Introduction to Digital Logic Lab for Transfer Students

ECE 2067

Credit Hours:
0.50 - 0.50

Course Levels:
Undergraduate (1000-5000 level)

Course Components:
Lab

Course Description:
Laboratory-only component of ECE 2060 for transfer students. Laboratory practice with and application of the theory of combinational and clocked sequential networks.

Prerequisites and Co-requisites:
Prereq: 2061, and CPHR 2.00 or above.

Course Goals / Objectives:
- Be competent in synthesizing networks of combinatorial, digital logic elements
- Be competent to 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 competent in working in teams for lab experiments
- 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
Course Topics:
- Introduction to lab Equipment: Signal Generator and Oscilloscope, how to measure digital signals using the oscilloscope and the motivation for using digital signals
- Introduction to Quartus and the DE2 Board: HDL files, basic RTL components for simulation. Quartus’s on-chip debugging tools, Signal Tap II and the In-System Memory Content Editor.
- Using the CODEC: Students are shown how to use the DE2’s audio CODEC chip to perform conversions between analog and digital signals.
- Introduction to the 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.
- Electronic Keyboard: Students build a circuit that takes signals from PS2 keyboard and converts them into musical tones by applying the concepts and skills they have learned in the previous 5 labs.
- Demo Player Feature for an Electronic Keyboard: Students add an auto play feature to the electronic keyboard that automatically plays a short tune. Emphasizes the use of sequential components, testing of large Quartus project.

Designation:
Elective
Required