

**Faculty of Engineering & Technology**

**Logical Design and Digital Circuits**

**Information :**

**Course Code :** ELE 215

**Level :** Undergraduate

**Course Hours :** 3.00- Hours

**Department :** Department of Electrical Engineering

**Instructor Information :**

Title	Name	Office hours
Associate Professor	Waleed Eid Abd Elrahman Alhanafy	
Assistant Lecturer	Nermin Mohamed Fawzy Mahmoud Salem	6

**Area Of Study :**

- Understand and use different number systems and coding schemes.
- Analyze and design combinational logic based on minimizing Boolean functions.
- Analyze and design flip flops and get deeply involved with sequential circuits (especially synchronous).
- Train students to perform experiments on digital circuits using software tools for circuit logic design and simulation.

**Description :**

Review on number systems: positional notation, binary number systems, number base conversion, octal and hexadecimal, negative numbers, coded number systems, Switching functions: main operators, postulates and theorems, Analysis and synthesis of switching functions, incompletely specified functions, Design using NAND and NOR gates, standard combinational Logic, PLA & PAL implementation of combinational logic, Storage devices: 1-bit storage, set-reset FF, clocked SR-FF, positive and negative-edge triggered SR-FF, JK-FF, Race-around condition, Master-slave JK-FF, D-FF, T-FF, Excitation table. Introduction to sequential circuits and FSM.

**Course outcomes :**

**a.Knowledge and Understanding: :**

1 -	a1. Explain different number systems: positional notation, binary number systems, number base conversion, octal and hexadecimal, negative numbers, coded number systems.
2 -	a2. Explain switching functions: main operators, postulates and theorems.
3 -	a3. Explain analysis and design of combinational circuits and their applications.
4 -	a4. Explain analysis and design of sequential circuits and their applications.

**b.Intellectual Skills: :**

1 -	b1. Solve problems related to different number systems and its different applications.
2 -	b2. Solve problems related to different combinational circuits and their different applications.
3 -	b3. Solve problems related to different sequential circuits and their different applications.
4 -	b4. Design digital circuits using professional software tools.

**c. Professional and Practical Skills: :**

1 -	c1. Clarify theories and techniques of mathematics to solve digital circuit problems.
2 -	c2. Build the components and requirements for designing a complete digital circuit.
3 -	c3. Develop the design and implementation of digital circuits using software tools and measuring instruments.
4 -	c4. Seek thoroughly datasheets and identify appropriate specifications for required digital circuits either combinational circuits or sequential circuits.

**d. General and Transferable Skills: :**

1 -	d1. Collaborate effectively within multidisciplinary team
2 -	d2. Communicate effectively.
3 -	d3. Effectively manage tasks, time, and resources.
4 -	d4. Search for information and engage in life-long self-learning discipline.

**Course Topic And Contents :**

Topic	No. of hours	Lecture	Tutorial / Practical
Number systems and coding systems	10	6	4
Switching functions: main operators, postulates and theorems.	10	6	4
Analysis and synthesis of switching functions	10	6	4
Analysis of Combinational circuits.	10	6	4
Design of Combinational circuits.	10	6	4
Asynchronous sequential circuits	5	3	2
Analysis of Synchronous sequential circuits.	10	6	4
Design of Synchronous sequential circuits, registers	10	6	4

**Teaching And Learning Methodologies :**

Interactive Lecture
Discussion
Problem Solving
Experimental Learning
Cooperative Learning
Research
Site Visit (Field Trip)
Project/Assignment

**Course Assessment :**

Methods of assessment	Relative weight %	Week No	Assess What
• Final exam	40.00		
o Electronic and computer Lab Experiments	10.00		

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o In Class Quizzes and participation	20.00		
o Mid-Term Exams	30.00		

**Books :**

Book	Author	Publisher
Digital Design	M.Morris Mano	Pearson