COURSE DESCRIPTION FORM

INSTITUTION National University of Computer and Emerging Sciences (NUCES-FAST)

PROGRAM (S) TO BE EVALUATED **BS Computer Science**

Digital Logic Design Lab

A. Course Description

(Fill out the following table for each course in your computer science curriculum. A filled out form should not be more than 2-3 pages.)

Course Code	EL - 1005
Course Title	Digital Logic Design Lab
Credit Hours	3+1
Prerequisites by Course(s) and Topics	(EE117) Applied Physics
Assessment Instruments with Weights (homework, quizzes, midterms, final, programming assignments, lab work, etc.)	Lab Activities 20 Mid-20 Project: 10 Final: 50
Course Coordinator	Engr. Kashan Hussain
URL (if any)	
Current Catalog Description	The goal of this course is to introduce concepts & tools for the design of digital electronic circuits using sequential and combinational logic to the freshmen computer science students.
Textbook (or **Laboratory Manual** for Laboratory Courses)	Self-designed Lab Manuals Digital Fundamentals Thomas L. Floyd.
Reference Material	1. Digital Systems Principles and Applications 8th Ed, Tocci, Widmer and Moss 2. Digital Design by Moris Mano
Course Goals	**A. Course Learning Outcomes (CLOs)**

1. Identify and explain fundamental concepts of digital logic design including basic and universal gates, number systems, binary coded system, basic components of combinational and sequence circuits.

2. Demonstrate the acquired knowledge to apply techniques related to the design and analysis of digital electronics circuits, including Boolean Algebra and Multi-variable Karnaugh map methods.

3. Analyze small –scale combinational digital circuits.

4. Design small-scale combinational and synchronous sequential digital circuit using Boolean Algebra and K-map.

B. Program Learning Outcomes

For each attribute below, indicate whether this attribute is covered in this course or not. Leave the cell blank if the enablement is little or non-existent.

1. Academic Education:	To prepare graduates as computing professionals	
2. Knowledge for Solving Computing Problems:	Apply knowledge of computing fundamentals, knowledge of a computing specialization, and mathematics, science, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.	
3. Problem Analysis:	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.	✔
4. Design/ Development of Solutions:	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	✔
5. Modern Tool Usage:	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.	

6. Individual and Team Work:	Function effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings.	
7. Communication:	Communicate effectively with the computing community and with society at large about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.	
8. Computing Professionalism and Society:	Understand and assess societal, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.	
9. Ethics:	Understand and commit to professional ethics, responsibilities, and norms of professional computing practice.	
10. Life-long Learning:	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.	

C. Relation between CLOs and PLOs
(CLO: Course Learning Outcome, PLOs: Program Learning Outcomes)

		PLOs											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CLOs	1		*										
	2		*										
	3		*										
	4			*									

Topics Covered in the Course, with Number of Lectures on Each Topic (assume 15-week instruction and one-hour lectures)

1. Topics to be covered:

List of Topics	No. of Weeks	Contact Hours	CLO
Lab 01 Introduction to DLD Equipment's	**2**	**6**	**1**
Lab 02 Introduction to Logic Works Software and Primary Logic Gates (AND, OR, and NOT) Implementation in Logic Works	**2**	**6**	**2**
Lab 03 Secondary Gates (NAND AND NOR)- More Secondary Gates and Boolean Algebra OR, and NOT) Implementation in Logic Works software	**1**	**3**	**3**
Lab 04 Secondary Gates (NAND AND NOR)- More Secondary Gates and Boolean Algebra	**1**	**3**	**3**
Lab 05 Simplification Of Digital Circuits	**2**	**6**	**2**
Lab 06 Half Adder, Full Adder, Half Subtractor and Binary Multiplication Implementation in Hardware.	**2**	**6**	**3**
Lab 07 Half Adder, Full Adder, Half Subtractor and Binary Multiplication Implementation in Logic Works	**2**	**6**	**3**
Lab 08 Binary Decoders and Encoder Implementation in Hardware			
Lab 09 Binary Decoders and Encoder Implementation in Logic Works	**2**	**6**	**3**
========== *Lab MID* ==========			
Lab 10 Multiplexer HW	**2**	**6**	**3**
Lab 11 Multiplexer SW	**2**	**6**	**3**
Lab 12 Latches and Flip Flops HW	**2**	**6**	**4**
Lab 13 Latches Flip Flops SW	**2**	**6**	**4**
Lab 14 Digital Counters and Registers HW-SW	**2**	**6**	**4**
Lab 15 Project Presentations Demo			

	Lab 16 Final Exam	**1**	**3**	
	Total			

Laboratory Projects/Experiments Done in the Course				
Programming Assignments Done in the Course				
Class Time Spent on (in credit hours)	**Theory**	**Problem Analysis**	**Solution Design**	**Social and Ethical Issues**
	30	30	120	0
Oral and Written Communications	Every student is required to submit at least __1__ written report of typically _2__ pages and to make _1__ oral presentations of typically __10__ minute's duration. Include only material that is graded for grammar, spelling, style, and so forth, as well as for technical content, completeness, and accuracy.			

Instructor Name: Muhammad Nadeem Ghouri

Instructor Signature: *Muhammad Nadeem*

Date 23rd Jan 2023