THE OHIO STATE UNIVERSITY

COLLEGE OF ENGINEERING

Introduction to Digital Logic

ECE 2060

Credit Hours:

3.00

Course Levels:

Undergraduate (1000-5000 level)

Course Components:

Lecture Recitation Lab

Course Description:

Introduction to the theory and practice of combinational and clocked sequential networks.

Course Goals / Objectives:

- Master the number representations used in today's digital systems and their arithmetic properties and conversion techniques
- Master analyzing, synthesizing, and designing networks of combinatorial, digital logic elements
- Be competent to analyze, design and synthesize digital clocked sequential circuits
- Be familiar with modern computer tools for digital design, verification and simulation
- Be familiar with how to implement their design schematics to hardware using modern FPGAs
- Be familiar with digital circuit design methods
- Be competent in reporting standards
- Be competent in using laboratory instruments and laboratory methodology
- Exposure to methodology for critical troubleshooting skills

Introduction to Digital Logic - 2/2

Course Topics:

- Number systems and conversion
- Boolean algebra
- Karnaugh maps
- Multi-level gate circuits and combinatorial logic.
- Multiplexers, decoders and PLDs
- Latches and flip-flops
- Registers and counters
- Timing (delays, timing diagrams)
- Analysis of clocked sequential circuits (general models for sequential circuits, timing charts, state tables, graphs)
- Design of clocked sequential circuits
- Finite state machines, flow diagrams, mapping to flip-flop circuits with logic gates.
- Introduction to the Audio Synthesizer: build a synthesizer, Students also learn how to use Matlab to create memory contents for ROM look-up tables. Finally students are introduced to bit shifting as a means of scaling signed and unsigned numbers.
- Simon Logic Game: Students build a state machine based logic game that presents a sequence of 4 lights and 4 audio tones that must be matched in sequence. This project incorporates all aspects of the course.

Designation:

Required Elective