BGC TRUST UNIVERSITY BANGLADESH

Department of Computer Science & Engineering

Course Curriculum

COURSE	
Code	CSE 2101
Title	**Digital Logic Design**
Degree	B. Sc. (Hons) in Computer Science and Engineering
Year/Semester	2nd Year, 3rd Semester
Type	Core
Credits	3
Teacher & Contact Details	**Abhijit Pathak,** Assistant Professor , Department of CSE, BGCTUB **Email Address:** abhijitpathak@bgctub.ac.bd

Course Objective:

One of the main goals of this course is to teach students the fundamental concepts in classical digital design and to demonstrate clearly the way in which digital circuits are designed and analyzed today. The purpose is to make students familiar with modern hierarchy of digital hardware and enlighten them the state-of-the-art computer hardware design methodologies. Moreover, the contents of the course provide students the basic idea of how to design and simulate logic circuits.

The objectives of this course are to:

- Introduce the concept of digital and binary systems
- Be able to design and analyze combinational logic circuits.
- Be able to design and analyze sequential logic circuits.
- Understand the basic software tools for the design and implementation of digital circuits and systems.
- Reinforce theory and techniques taught in the classroom through experiments and projects in the laboratory.

Course Learning Outcomes:

- CLO:1. Identify and explain fundamental concepts of digital logic design including basic and universal gates, number systems, binary coded systems, basic components of combinational and sequential circuits (Level: C2)
- CLO:2. Demonstrate the acquired knowledge to apply techniques related to the design and analysis of digital electronic circuits including Boolean algebra and multi-variable Karnaugh map methods (Level: C3)
- CLO:3. Analyze small-scale combinational and sequential digital circuits (Level: C4)

- CLO:4. Design small-scale combinational and synchronous sequential digital circuit using Boolean algebra and K-maps (Level: C5)

Course Content

Mid Term Examination

Binary Systems – Four Lectures

- Introduction
- Number Systems and Conversions
- Arithmetic with number systems
- Signed and unsigned number systems and their arithmetic
- Binary Codes

Boolean Algebra & Logic Gates – Five Lectures

- Boolean Postulates & Theorems
- Boolean Functions and their Complements
- Sum of Min Terms & Product of Max Terms
- Standard forms & Canonical Forms
- Digital logic gates

Gate level Minimization – Six Lectures

- Karnaugh maps
- Multi-variable (2,3,4,5) K-maps
- Don't care conditions
- Digital Circuits using Basic and Universal Gates

Final Examination

Combinational Logic – Five Lectures

- Analysis and Design
- Code Converters
- Adders & its types
- Subtractors, Multiplier
- Magnitude Comparator
- Decoders and Encoders
- Multiplexers

Sequential Circuits – Six Lectures

- Latches (SR Latch, D Latch)
- Flip Flops (D Flip Flop, JK Flip Flop, T Flip Flop)
- Characteristic Tables, Characteristic Equations.
- Design and Analysis of Clocked Sequential Circuits (State Equations, State Tables, State Diagrams)
- Designing Counters

Registers & Counters – Six Lectures

- Simple registers
- Registers with parallel Load
- Shift Registers/Serial to parallel Convertors
- Universal Shift Register
- Asynchronous and Synchronous Counters
- Ripple, Binary, BCD, & Johnson Counters

Instruction of Uniform Courses Evaluation System

Theoretical exam evaluation system

Nature of Exam	**Percentage (%) of marks**	
Attendance & Class Performance	**10%**	**Sessional: 25%**
Class Test/Presentation	**15%**	
Mid-Term	**15%**	
Final Semester Exam	**60%**	
Total	**100%**	

Textbooks:

Digital Design M. Morris Mano, Michael D. Ciletti (4th Edition)

Reference Books:

Digital fundamentals Floyd (9th edition)