

	Course name: EE215 Logic Design		Department: Electrical and Electronics Engineering				Semester 3
	Methods of Education						Credit (ECTS)
	Lecture	Study Time	Lab	Homework	Project	Exam (incl. Prep.)	Total
39	40	0	10	20	20	129	5
Language	English						
Compulsory/Elective	Compulsory						
Prerequisites	None						
Course Contents	Number systems and codes. Boolean algebra and logic gates, Canonical and Standard forms. Simplification of Boolean functions and their implementation with logic gates. Analysis and design of combinational circuits. Adders, MSI and PLD components, decoders, demultiplexers, encoders, multiplexers. ROMs and PLAs. Introduction to sequential logic. Flip-flops. Analysis of clocked sequential circuits: characteristic tables, state tables and state diagrams, design of clocked sequential circuits. Counters, shift registers, memory elements.						
Course Objective	<ol style="list-style-type: none"> To provide fundamental concepts used in the analysis and design of digital circuits and systems To provide experience to analyze and design of combinational logic circuits To provide experience to experimentally validate combinational logic circuits To provide experience to analyze and design of synchronous sequential circuits To provide experimentally validate synchronous sequential logic circuits To develop skills to work on a project about combinational and/ or synchronous sequential logic circuits To develop skills to prepare effective project report 						
Learning Outcomes and Competences	<p>Students who pass the course will be able to:</p> <ul style="list-style-type: none"> - Perform conversions between number systems, make addition and subtraction in unsigned and complement number systems. - Analyze and design combinational circuits using tools such as Boolean algebra, Karnaugh map, and etc. - Analyze and design arithmetic circuits using half adders, subtractors and full adders, subtractors. - Analyze and design synchronous sequential circuits constructed with flip-flops, shift registers and counters. - Describe combinational circuits using Verilog hardware description language in structural and behavioral forms. - Simulate the Verilog code describing combinational logic using simulation software. - Prepare well written reports. 						
Textbook and /or References	<ol style="list-style-type: none"> M. Morris Mano, Michael D. Ciletti "Digital Design: With an Introduction to the Verilog HDL ", Prentice Hall International, 5th Edition, 2012. John F. Wakerly, "Digital Design, Principles and Practices", Pearson International Edition, 4th Edition, 2007. 						
Assessment Criteria					If any, mark as (X)	Percentage (%)	
	Midterm Exams				X	20	
	Quizzes				X	12	
	Homework				X	3	
	Projects				X	10	
	Term Paper						
	Laboratory work				X	15	
Other							

	Final Exam	X	40
Instructors	Assoc. Prof. Enver ÇAVUŞ		
Weekly Schedule			
Week	Subject		
1	Introduction to Digital Design. Number systems, conversion between binary, decimal, octal, hexadecimal systems. Unsigned and signed numbers.		
2	Two's complement number system. Range of numbers for unsigned, signed magnitude and in two's complement number systems. Overflow issues. Floating point format.		
3	Boolean algebra, Boolean functions, logic gates, Canonical and standard forms. Writing functions from design descriptions.		
4	Minimization of Boolean functions, 3 and 4 variable Karnaugh map method, NAND and NOR implementations, don't care conditions.		
5	Binary adder, subtractor, encoders and decoders.		
6	Multiplexers and demultiplexers.		
7	Combinational Programmable Logic Devices (PAL, PLA, GAL)		
8	S-R Latches, D-latch, D-flip-flop.		
9	Mid-term Exam		
10	Analysis of synchronous sequential circuits with D-flip-flops. Finding characteristic tables, state tables and state diagrams.		
11	Mealy and Moore Finite State Machines		
12	Counters, shift registers.		
13	Memories		
14	Review		
14	Review		