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| **Code and Name** | CSE 231/CSE 231 L Digital Logic design |
| **Type** | Core, Engineering, Lecture |
| **Credit Hours** | 3 |
| **Pre-requisites** | CSE173 Discrete Mathematics |

**Instructor’s Details:**

Dr. S. M. Mahfuz Alam

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Office Room: 1184 (SAC)

Office Hours (By Appointment): Thursday/Saturday 11.30 AM -12.30 PM.

**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.

**Course Objective:**The objectives of this course are

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

**Course Outline:**

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

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| CO | Description |
| CO1 | Apply principles to Boolean algebra to logic functions. |
| CO2 | Use K-maps to realize two-level minimal/optimal combinational circuits with up to 4-5 variables. |
| CO3 | Construct gate-level implementation of a combinational logic function using fundamental logic gates (AND/OR/NOT), Multiplexers, Decoders and Programmable logic gates. |
| CO4 | Analyze and design sequential circuits built with various flip-flops, registers, counters. |
| CO5 | Use simulation tool to construct Digital Logic circuit in Schematic level. |
| CO6 | Operate laboratory equipment, build and troubleshoot simple combinational and sequential circuits. |

**Weightage Distribution among Assessment Tools**

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| Assessment Tools | Theory Weightage (%) |
| Class Performance/Attendance | 5 |
| Assignment | 5 |
| Quizzes | 10 |
| Midterm Exam | 25 |
| Final Exam | 25 |
| Term Project | 10 |
| Lab Work | 20 |