



Course Name	Logic Circuits (Digital System I)
Prerequisite course	
Corequisite course	Discrete Mathematics
References	1. Digital Design, M.Morris Mano, 5 <sup>th</sup> ed. , 2012. 2. Introduction to switching theory & logical design, Fredric J.Hill & Gerald R.Peterson,3 <sup>th</sup> ed. , 1981.
Course instructor	Rasoul Dalirrooy fard
Syllabus	<ol style="list-style-type: none"> <li>1. Primary Concepts: Signals and Digital circuits , Representation of numbers, Number Base Conversion , Sumation and Subtraction in 2 base , One's and Two's Complements , Binary Codes (BCD , Gray , 8 4 -2 -1 , Excess-3 , 2 4 2 1, ... ) , Detection &amp; Correction of Error .</li> <li>2. Boolean Algebra and Logic Gates : Algebra Structures and Boolean algebra , DeMorgan's Theorem , Boolean Function and Algebra Operations , Literal Concept , Canonical and Standard Form , Minterm &amp; Maxterm Function , Digital Logic Families , Digital Logic Gates and their Characteristics (Fanout , Delay Time , Noise Margin).</li> <li>3. Simplification of Boolean Functions: Karnaugh Table, Prime Impliment Table, Two Level Implementations, Don't care States, Quine-McClusky Algorithm.</li> <li>4. Combinational Logic Circuits: Design Methods, Adders, Subtractors , Code Conversion , Analysis Procedure , EOR &amp; ENOR Gates Applications.</li> <li>5. Combinational Logic with MSI &amp; LSI : Binary Parallel Adder , Decimal Adder , Magnitude Comparator , Decoders , Encoders , Demultipelexer , Multipelexer , Read Only Memory (ROM) , Programmable Logic Array (PLA) .</li> <li>6. Sequential Logic Circuits : Asynchronous &amp; Synchronous Concepts , Asynchronous Circuits Problems (Cycle , Race , Hazard) , Asynchronous SR Flip Flop , Synchronous Flip Flop , Triggering , Master Slave &amp; Edge Triggered Flip Flop , Analysis of Synchronous Circuits Procedure , Design of Synchronous Circuits , Simplification of States Theorem , State Assignment Theorem , Counters , Mealy &amp; Moor Circuits .</li> <li>7. Synchronous Sequential Logic Circuits with MSI &amp; LSI : Registers , Shift Registers , Serial Adders , Ripple Counters , Synchronous Counters , Timing Sequences , Johnson Counter , Memory , Sequential &amp; Random Access Memories .</li> </ol>