

**School of Engineering and Natural Sciences / Computer Engineering (English)**

**2022 - 2023 Academic Year**

**DIGITAL LOGIC DESIGN**

**Syllabus**

<b>Course Description</b>					
<b>Name</b>	<b>Code</b>	<b>Semester</b>	<b>T+A Hour</b>	<b>Credit</b>	<b>ECTS</b>
DIGITAL LOGIC DESIGN	COE2112504	Fall Semester	3+2	4	8
<b>Prerequisites Courses</b>					
<b>Recommended Elective Courses</b>					
<b>Language of Instruction</b>	English				
<b>Course Level</b>	First Cycle (Bachelor's Degree)				
<b>Course Type</b>	Required				
<b>Course Coordinator</b>	Lect. Mustafa AKTAN				
<b>Name of Lecturer(s)</b>	Lect. Mustafa AKTAN				
<b>Assistant(s)</b>					
<b>Aim</b>	This lecture involves basic digital circuit theory. At the end of the semester, the students will be able to: Conduct an experiment to learn the logic design and prototyping process Write an effective technical report for the lab experiments. Design a digital circuit with combinational and sequential logic components to address a problem Build a prototype of a digital logic circuit and demonstrate that it meets performance specifications. Design an experiment to validate through empirical means one of the following: a hypothesis, a Boolean logic law or identity, dependency among variables, etc. Use state-of-the-art combinational and sequential logic design methodologies, techniques, and paradigms.				
<b>Course Content</b>	This course contains; Course Overview, Number Systems, Addition/Subtraction of Signed Numbers, Logic Gates, Boolean Algebra, Synthesis, Karnaugh Maps, First Half Review, Addition, Subtraction, Multiplication, Combinational Circuits, Sequential Circuits, Registers and Counters, Memory and Programmable Logic, Implementation Technology, Hardware Description Language.				
<b>Course Learning Outcomes</b>			<b>Teaching Methods</b>	<b>Assessment Methods</b>	
Students will be able to design digital logic design circuit using simulation tools, test with measurement tools in lab, and evaluate the results orally and written reports.			1, 13, 16, 2, 9	A, C, D	
Students will be able to design synchronous circuit design using sequential logic circuits (registers and flip-flops).			1, 13, 16, 2, 9	A, C, D	
Students will be able to design large and complex circuits using combinational logic circuits (adders/subtractors, code converters, comparators, multiplexors/demultiplexors, and decoders/encoders).			1, 13, 16, 2, 9	A, C, D	
Students will be able design and analyze circuits using combinational design techniques (K-maps, tabulation method).			1, 13, 16, 2, 9	A, C, D	
Students will be able to set and solve functions using Boolean algebra.			1, 13, 16, 2, 9	A, C, D	
Students will be able to understand and use number representation, number bases and base conversions, and binary codes.			1, 13, 16, 2, 9	A, C, D	
<b>Teaching Methods</b>	1: Lecture, 13: Experiment / Laboratory, 16: Project Based Learning, 2: Question - Answer, 9: Simulation				
<b>Assessment Methods</b>	A: Written Exam, C: Homework, D: Project / Design				
<b>Lecture Schedule</b>					
<b>Sequence</b>	<b>Topics</b>	<b>Preliminary Preparation</b>			
1	Course Overview	Lecture Notes, Related Book Chapter			
2	Number Systems	Lecture Notes, Related Book Chapter			
3	Addition/Subtraction of Signed Numbers	Lecture Notes, Related Book Chapter			
4	Logic Gates, Boolean Algebra	Lecture Notes, Related Book Chapter			
5	Synthesis	Lecture Notes, Related Book Chapter			
6	Karnaugh Maps	Lecture Notes, Related Book Chapter			
7	First Half Review	Lecture Notes, Related Book Chapter			
8	Addition, Subtraction, Multiplication	Lecture Notes, Related Book Chapter			
9	Combinational Circuits	Lecture Notes, Related Book Chapter			
10	Sequential Circuits	Lecture Notes, Related Book Chapter			
11	Registers and Counters	Lecture Notes, Related Book Chapter			
12	Memory and Programmable Logic	Lecture Notes, Related Book Chapter			
13	Implementation Technology	Lecture Notes, Related Book Chapter			
14	Hardware Description Language	Lecture Notes, Related Book Chapter			
<b>Evaluation Methods</b>		<b>Weight(%)</b>			
Midterm Exam		30			
General Exam		70			

<b>Resources</b>
Textbook: Digital Design, 5/E (6/E), M. Morris Mano, Michael D. Ciletti, ISBN-10:0132774208, Tools: Tinkercad