ECE 394-001: Digital Systems Lab (0-3-1)

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Office hours: Wednesdays and Fridays 10:00-11:25, or by appointment
Meeting times: Mondays 1:00-3:55, FMH 211
Pre-requisites: ECE 251, ECE 271, ECE 291

Text: *Laboratory Manual and Supplementary Notes: ECE 394 – Digital Systems Lab*, by Edwin Hou and Arthur Glaser (available via the ECE Department Laboratory web page at http://centers.njit.edu/ecelab and the course Moodle page).

All components needed to perform the experiments in this course are included in the ECE labs kit that students have obtained for use in previous lab courses. Spare parts are available for purchase from the IEEE store.

Description: Experiments emphasize digital design from basic electronic circuits to complex logic. Topics include switching speed, basic sequential circuits, the arithmetic/logic unit, and computer memories.

Course Outcomes:

1) The student will be able to design and construct combinatorial circuits using discrete logic gates.
2) The student will be able to design and construct sequential circuits using flip-flops.
3) The student will be able to design and construct more complex digital circuits using more complex digital components, including shift registers, counters, memory, and ALUs.
4) The student will be able to use CAD tools to program PLDs to implement combinatorial and sequential digital designs.
5) The students will be able to communicate their designs via written laboratory reports documenting the results of the lab experiments.
6) The student will be able to work in teams enhancing skills in leadership and contribution to a team.

Student Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (CLO 1, 2, 3, 4)
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors (CLO 1, 2, 3, 4)
3. an ability to communicate effectively with a range of audiences (CLO 5)
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives (CLO 6)
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. (CLO 1, 2, 3)

Course Schedule:

Week	Experiment	Topic
1-2	1	Logic Gates and Logic Families
3	2	Combinatorial Circuits
4-5	3	Sequential Circuits
6	4	Shift Registers
7	5	Gate Function Detector
8	6	Counters
9	7	Memory and ALU
10-13	8	Project: 4-bit RPN Calculator
14	8	Project Presentations

Grading Policy:

Experiments 1-7   10% each

    Prelab: 30% (individual)   (70% total)
    Demo: 20%
    Lab Report: 50% (group)

Final Project (Experiment 8)   30%

    Prelab: 20% (individual)
    Demo: 20%
    Presentation: 20%
    Lab Report: 40% (group)

Notes:

- Prelabs are due by the beginning of class in the first week in which an experiment is being performed. No prelab is required for Experiment #1.
- Individual effort will be considered in grading of all items. Team work is vital to success.

Honor Code: The NJIT Honor Code will be upheld, and any violations will be referred to the Dean of Students.