

ECE 102: Digital Circuit Logic

IN

OUT

High School Math

- Algebra
- Trigonometry

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
- Introduction to hardware description language (HDL)
- Sequential Circuit Design
 - Latches and Flip-flops
 - Counters
 - Mealy and Moore circuits
 - Analysis of synchronous sequential networks
 - Synthesis of synchronous sequential circuits
 - State graphs and tables
 - Reduction of state tables
 - Design examples

Applications:

- Adder/subtractor design
- Array multiplier
- ALU design
- Processor design

Tools:

- CAD tools for design, simulation and debugging, FPGA based implementation

Number Systems and Binary Representations

- Understand fundamentals of number systems
- Understand binary representation of information

Binary Logic

- Know the rules of Boolean algebra
- Construct and use truth tables
- Derive canonical expansions of Boolean logic functions
- Optimize logic using K-maps and algebraic techniques

Logic Circuit Analysis and Synthesis

- Understand representations of logic equations operations as gate- and register-transfer level schematics

Finite State Machines

- Has knowledge of FSMs and sequential building blocks
- Design, analyze, and optimize an FSM starting with design specifications

Programmed Logic

- Understand HDL and describe circuits in HDL
- Implement logic in programmable devices (PLA/PLD, FPGA)