1. Course Number and Name: 120 CPE – Digital Logic Design

2. Credits and Contact Hours: 4 Credit

a. Lecture – 3 day per week at 50 minutes for 16 weeks
b. Laboratory – 1 day per week at 100 minutes for 16 weeks

3. Course Coordinator or Instructor:

Dr. Wadea Ghribi

4. Text Book:

- Logic and Computer Design Fundamentals, 4/e (Prentice Hall) M. Morris Mano & Charles R. Kime
- Fundamentals of Digital Logic with VHDL Design, 2/e (Mc-Graw-Hill)Stephen Brown &ZvonkoVaranesic
- Digital Logic Circuit Analysis & Design (Prentice Hall) Victor P. Nelson, H. Troy Nagle, Bill D. Carroll, & David Irwin

5. Specific Course Information:

a. **Catalog Description:** This course will focus on the theory of digital circuits and systems, stressing techniques for the analysis and synthesis of combinational and sequential logic systems

b. **Prerequisites:** 111 CPE Semiconductor Devices

c. **Status:** Required

6. Specific Goals for the Course:

a. Course Outcomes:

1. Describe the knowledge acquired in Digital Logic Design.
2. Prepare the arithmetic operations in different numbering system
3. Evaluate the numbering system and design the logic gates and Flip-Flops to perform a specified function.
4. Analyze the Boolean equations and simplify it.
5. Explain the understanding, designing and implementation of Digital Logic Circuit.
6. Question individual and in group discussion for developing circuit design.

b. Student outcomes in Criterion 3 addressed by course:

Course LOs #	Map course LOs with the program LOs. (Place course LO #s in the left column and Student LO #s across the top.)											
	Student Learning Outcomes Use LOs Codes											
	a1	a2	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2
1	√											
2			√									
3				√								
4					√							
5							√					
6								√				

7. List of Topics: 120 CPE – Digital Logic Design

List of Topics for Theory:

- **Digital Computers and Information:** Digital Computers, Number Systems, Arithmetic Operations, Decimal Codes, Alphanumeric Codes.
- **Combinational Logic Circuits:** Binary Logic and Gates, Boolean algebra, Standard Forms, Map Simplifications, Map Manipulation, NAND and NOR Gates, Exclusive-OR Gates, Integrated Circuits.
- **Combinational Logic Design:** Combinational Circuits, Design Topics, Analysis Procedure, Design Procedure, Decoders, Encoders, Multiplexers, Binary Adders, Binary Subtraction, Binary adder-Subtractors, Binary Multipliers, Decimal Arithmetic, HDL Representation-VHDL & Verilog.
- **Sequential Circuits:** Sequential Circuit, Latches, Flip-Flops, Sequential Circuit Analysis, Sequential Circuit Design, Designing with D Flip-Flops, Designing with JK Flip-Flops, HDL Representation for Sequential Circuits (VHDL & Verilog).
- **Registers and Counters:** Registers, Shift Registers, Ripple Counter, Synchronous Binary Counters, BCD Counters, HDL Representation for Shift Registers and Counters.

List of Topics for Laboratory:

- 1 Basic gates (NOT, Buffer, AND, NAND, OR, NOR, XOR, XNOR)
- IC's (7400, 7402, 7404, 7407, 7408, 7432, 7486, 74266)
- Realization of Boolean equation.
- Design and Implementation of Half Adder and Full Adder
- Design and Implementation of Half Subtractor and FullSubtractor.
- Design and Implementation of BCD to Excess-3
- Design and Implementation of Binary to Grey and Grey to BinaryConversions.
- Design and Implementation of Multiplexer and De-multiplexer.
- Design and Implementation of Single bit Comparators.
- Design and Implementation of Encoders and Decoders.
- Verification of Basic Flip-flops - SR, T, D, JK Flip-flops.
- Design and Implementation of up-Counter and Down-Counter.
- Design and Implementations of 3-bit Shift register.
- Design Implementations of 3-bit Binary to DecimalNumber System.