Cleveland State University
Department of Electrical Engineering and Computer Science

EEC 384: Digital Systems Laboratory

Catalog Description: EEC 384 Digital Systems Laboratory (0-3-2)
Pre-requisite: EEC383
Selected experiments in digital systems.

Textbook: Lab supplements.


Coordinator: Dr. Pong P. Chu
Associate Professor of Electrical Engineering and Computer Science

Course Objectives: To apply theoretical principles to design, simulate, implement and verify digital circuits with EDA (Electronic Design Automation) software tools and FPGA (field programmable gate array) devices.

Expected Outcomes: Upon completion of this course, students should be able to:
1. Apply EDA software to design and verify digital circuits
2. Derive basic digital circuits using Verilog HDL
3. Design, simulate, implement and test combinational circuits
4. Design, simulate, implement and test sequential circuits
5. Design, simulate, implement and test FSM (finite state machine)

Fulfillment of EE and CE Program Objectives and Outcomes:
Objectives:
1. Practice electrical engineering in one or more of the following areas: communications, computers, controls, power electronics, and power systems
2. Define and diagnose problems, and provide and implement electrical engineering solutions in an industrial environment

Outcomes:
a. An ability to apply knowledge of mathematics, science, and engineering to general electrical engineering and, in particular, to one or more of the following areas: communications, computers, controls, power electronics, and power systems
b. An ability to design and conduct electrical engineering experiments, as well as to analyze and interpret data
c. An ability to design a system, component, or process to meet desired needs
e. An ability to identify, formulate, and solve electrical engineering problems
k. An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.

Contribution of Course to Meeting the Professional Component:
Math & Basic Science: 0 credit;
Engineering Topics: 2 credits;
General Education: 0 credit
Prerequisites by Topic: Digital systems design principles (materials covered in EEC383)

Topics:

1. Introduction to EDA software tools and design flow 6
2. Gate-level combinational circuit with schematic capture 3
3. Module-level combinational circuit with schematic capture 3
4. Arithmetic circuit with schematic capture 6
5. Counter and shift register with schematic capture 3
6. Finite state machine with schematic capture 3
7. Introduction to Verilog hardware description language 6
8. Multiplexing and decoding circuit with Verilog 3
9. ALU circuit with Verilog 3
10. Programmable counter with Verilog 3
11. Finite state machine with Verilog 3
12. Test 3

Total 45

Computer Usage: EDA software is used in laboratory to do schematic capture, HDL entry, synthesis, and simulation.