

ECE 102: Digital Circuit Logic

IN

High-school Math/Science

Pre-requisites:

- None

Concepts:

- Introduction to Digital Systems
- Number, character, and information representation
- Boolean Algebra
 - Algebraic simplification
 - Duality
 - Minterms and Maxterms
 - Karnaugh maps
- Combinational Logic Design
 - Two-level and multi-level networks
 - Design using NAND, NOR
 - Multiplexers, decoders
 - ROM, PLA, PLD based design
 - Adder and multiplier design
- Sequential Circuit Design
 - Latches and Flip-flops
 - Counters
 - Mealy and Moore machines
 - Analysis of synchronous sequential networks
 - State graphs and tables
 - Reduction of state tables
 - Design examples

Applications:

- Adders
- Array Multiplier
- Traffic light controller
- ALU design

Tools:

- Basic logic design tools

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OUT

Number Systems and Binary Representations

- Understands fundamentals of number systems
- Understands binary representations

Boolean Algebra

- Knows rules of Boolean algebra
- Can construct and use truth tables
- Can derive canonical expansions of Boolean logic functions
- Can use K-maps to minimize logic

Gate-Level Design

- Understands representation of logic equations as gate-level schematics

Finite State Machines

- Has knowledge of FSMs and sequential building blocks
- Able to design and optimize an FSM starting with design specifications

Programmable Logic

- Can implement logic in programmable devices (PLA/PLD, FPGA)

Memory

- Has basic understanding of structure and behavior of ROM and RAM devices