Course Description

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he/she has made the most of the available learning opportunities. They must be match to the description of the programe.

<table>
<tr><td>1. Educational Institution</td><td colspan="4">Shatt Al-Arab University</td></tr>
<tr><td>2. Scientific Department / Center</td><td colspan="4">Computer Technology Engineering</td></tr>
<tr><td>3. Course name/code</td><td colspan="4">Digital Fundamentals</td></tr>
<tr><td>4. Programme(s) to which it contributes</td><td colspan="4">First year class / Semester 1</td></tr>
<tr><td>5. Available forms of attendance</td><td colspan="4">Lecture, laboratory</td></tr>
<tr><td>6. Semester/Year</td><td colspan="4">2024/2025</td></tr>
<tr><td rowspan="3">7. Number of study hours (total)</td><td rowspan="3">150 hours</td><td colspan="3">Number of hours per week</td></tr>
<tr><td>theoretical</td><td>practical</td><td>Total</td></tr>
<tr><td>1</td><td>2</td><td>3</td></tr>
<tr><td>8. Date of preparation of this description</td><td colspan="4">2 – 10 - 2025</td></tr>
<tr><td colspan="5">9. Course Objectives:
a. To be able to deal with the number systems and codes.
b. To understand the functionality of logic gates.
c. To have a skill to use the logic gates in designing logic circuit.
d. To have a skill to simplify the digital circuits.
e. To learn the simplification process, Boolean expression, Demorgans law, and Karnaugh map..
f. To understand the principles for designing logic circuit.
g. To understand adder, subtractor, decoder, incoder, multiplexer,</td></tr>
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demultipleaer, and comparator circuits.

10. Course Outcomes and Teaching Methods, Learning and Evaluation

a. Recognize each type of number systems.
b. Identify the process of converting between number systems.
c. Summarize the types of logic gates.
d. Discuss the use of each gate.
e. Describe design of logic circuit by using logic gats.
f. Explain the simplification processes.
g. Explain Boolean expression and Demorgan's law.
h. Explain the Karnaugh map for different numbers of bits.
i. Discuss the design of logic circuit before and after simplification.
j. Explain the combinational logic circuit .
k. Identify the adder, subtractor, decoder, encoder, multiplexer, demultiplexer, comparator circuits, and code conversion.
l. Identify the basic circuit elements and their applications.

Teaching and learning methods

Academic lectures: providing a solid foundation upon which to develop cognitive balance for students Practical laboratory:, which provides each student the expertise to help develop practical skills side and consolidate the principles necessary to carry out the projects correctly

Evaluation Methods

Interactive tests: basically to assess the student by observing the extent of interaction provides during the lecture and participation

Written tests: that provides knowledge of the extent of the student's understanding

and follow-up of the material and scientific observations given by teaching

Quarterly tests: Episode moderation and be to assess the student's interest and its interaction with the scientific article received during the semester for academic and skills

Final tests: These are the final episode to assess the student's interest and its interaction with the scientific article received during the school year for academic and skills

C. Thinking Skills

C1- Implant the spirit of creativity among students and to ensure that find them innovative solutions to various problems

C2- Students develop the ability to work together effectively as teams come out excellent result

C3- Sense of responsibility among students and psychological configuration to carry the burden on their shoulders Development

C4- Development to ensure the values and perseverance to get the job done to reach satisfactory results

Teaching and learning methods

Stimulate the creative side of the students and that by asking various scientific problems and the demand of the students find appropriate scientific solutions to them in different ways

Develop a spirit of cooperation between the students, through the formation of working teams and motivate the students to exert all the necessary conditions for the work of the various efforts and with several people

Evaluation Methods

Direct assessment: Where is this assessment by the teaching directly and through note student interaction during the lecture and install notes about it

Practical projects is to assess the student's ability to achievement and creativity and to work in teams, consequences and solutions to various scientific problems

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quiz**	2	10% (10)	5, 10	LO #1- 3, LO # 4 - 8
	Assignments	1	10% (10)	12	LO # 1-11
	Projects / Lab.	1	10% (10)	Continuous	LO # 1-12
	Report	1	10% (10)	Continuous	LO # 1-12
Summative assessment	**Midterm Exam**	2 hr	10% (10)	10	LO # 1-10
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

11 - Course Structure

Week	Material Covered
Week 1	Number systems (decimal, binary, octal, conversions, operations)
Week 2	Number systems (hexadecimal, BCD, conversions, operations)
Week 3	Number systems (excess-3,gray code, conversions, operations, complements)
Week 4	Logic gates (AND,OR,NOT,NAND,NOR,XOR,XNOR)
Week 5	Logic simplification (Boolean theorem)
Week 6	Logic simplification (Demorgan's theorem)
Week 7	Karnaugh maps(2-variables,3-variables,)
Week 8	Karnaugh maps (4-variables (SOP,POS,don't care))
Week 9	Karnaugh maps (5-variables, (SOP,POS,don't care))
Week 10	Midterm exam
Week 11	Arithmetic operations
Week 12	Arithmetic operations (decoder, encoder)
Week 13	Arithmetic operations (Multiplexer, Demultiplexer)
Week 14	Arithmetic operations (comparators)
Week 15	Arithmetic operations (code conversion)
Week 16	**Preparatory week before the final Exam**

12 - Course Structure - Lab.	
Week	**Material Covered**
Week 1	logic gates (NOT, AND,OR)
Week 2	Logic gates (NOR.NAND)
Week 3	Logic gates (XOR,XNOR)
Week 4	Boolean theorem
Week 5	Demorgan's law
Week 6	Karnaugh map
Week 7	SOP
Week 8	POS, don't care
Week 9	Combinational circuit (half adder, full adder)
Week 10	Combinational circuit (Half subtractor, full subtractor)
Week 11	Decoder and Encoder circuits
Week 12	Multiplexer and Demultiplexer circuits
Week 13	Comparator circuit
Week 14	Code conversion circuits

13. Infrastructure	
1 Required textbooks	Digital Fundamentals by Floyed
2 Key references (sources)	
m. Recommended books and references (scientific journals, reports,....)	Digital circuit analysis and design with Simulink modeling by Steven T. Karris
n. Electronic references, websites	https://www.coursera.org/browse/physical-science-and-engineering/electricalengineering

14 Course improvement Plan
improving the subjects of the current curriculum by checking the current materials by deleting / adding others new topics