Department of
Electrical and Computer Engineering
NORTH SOUTH UNIVERSITY

COURSE OUTLINE

1. Course Information:

Course Code	CSE231	**Course Title**	Digital Logic Design
Section	7	**Semester / Year**	Fall 2022
Course Type	Core	**Pre-requisite (if any)**	CSE225, CSE173
Credit Value	3	**Contact Hours / Week**	3

2. Instructor Information:

Name	Prof. Dr. M. A. Razzak (Azz)	**Designation**	Professor
E-mail	drmarazzak@gmail.com	**WhatsApp**	01753872800
Classroom	SAC 402	**Office Room**	SAC 932
Class Hours	M/W 8:00 – 9:30	**Tutorial Hours**	S/T/M/W 9:30 – 11:00

3. Course Rationale:

One of the core requirements for the students majoring in Electrical and Electronic Engineering, Electronic and Telecommunication Engineering and Computer Science and Engineering to understand the basic level digital circuit components and apply the combinational and sequential logic circuits in various applications.

4. 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.

5. Course Objectives:

The objectives of this course are

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

6. Course Outcomes (COs) and Mapping with Program Outcomes (POs):
Upon successful completion of this course, students will be able to

CO No.	CLO Statement	Corresponding PO	Domain & level of learning taxonomy
CO1	**Apply** principles of Boolean algebra to logic functions.	PO1: Engineering Knowledge	Cognitive Level 3 (Apply)
CO2	**Use** K-maps to realize two-level minimal/optimal combinational circuits with up to 4-5 variables	PO3: Design/ Development of Solution	Cognitive Level 3 (Apply)
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)	PO3: Design/ Development of Solution	Cognitive Level 6 (Create)
CO4	**Design** sequential circuits built with various flip-flops, registers, counters	PO3: Design/ Development of Solution	Cognitive Level 6 (Create)
CO5	**Use** simulation tool (e.g. Logisim) to construct Digital Logic Circuit in schematic level.	PO5: Modern Tools Usage	Psychomotor Level 2 (Manipulation)
CO6	**Operate** laboratory equipment to build and troubleshoot simple combinational and sequential circuits.	PO5: Modern Tools Usage	Psychomotor Level 3 (Precision)

7. Course plan specifying content, CLOs, co-curricular activities (if any), teaching learning and assessment strategy mapped with CLO:

Week	Topic	Teaching-Learning Strategy	Assessment Strategy
1	• Introductory Concepts of Digital Systems	• Lecture • Tutorial	• Exam
2	• Number Systems, Operations and Codes	• Lecture • Tutorial • Discussion	• Exam
3	• Logic Gates • Universal Gates	• Lecture • Tutorial • Discussion	• Exam
4	• Boolean Algebra and Logic Simplification • Demorgan's Theorem, Karnaugh Map	• Lecture • Tutorial • Discussion	• Exam • Assignment
5	• Combinatorial Logic Circuits • Adder, Subtractor, Comparators	• Lecture • Tutorial • Discussion	• Exam
6	• Multiplexures and Demultiplexures • Parity Generator / Checker	• Lecture • Tutorial • Discussion	• Exam • Assignment

7	• Review • **Mid Term**	• Lecture • Tutorial • Discussion	• Exam
8	• Encoder, Decoder, Code Converters	• Lecture • Tutorial • Discussion	• Exam • Assignment
9	• Sequential Logic Circuits • Latches, Flip-Flops and Timers	• Lecture • Tutorial • Discussion	• Exam • Assignment
10	• Counters	• Lecture • Tutorial • Discussion	• Exam • Project
11	• Registers	• Lecture • Tutorial • Discussion	• Exam • Project
12	• Programmable Logic Circuits • Memory Devices (ROMs, PLAs, PALs)	• Lecture • Tutorial • Discussion	• Exam • Project
13	• **Final Exam (Announced by the Controller of Exam Office)**	• Lecture • Tutorial • Discussion	• Final Exam

8. Assessment and Evaluation:

Assessment Tools	Marks Distribution
Attendance	5%
Quiz	15%
Assignment	10%
Mid Term Exam	20%
Final Exam	30%
Lab	20%
Total	100%

For final grading University policies shall be followed.

9. Learning Materials

(a) Textbook(s):

1. ***Digital Fundamentals*** by Thomas Floyd, Pearson International Edition, 11th Edition.

(b) Reference Book(s):

1. ***Digital Logic and Computer Design*****,** M Morris Mano, Pearson Education India, 2008.
2. ***Digital Design: Principles and Practices***, J F Wakerly, Prentice Hall, 4th Edition.
3. ***Digital Systems: Principles and Applications*** by Ronald Tocci, Neal Widmer and Greg Moss, Pearson International Edition, 12th Edition.

(c) Simulation Software: Logisim, Multisim

10. Course Policies

- **Attendance:** Regular class attendance is mandatory. Points will be taken off for missing classes. Without 70% of attendance, sitting for final exam is NOT allowed. Students will not be allowed to enter the classroom 30 minutes after schedule time.
- **Lecture Notes and Learning Materials:** The lecture notes and/or other reading materials for each class will be available to the online platform prior to that class so that student may have a cursory look into the materials. It is to be noted that slides and lectures given in the class should be considered as a guideline to learn about a topic. However, students **must** follow and practice from the textbooks to further enhance and clarify their understanding about that specific topic.
- **Class Participation:** Class participation is vital for better understanding of technological issues. Students are invited to class discussion and raise questions.
- **Tutorials:** Students should take tutorials with the instructor during the office hours. Other than the office hours, prior appointment is required.
- **Makeup Class:** Students will be notified in due time for any class cancelation, extra class, make-up class and tutorial class.
- **Exam Schedule:** The date and syllabus of quiz, and midterm exam is already given here, however, announcements will be given ahead of time. Final exam will be held as per schedule declared by the controller of exam office.
- **Makeup Exams:** There is **NO** provision for makeup exams. However, makeup for final examination may be arranged only if an absolutely unavoidable valid reason for absence is found. In such a case, a written explanation of the situation along with supporting documents must be submitted to the department before the exam date.
- **Cheating and Plagiarism:** Cheating and plagiarism on exams, assignments and reports are unacceptable. University policies shall be strictly enforced in this regard.