Module (Course Syllabus) Catalogue

2024-2025

College/ Institute	Technical College of Computer and Informatics Engineering	
Department	Artificial Intelligence and Robotic Engineering	
Module Name	Digital Logic Design	
Module Code	DLD202	
Semester	2	
Credits	5	
Module type	Prerequisite ☐ Core ☒ Optional ☐	
Weekly hours	Four hours	
Weekly hours (Theory)	(2)hr Class	(2)hr Workload
Weekly hours (Practical)	(2)hr Class	(2)hr Workload
Lecturer (Theory)	Zardasht Abdulaziz Abdulkarim SHWANY	
E-Mail & Mobile NO.	zardasht.abdulkarim@epu.edu.iq, 07504612522	
Lecturer (Practical)	Karwan Hoshyar Khoshnaw	
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ECTS Workload Calculation Form
Digital Logic Design Course

S	Activity	Description	Activity Type	No	Time Factor	Workload
1	Course	Theory In Class	Face to face activity hours	12	2	24
2	Course	Preparation Theory	Household activity hours	12	2	24
3	Course	Practical	Face to face activity hours	12	2	24
4	Course	Preparation Practical	Household activity hours	12	2	24
5	Assignment	Homework	Household activity hours	2	4	8
6	Assessment	Quiz	Household activity hours	2	4	8
7	Assessment	Mid Term Theory	Face to face activity hours	1	1	1
8	Assessment	Mid Term Theory Preparation	Household activity hours	1	4	4
9	Assessment	Mid Term Practical	Face to face activity hours	1	1	1
10	Assessment	Mid Term Practical preparation	Household activity hours	1	4	4
11	Assessment	Final Theory	Face to face activity hours	1	2	2
12	Assessment	Final Theory Preparation	Household activity hours	1	5	5
13	Assessment	Final Practical	Face to face activity hours	1	1	1
14	Assessment	Final Practical preparation	Household activity hours	1	5	5
			Face to face huors/12 week	4.42	F. to F. huors	53
			Home huors/16 week	5.13	Home huors	82
			Total huors/20 week	8.44	Total huors	135
			ECTS (Total hours / 27)	5	Accepted	

Course Book

Course Description	This course will give principals of the Digital logic design with all the fundamentals of Digital logics in such a way that they will gain theoretical and practical experience of about the fundamental concepts of Digital logic design including Logic Gates, Boolean Algebra Theorem, Universal Gates, Adders, Subtractions & Flip Flops, and design Digital Logics.
Course objectives	After taking this course, students have ability to: 1-Providing a comprehensive understanding of the main principles of digital logic design. 2- Clarify the main digital laws. 3- Apply these principals practically.
Student's obligation	1. Class attendance is important, and attendance will be taken every lecture. 2. The student submits a weekly report about what have done in the Lab section. For examination, there are semester exam and final exam for the practical and the theory parts. During the class hours there will be some quizzes
Required Learning Materials	Smartboard, White board, and projector.
Assessment scheme	15% Midterm Practical 10% Midterm Theory 8% Quiz 5% Assignment (homework) 40% Final Practical 20% Final Theory
Specific learning outcome:	**By the end of the course, students should be able to:** 1. Recognize different numbering systems. 2. Convert numbers from system to other. 3. Execute binary arithmetic.

	4. Identifying different logic gates from their symbol & write their truth table. 5. Convert any logic equation into logic circuit. 6. Minimize logic equation to get minimized logic circuit. 7. Implement any logic circuit using one type of logic gates either NOR or NAND gates. 8. Use logic modules (Adder, decoder, multiplexer, demultiplexer). 9. Recognize different types of flip flops and convert one type into another. 10. Implement registers using flip-flop.
Course References:	1.Godse, Atul P., and Deepali A. Godse. Digital Logic Design & applications. Technical Publications, 2. Digital Logic Design, Brian Holdsworth, Clive Woods. 3. Brown, Stephen D. Fundamentals of digital logic with Verilog design. Tata McGraw-Hill Education. 4. Digital Design: A Systems Approach, William James Dally (Author), R. Curtis Harting. 5- Fundamentals of digital Logics by A. ANAND KUMAR 6- Internet recourses.

Course topics (Theory)	**Week**	**Learning Outcome**
Introduction to Digital Logic	1	
Numbering systems (Decimal, Binary, Octal, and Hexadecimal). Number base Conversions.	2	**1, 2**
Conversion: Decimal Number, Binary Number, Conversion: Octal Number, Hexadecimal Number.	3	**1, 2**
Binary Arithmetic: Addition. Subtraction: 1st complement, 2nd Complement	4	**3**
Logic Gates (NOT, AND, OR, NAND, NOR). Exclusive-OR (EX-OR), Exclusive-NOR (EX-NOR),	5	**4**
Universal Gates (NAND Gate + NOR Gate).	6	**4, 7**

Rules in Boolean Algebra.	7	**8**
De- Morgan's Theorems.	8	**8**
Logic expression and truth table of a logic circuit. Combination Logic Sum of Products and Product of Sum.	9	**8**
Adders (Half Adder /Full Adder). Subtractors (Half Subtractor/ Full Subtractor). Comparator	10	**8**
Minimization With Karnaugh Maps,	11	**6**
Decoders, Multiplexers, Demultiplexer	12	**8**
Flip-Flops (RS Flip-Flop), (Clocked RS Flip-Flop). (J-K Flip-Flop), (D Flip-flop), (T Flip-Flop).	13	**9, 10**
Practical Topics	Week	**Learning Outcome**
NOT, OR, AND gates using ics	1	4
NOR & NAND gates using ics	2	4
Ex. Or gate and Ex. NOR gate.	3	5
De morgan's theorems	4	7
Universal gates.	5	7
Half-adder and Full-adder.	6	8
Half-subtractor and Full-subtractor	7	8
Comparator.	8	8
Seven-Segment display.	9	8,9 and 10
Decoder	10	8,9 and 10
Up counter. Down counter	11	8,9 and 10
Clock Generation by Integrate Logic (IC 555)	12	8,9 and 10

Questions Example:

Ministry of Higher Education
& Scientific Research
Erbil Polytechnic University
Technical College of Computer
and Informatics Engineering
AI and RE Department

Final Exam: (Second Semester)

Class: First
Module Name: Digital Logic Design
Module Code: DLD202
Time: 120 Minute
Date: 6 / 6 / 2025

Q1/ a) Convert the following Numbers below: **(30 Mark)**

1- Hex. Number $(7AF)_{16}$ to Octal Number.
2- Binary Number $(101111.101)_2$ to Decimal Number.
b) Make a truth table for comparing two Bit numbers.

Q2/ Find the result for the following operation using (Full-Adder) and draw it: **(20 Mark)**

1111
1011 -

Q3/ Simplify a Karnaugh map shown below write the Boolean Expression and draw it. **(25 Mark)**

CD / AB	00	01	11	10
00	1	1	0	1
01	0	0	1	1
11	0	0	1	1
10	1	1	0	0

Q4/ Answer the Following: **(25 Mark)**

a) What are the types of multivibrators?
b) Draw the logic Logic for 3-bit J-K flip flop, with timing diagram.

Lecturer

Zardasht Abdulaziz Abdulkarim

Extra notes: I feel we need to spend more time; we will not have enough time to go through the topics in detail, it will be better to increase the theoretical hours to make more imagination about this subject.
External Evaluator