EE 2169 – "Lab for EE 2369"
Digital Systems Design I Lab General Information

Supervising Professor: Dr. P. Nava
Office: Engineering Building, Room A-319 Email: **pnava@utep.edu**
Office Hours: 3:30 - 4:30 Monday
11:00 - 12:00 Tuesday
12:30 - 1:30 Wednesday
11:00 - 12:00 Friday
Other times by appointment

NOTE: Meeting Venue: Digital/Microprocessor Lab (Engineering Building, Room E-340)

Course Description: Implementation and testing of combinational and sequential digital systems.

Prerequisite: EE 1305 and EE 1105, each with a grade of "C" or better; or CS 1301 and CS 1101, each with a grade of "C" or better; or CS 1401 with a grade of "C" or better.

Co-requisite: EE 2369 (Digital Systems Design I). There are hardware projects and software simulation projects, performed in this lab, that are associated with this class. The student is responsible for completing the labs, and meeting with the Teaching Assistant at the formally scheduled time assigned to the section in which the student registered. Please note that the lab is 1 credit hour, and the grade for that lab is calculated separately from the grade in the EE 2369 class.

Text: None. All handouts and printed materials will be provided on BlackBoard.

Required Resources:
1) USB Flash Drive
2) ECE Vectra Lab Student Computer Account (see Nito, Room E319 B)

Course Outcomes:
At the end of this course students will be able to:
- Utilize the standard design sequence outlined below to create Digital Logic Systems;
- Use the Xilinx ISE development environment to implement designs;
- Implement Digital Logic Systems in various forms;
- Use the Xilinx Spartan 3 (or similar) FPGA Chipset as target hardware for implementation; and
- Design via Verilog (HDL) or schematic capture modules found in the development platform.

Design Sequence (using an integrated design platform):
1) Design Creation (schematic capture or HDL)
2) Synthesis (create design into a gate-level netlist)
3) Constraints (specify timing constraints and I/O assignment)
4) Implementation (compile design into place and route design)
5) Result Analysis (run a test bench and look at ISM simulation results to make corrections if necessary)
6) Debug (close ISM, edit, and try again)
7) Device Programming (download design into device)

Course Policies:
- You are required to attend the section of Lab in which you are registered, and to be on time.
- Pre-Lab Assignments are work assignments to be completed in preparation for your lab attendance.

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- Pre Lab work should be submitted on BlackBoard, by the deadline indicated.
- Pre-Lab work is typically done by hand, so it can be scanned and uploaded to BlackBoard. There are scanners available in the library, as well as virtually every computer lab on campus. Do NOT submit pictures of your Pre-Lab work, make sure your submission is a PDF file.
- Graded Pre-Labs will be available, on BlackBoard, prior to your lab session, so that you may correct any errors or misunderstandings prior to carrying out the lab.
- Group discussions and group problem solving is allowed and encouraged to the degree that it can be ensured that all group members contribute and understand all required facets of the work at hand.
- Lab assignments should be completed during the lab session. Each student must present a working demonstration of the lab assignment to the instructor **before the end** of the lab session in order to earn full credit. Getting assistance or assisting other students is allowed, as long as one student does not perform the other's lab procedure.
- Lab Reports are due by the date indicated on BlackBoard, and must always be written by each student individually and uniquely in his/her own style. NOTE: there is a handout on PROFESSIONAL ENGINEERING WRITING STYLE in the "Getting Started" folder on BlackBoard.
- A Lab Report TEMPLATE, as well as Lab Assignments are provided on BlackBoard. This will allow you to use MSWord and create your individual Lab Report (complete with screenshots of your circuit, simulation and/or implementation). Once completed, you can save as a PDF document and upload to BlackBoard.
- Late assignments will NOT be accepted without **written** medical, legal, military, or work justification. Special circumstances will be considered if reported in time. Makeup labs are by appointment only.
- Samples of student work will be collected for quality assurance purposes. Please notify the professor, in writing, if there is any confidentiality requirement about any work that is submitted.
- All work must have good presentation for full credit.

