesic, Fundamentals of Digital Logic with VHDL Design, 3th ed.,McGraw-Hill Education, April 14, 2008.		
3	Digital electronics - supplementary nodes, available at course web site.		
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Number of classes of active education per week during semester/trimester/year				
Lectures	**Exercises**	**OFE**	**Study and research work**	**Other classes**
2	2	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**	30
Exercises	10	**Oral exam**	30
Colloquia	30		
Projects			