Zarqa University **Instructor:**
Faculty: Information Technology **Lecture's time:**
Department: Computer Science **Semester:**
Course title: Digital Logic Design**(1501230)** **Office Hours:**

Course description:

This course begins with a review of the basics of binary system operation and the Boolean algebra. The topics discuss binary logic gates and the concepts of logic minimization using both Boolean algebra and K-map methods. Techniques for design and analysis of combinational and sequential circuits are introduced. Combinational circuits such as Adder/Subtractor, Decoder, Encoder, Magnitude Comparator, and Multiplexer are presented.

Aims of the course:

Students are expected to:
1. Understand number systems.
2. Understand Boolean algebra and its use in gate-level minimization
3. Understand K-map for gate-level minimization
3. Design combinational circuits
4. Design sequential circuits

Intended Learning Outcomes (ILOs):

Upon successful completion of this course, students will be able to:

A. Knowledge and Understanding

- A1.*Concepts and Theories:* Demonstrate the basics of Computer Components.
- *A2. Contemporary Trends, Problems and Research***:** Recognize the logic of Digital Circuits.
- A3**.** *Professional Responsibility:* Abide by laws and regulations of hardware development and design

B. Subject-specific skills

- *B1. Problem solving skills:* analyze logic design related problems and determine the appropriate solution(s).
- *B2. Modeling and Design*: Gather and assess relevant information, using abstract ideas to interpret it effectively.
- *B3. Application of Methods and Tools*: Distinguish Diagnosis Techniques.

C. Critical-Thinking Skills:

- C1. *Analytic skills:* Use analytic skills to analyze problems at hand and determine the appropriate Design for logical circuits.
- C2.*Strategic Thinking*: Use strategic thinking to propose efficient solutions for complex circuits.
- C3. *Creative thinking and innovation:* Use creative thinking and innovation to mix

different techniques of circuit design to improve efficiency and reduce cost.

D. General and Transferable Skills

D1. *Communication:* Express and communicate ideas in written and oral forms.

D2. *Teamwork and Leadership:* Be cooperative members of a team**.**

D3. *Organizational and Developmental Skills:* plan, prioritize, and achieve defined goals to have Effective reasoning in problem solving**.**

Course structure:

Week	Hours	ILOs	Topics	Teaching Procedure	Assessment methods
1	3	A1	• Binary Numbers • Number base conversion • Octal and Hexadecimal Numbers	Lecturing with active participation, quizzes, team learning	Homework, quizzes, reports
2	3	A1,D1	• Complements • Binary Codes • Binary Storage and Registers • Integrated Circuits	=	=
3,4	4	A1, B1, D2	• Basic postulates and theorems • Boolean functions	=	=
4,5	4	A1,B1,B2	• Canonical and Standard Forms • Logic gates.	=	=
5,6	3	A3, B1, C1	• The map	=	=

			method • product of sums Simplification		
6	1	A1,B1,B2	• NAND and NOR implementation • Don't- care conditions	=	=
7	3	A1, B2, B3	• Design Procedure • Adders and Subtractors	=	=
8	3	A1, B2, B3, C2	• Code Conversion • Analysis Procedure	=	=
9	3	A1, B2, B3, D1, D2	• Binary Parallel Adder • Decoders	=	=
10,11	5	A1,B1,B2, D3	• Multiplexers • Read Only Memory (ROM)	=	=
11	1	A1,B1,B2	• Flip-Flops	=	=
12,13	5	A1,B1,B2, C3	• Counters	=	=
13,14	4	A1,B1,B2, C3, D3	• Registers • The Memory Unit (RAM).	=	=

References:

A. Main Textbook:

M. Morris Mano and Michael D. Ciletti ,"Digital Design With an Introduction to the Verilog HDL", FIFTH EDITION, 2013, Library of Congress Cataloging-in-Publication Data.

B. Supplementary Textbook(s):

a. Chu,Y.,"Digital Computer Design Fundamentals ", McGraw-Hill Book Co.,1962.

a. Rhyne, V. T., "Fundamentals of Digital Systems Design". Prentice Hall, 1973.

Assessment Methods:

Methods	Grade	Date
First Exam	20%	
Second Exam	20%	
Assignments (Reports /Quizzes/ Seminar / Tutorials ….)	10%	
Final Examination	50%	