Lab Guidelines

Each lab is divided into three important tasks: *Pre-lab, Demonstration, and Lab Report*. Students can access the instructions for the PRELAB on the LAB HANDOUT, available on BlackBoard. Students are responsible for working on the PRELAB, which is hand written and typically includes a preliminary design for the lab assignment. Note that this work is to be completed prior to lab, and uploaded to Black Board by the deadline indicated on BlackBoard. The PRELAB will be graded, and available on Black Board, prior to your Lab session.

The Laboratory (Procedure) will be carried out during the formal assigned lab period.
Group discussion is strongly recommended, but each individual must submit their own work.

Apart from the assigned TA for your lab there are other TAs, administering different lab sections, to help with questions. However, completed labs can only be checked by the assigned TA. If a student fails to demonstrate work during the lab "checkout" time, arrangements must be made to demonstrate the circuit during another designated time and points will (potentially) be deducted. At the start of the lab session students should have their graded PRELAB on hand, and should also have their corrected design according to feedback provided, if necessary. Before calling the TA for demonstration of your circuit operation ("checkout"), make sure everything is ready (graded/corrected PRELAB, circuit to be tested in software or physically wired on the bread-board). Also, students should be prepared to answer questions pertain-

ing to the lab. If the circuit doesn't work at checkout time, the lab will be graded for partial points. Extra time will be allotted, but points will be deducted, as deemed necessary.

You must submit a formal lab report with neatly drawn figures, diagrams, or embedded screenshots, as necessary. The lab report will include a cover page showing your name, lab name, lab number, due date. The graded PRELAB will be the first page(s). The written report format should contain the following sections:

- Objective
- Equipment Required
- Procedure and Testing/Verification/Results
- Conclusion (questions are typically provided to guide the student)

An MSWord Template will be provided for the Lab Report. If the lab included generation of an HDL program, please make sure that a listing of the program is included (either embedded in the report, or attached as an Appendix to the Report), and ensure that it has the required comments and documentation.

Course Grading:

Lab Assignments 75%
Quizzes..... 25%

Lab Grading Rubric:

Pre-Lab ..... 30 pts
Lab Demonstration ..... 30 pts
Formal Lab Report ..... 20 pts
Conclusions ..... 20 pts
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Scale for Letter Grade:

20%

90% – 100% → **A**
80% – 89% → **B**
70% – 79% → **C**
60% – 69% → **D**
0% – 59% → **F**

Lab Report Guidance:

You will be provided with a Lab Assignment (write-up) on a weekly basis. It will have a short reading assignment, Pre-Lab assignment (preparation for the lab), Lab Procedure, and some guiding questions for writing your conclusion.

Pre-Lab:

- Calculations (tables, diagrams, K-maps, etc.)
- Justifications – 1 paragraph

Lab Procedure and Results:

- Steps involved in the procedure
- Schematics, HDL, screenshots (pictures), Simulation, etc.
- Justifications – 1 paragraph
- Notes on any problems encountered, and solutions implemented

Demonstration:

- Demonstrate working software, simulation, or circuit to Teaching Assistant, if applicable.

Conclusions:

- Discussion of the objective of the lab (given in the Lab Assignment), and what was learned during this lab. Answer questions given in the Lab write-up, which are intended to guide your conclusions.

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Some general questions that could be addressed here are:

- What is the relationship between the course lecture and how you implemented this lab?
- Comment on expected and unexpected results during the lab procedure.
- How is what you did in this Lab seen in technologies in the real world? Give examples.

Academic Dishonesty:

As an entity of The University of Texas at El Paso, the Department of Electrical and Computer Engineering is committed to the development of its students and to the promotion of personal integrity and self-responsibility. The assumption that a student's work is a fair representation of the student's ability to perform forms the basis for departmental and institutional quality. All students within the Department are expected to observe appropriate standards of conduct. Acts of scholastic dishonesty such as cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in the whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student, or the attempt to commit such acts will not be tolerated. Any case involving academic dishonesty will be referred to the Office of Student Conduct and Conflict Resolution (OSCCR). See the OSCCR homepage at http://sa.utep.edu/osccr/ for more information.

American Disabilities Act:

If you feel you may have a disability that requires accommodations, contact the Center for Accommodations and Support Services (CASS, http://sa.utep.edu/cass) at 747-5148 located in the Union East, Room 106.