



## **Course Objective and Outcome**

Department of Electrical and Computer Engineering

School of Engineering and Physical Sciences

North South University, Bashundhara, Dhaka-1229, Bangladesh

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1. **Course Number and Title:** **CSE231 Digital Logic Design**  
**CSE231L Digital Logic Design Laboratory**
2. **Credits:** 3 + 0 = 3 Credits
3. **Type:** Required, Engineering, Lecture + Lab
4. **Prerequisites:** CSE173 Discrete Mathematics
5. **Contact Hours:** Lecture – 3 Hours/week, Lab – 3 Hours/week

### **6. Course Summary:**

This course provides an introduction to logic design and basic tools for the design of digital logic systems. A basic idea of number systems will be provided, followed by a discussion on combinational logic: logic gates, Boolean algebra, minimization techniques, arithmetic circuits (adders, subtractors), basic digital circuits (decoders, encoders, multiplexers, shift registers), programmable logic devices (PROM, PAL, PLA). The course will then cover sequential circuits: flip-flops, state transition tables and diagrams, state minimization, state machines, design of synchronous/asynchronous counters, RAM/ROM design. An introduction to programmable logic will also be provided. Hands-on experience will be provided through project on design of a sequential logic system. This course has separate mandatory laboratory session every week as CSE 231L.

### **7. Course Objective:**

The objectives of this course are

- a. to introduce Boolean logic operation and Boolean Algebra
- b. to teach students how to use Boolean Algebra and K-maps to realize two-level minimal/optimal combinational circuits
- c. to exposed students in the introductory design process of combinational and sequential circuits
- d. to teach the operation of latches, flip-flops, counters and registers.
- e. to explain how to analyze and design sequential circuits built with various flip-flops.
- f. to introduce using simulation tool for digital system design.

### **8. Course Outcomes (COs):**

Upon successful completion of this course, students will be able to

Sl.	CO Description	Weightage (%)
CO1	apply principles of Boolean algebra to logic functions.	10%
CO2	use K-maps to realize two-level minimal/optimal combinational circuits with up to 4-5 variables	10%
CO3	construct gate-level implementation of a combinational logic function using fundamental logic gates (AND/OR/NOT), Multiplexers, Decoders and Programmable logic gates (ROMs, PLAs and PALs)	30%
CO4	analyze and Design sequential circuits built with various flip-flops, registers, counters	30%
CO5	use simulation tool (e.g. Logisim) to construct Digital Logic Circuit in schematic level	5%
CO6	operate laboratory equipment build, and troubleshoot simple combinational and sequential circuits	20%

## 9. Mapping of CO-PO

Sl.	CO Description	POs	Bloom's taxonomy domain/level	Delivery methods and activities	Assessment tools
CO1	<b>Apply</b> principles of Boolean algebra to logic functions.	<b>a</b>	Cognitive/ Apply	Lectures, notes	Quiz, Exam
CO2	<b>Use</b> K-maps to realize two-level minimal/optimal combinational circuits with up to 4-5 variables.	<b>c</b>	Cognitive/ Apply	Lectures, notes	Quiz, Exam
CO3	<b>Construct</b> gate-level implementation of a combinational logic function using fundamental logic gates (AND/OR/NOT), Multiplexers, Decoders and Programmable logic gates (ROMs, PLAs and PALs)	<b>c</b>	Cognitive/ Create	Lectures, notes	Exam, Design Project
CO4	<b>Analyze</b> and <b>Design</b> sequential circuits built with various flip-flops, registers, counters	<b>c</b>	Cognitive/ Create	Lectures, notes	Exam, Design Project
CO5	<b>Use</b> simulation tool (e.g. Logisim) to construct Digital Logic Circuit in schematic level	<b>e</b>	Cognitive/ Apply, Psychomotor/ Manipulation	Lab class	Lab work, Design Project
CO6	<b>Operate</b> laboratory equipment <b>build</b> , and <b>troubleshoot</b> simple combinational and sequential circuits	<b>e</b>	Cognitive/ Remember,	Lab class	Lab work, Design Project

			Psychomotor/ Precision		
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## 10. Resources

### Text books:

No	Name of Author(s)	Year of Publication	Title of Book	Edition	Publisher's Name	ISBN
1	M Morris Mano & M D Ciletti	2012	Digital Design	5 <sup>th</sup> ed.	Pearson Education	ISBN-13: 978-0-13- 277420-8

### Reference books:

No	Name of Author(s)	Year of Publication	Title of Book	Edition	Publisher's Name	ISBN
1	J F Wakerly	2005	Digital Design: Principles and Practices	4 <sup>th</sup> ed.	Prentice Hall	ISBN-13: 978- 0131863897

## 11. Weightage Distribution among Assessment Tools

Assessment Tools	Theory Weightage (%)
Class Performance	To be announced as per UGC guideline for Summer 2020
Assignment	
Quizzes	
Midterm Exam	
Final Exam	
Term Project	
Lab work	

## 12. Grading policy: As per NSU grading policy available in

<http://www.northsouth.edu/academic/grading-policy.html>