

Syrian Arab Republic	 الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

Course Syllabus

1– Basic Information:

Course Name	Digital Systems
Course ID	DG
Contact Hours (Registered Sessions)	15 Hours
Contact Hours (Synchronized Sessions)	15 Hours
Mid Term Exam	–
Exam	1h15min
Registered Sessions Work Load	15 Hours
Synchronized Session Work Load	15 Hours
Credit Hours	3

2– Pre–Requisites: No pre–requisite is needed.

3– Course Objectives:

The aim of this course is to introduce the main concepts of digital logic circuits. It explains the binary numbering system as well as main coding and numbering systems. It presents logic gates, Boolean algebra and Karnaugh Maps. It outlines procedures to analyze, simplify and design of Combinational Logic Circuits and Sequential Logic Circuits. It outlines design methods for main application of logic circuits such as counters, registers, memories, arithmetic circuits and data control circuits.

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Intended Learning Outcomes (ILO):

Code	Intended Learning Outcomes
ILO1	Explain binary coding system and how to convert numbers between binary and decimal, coding negative numbers in binary system, Apply main numbering systems.
ILO2	Explain logic gates, Boolean algebra and Karnaugh maps. Analyze and design Combinational logic circuits using formal procedures.
ILO3	Explain Flip-Flops Latches. Analyze and design Sequential logic circuits using formal procedures.
ILO4	Analyze and design digital circuits applications such as registers, shift registers, counters, Arithmetic circuits, data control, memories and data buses.

4- Course content (15 hours of synchronized sessions)

Chapter Number	Chapter Title	Summary	ILO
1	Coding and numbering systems -1	Introduce Binary numbering system and how to convert between binary and decimal. Arithmetic operations in binary.	ILO1
2	Coding and numbering systems -2	Outlines how to present signed numbers in binary. It shows how subtract numbers in binary. It outlines Binary Coded Decimal BCD and	ILO1

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		Gray codes. It presents Hexadecimal numbering system.	
3	Logic Gates and Boolean Algebra	This chapter introduces the basic postulates of Boolean algebra and shows the correlation between Boolean expressions and their corresponding logic diagrams. The most useful logic gates used in the design of digital systems are identified	ILO2
4	Combinational Logic Circuits	This chapter covers the map method and algebraic method to simplify and design combinational logic circuits.	ILO2
5	Sequential Logic Circuits	This chapter outlines the formal procedures for analyzing and designing clocked sequential circuits. The gate structure of several types of flip-flops is presented together. Specific examples are used to show the derivation of the state table when analyzing a sequential circuit.	ILO3
6	Arithmetic Circuits	This chapter outlines the design of Arithmetic circuits.	ILO4
7	MSI Logic Circuits	Medium-scale integration (MSI) circuits and their most used components such as encoders, decoders, multiplexers and DE-multiplexers.	ILO4
8	The Counters	This chapter presents the design of	ILO4

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		synchronized and unsynchronized digital counters.	
9	Memories and Data Bussing	This chapter outlines memories types and their schematic design. It presents three states gates and data buses.	ILO4

5- Assessment Criteria (Related to ILOs)

ILO codes	Intended Learning Outcomes	Home work	Synchronized Sessions	Exam
	To achieve ILO the student should be able to:			
ILO1	1- Convert from binary to decimal and vice versa	*	*	*
	2- Apply arithmetic operations on binary numbers.	*	*	*
	3- Convert between main numbering systems such as binary, decimal, hexadecimal, BCD and Gray.	*	*	*
ILO2	1- Simplify logic functions by Boolean theorems.	*	*	*
	2- Simplify logic functions by Karaugh maps.	*	*	*

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LO3	1- Analyse main Flip-Flops (D, SC, J K) performance.	*	*	*
	2- Analyse and design some sequential circuits' applications.	*	*	*
ILO4	1- Design and analyse MSI circuits.	*	*	*
ILO4	2- Design and analyse Arithmetic circuits.		*	*
ILO4	3- Design synchronized and un synchronized digital counters.		*	*
ILO4	4- Identify memories types performance.		*	*

6- Practice Tools

Name	Function
Logisim	Logic circuits simulation software

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7– Main References

- All content of the course can be downloaded from Moodle course page as Pdf files and registered sessions.
- Synchronized sessions.

8– Additional References

- Elahi, Ata. *Computer Systems: Digital Design, Fundamentals of Computer Architecture and Assembly Language*. Springer, 2017.