University of Bahrain
Quality Assurance and Accreditation Center

Course Syllabus Form

1. Course code:	ITCE112 -250	**2. Course title:**	Digital Design I				
3. College: Information Technology							
4. Department: Computer Engineering							
5. Program: BSc. In Computer Engineering							
6. Course credits: 3-2-3							
7. Course NQF Level: 5							
8. NQF Credits: 124							
9. Prerequisite: ITCE101							
10. Lectures Timing & Location: MW 9:30 – 10:45, S40 - 1085 **M 11:00 – 12:40, S40 - 1083**							
11. Course web page: http://blackboard.uob.edu.bh/ MS Teams							
12. Course Instructor: Dr. Jalal Khlaifat , **jkhlaifat@uob.edu.bh**							
13. Office Hours and Location: UTH 10 am, S40-1109							
14. Course coordinator: Dr. Jalal Khlaifat							
15. Academic year: 2023-2024							
16. Semester:		**First**	√	**Second**		**Summer**	
17. Textbook(s): Floyd, T.L. (2014). *Digital Fundamentals*. 11th ed. Pearson Prentice Hall							
18. References: • Morris, M. and Michael C. (2013). Digital Design. 5th ed. Pearson Prentice Hall. • Charles H. and Roth, Jr. (2014). Fundamentals of Logic Design. International ed. Cengage Learning							
19. Other learning resources used (e.g. e-Learning, field visits, periodicals, software, etc.): Blackboard: http://blackboard.uob.edu.bh) Software with the book's CD and Circuit Cloud Simulator at **http://circuits-cloud.com**							
20. Course description (as published): This course covers the fundamental of digital logic and design. Topics include: number systems; Binary codes, logic gates, Boolean algebra, simplification of logic functions: Karnaugh maps, combinational logic circuits (adders, decoders, encoders, multiplexer, etc.). Analysis and design of sequential circuits: latches, Flip-Flops, counters, registers. Design of state machines (Mealy, Moore). The laboratory experiments will provide students with hands-on experience of designing, implementing, testing, and simulating digital logic circuits.							

Note: Additional information could be added as required by the Instructor, (eg, Policies)
Note: Items shown underlined cannot be changed without the department consent.

21. Course Intended Learning Outcomes (CILOs):

CILOs	*Mapping to PILOs*										
	1	2	3	4	5	6	7				
1. Apply knowledge of number systems, codes, and Boolean Algebra to analyze and design logic circuit.	✓					✓					
2. Design a combinational logic system from a given specification with logic gates and devices such as MUX, Decoders, or ROMs.	✓	✓				✓					
3. Design and analyze sequential circuit with Flip Flops and tracing timing diagram	✓	✓				✓					
4. Implement real digital systems, write proper lab report, function on multi-disciplines teams through digital lab experiments.					✓	✓					

22. Course assessment:

Assessment Type	*Details/ Explanation of Assessment in relation to CILOs*	*Number*	*Weight*	*Date(s)*
Quizzes	**1-3**	**2**	20 %	TBA
Examinations	**1-3**	**1**	20 %	TBA
Laboratory/Practical	**1-4**	**6**	20 %	Table 24
Assignments			-	
Projects/Case Studies				
Final Examination	**1-3**	**1**	40 %	9 June 2024 @8:30
Total			100%	

23. Description of Topics Covered

Topic Title (e.g. chapter/experiment title)	*Description*
Number systems, conversion, and Binary codes	Introduction to number systems (Binary, Octal, Decimal, Hexa-Decimal), number systems conversion, Binary arithmetic, Representation of negative numbers, 2's complement arithmetic, binary codes
Logic gates and Boolean algebra	Describe the basic logic gates and how to combine gates to construct circuits. Boolean algebra theorems, algebraic manipulations, complements of functions, K-map, and multi-level circuits including NAND only and NOR only circuits
Combinational circuits	Adders, subtractors, decoders, and multiplexers. Implementation of Boolean functions using decoders and multiplexers.
Sequential circuits	Introduction to Latches and flipflops. Flip-flop conversion, Timing diagram tracing. Design of sequential circuits such as counters and registers. Introducing state machines: Moore and Mealy state machines. Design of state machine.

24. Weekly Schedule					
Week	*Date*	*Topics covered*	*CILOs*	*Teaching Method*	*Assessment*
1	11-15 Feb	Introduction	1		
2	18 – 22 Feb	number systems, conversions and Binary arithmetic. Representations of negative numbers, 1's Complement, 2's complement arithmetic, BCD, binary codes.	1,2	Exp 1	
3	25– 29 Feb	Logic gates, Boolean algebra, basic operations.	1,2,3		
4	3 – 7 Mar	Boolean algebra theorems, algebraic manipulations, complements of functions.	1,2,3	Exp 2	
5	10 – 14 Mar	Karnaugh maps, Minimization with K-Maps, don't care conditions.	1,2,3		
6	17 – 21 Mar	Multi-level realization, NAND and NOR implementations.	1,2,3	Exp 3	
7	24 – 28 Mar	Combinational logic design, MSI Circuits: binary adders, Magnitude comparators, decoders, encoders	4		
8	31 Mar – 4 Apr	**Mid-Semester Break**			
9	7 – 11 Apr	Multiplexers, de-multiplexers, code converters, parity generators.	3,4	Exp 4	
10	14 – 18 Apr	Implementation of Boolean functions using decoders and multiplexers.	3,4		
11	21 – 25 Apr	Latches, Flip flops (SR, D, JK and T)	2,3,4	Exp 5	
12	28 Apr – 2 May	Flip flop conversion and Timing Diagrams	2,3,4		
13	5 – 9 May	Counters design	2,3,4		
14	12 – 16 May	Shift registers, State machine	2,3,4	Exp 6	
15	19 – 23 May	Design of state machine circuits	2,3,4		
16	26 – 28 May	**Revision**	**2,3,4**		

Academic Integrity Statement
Honesty and integrity are integral components of the academic process. Students are expected to be honest and ethical at all times in their pursuit of academic goals in accordance with the Regulations of Professional Conduct Violations for University of Bahrain Students, the UOB Plagiarism Policy and the UOB Guide to Students Rights and Duties. Any breach of academic integrity will be dealt according to the University Regulations for Professional Conduct Violations.

Prepared by: Dr. Hessa Al-Junaid, Dr. Amal AbuHassan, Dr. Wael El madany
Date: 19 Feb 2018