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

2023 - 2024 Academic Year

DIGITAL LOGIC DESIGN

Syllabus

Course Description					
Name	**Code**	**Semester**	**T+A Hour**	**Credit**	**ECTS**
DIGITAL LOGIC DESIGN	COE2112504	Fall Semester	3+2	4	8

Prerequisites Courses	
Recommended Elective Courses	
Language of Instruction	English
Course Level	First Cycle (Bachelor's Degree)
Course Type	Required
Course Coordinator	Assist.Prof. Mustafa AKTAN
Name of Lecturer(s)	Assist.Prof. Mustafa AKTAN
Assistant(s)	
Aim	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 processWrite an effective technical report for the lab experiments.Design a digital circuit with combinational and sequential logic components to address a problemBuild 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.
Course Content	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.

Course Learning Outcomes	**Teaching Methods**	**Assessment Methods**
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.	16, 17, 2, 21, 9	A, E, F
Students will be able to design synchronous circuit design using sequential logic circuits (registers and flip-flops).	16, 17, 2, 21, 9	A, E, F
Students will be able to design large and complex circuits using combinational logic circuits (adders/subtractors, code converters, comparators, multiplexors/demultiplexors, and decoders/encoders).	16, 17, 2, 21, 9	A, E, F
Students will be able design and analyze circuits using combinational design techniques (K-maps, tabulation method).	16, 17, 2, 21, 9	A, E, F
Students will be able to set and solve functions using Boolean algebra.	16, 17, 2, 21, 9	A, E, F
Students will be able to understand and use number representation, number bases and base conversions, and binary codes.	16, 17, 2, 21, 9	A, E, F

Teaching Methods	16: Question - Answer Technique, 17: Experimental Technique, 2: Project Based Learning Model, 21: Simulation Technique, 9: Lecture Method
Assessment Methods	A: Traditional Written Exam, E: Homework, F: Project Task

Lecture Schedule

Sequence	**Topics**	**Preliminary Preparation**
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

Evaluation Methods	**Weight(%)**
Midterm Exam	30
General Exam	70

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