WEST VIRGINIA UNIVERSITY
COLLEGE OF ENGINEERING AND MINERAL RESOURCES
Department of Computer Science and Electrical Engineering
CpE272 Digital Logic Lab
Spring 2010

Meeting Location: ESB 903

Carter Edge

Lab Times:	**Tuesday 2pm-5pm**
	Thursday 6pm-9pm
Office Hours:	**Wed-Thurs 2pm-3:30pm and by appointment**
Office:	**ESB 757**
Email:	**cedge@mix.wvu.edu**

Ben Knabenshue

Lab Times:	**Wednesday 6pm-9pm**
Office Hours:	**Monday 3pm-5pm; Thursday 1pm-2pm and by appointment**
Office:	**ESB 901**
Email:	bknabens@mix.wvu.edu

Cletis Nicklow

Lab Times:	**Monday- 2pm-5pm**
	Wednesday - 2pm-5pm
Office Hours:	**Monday – 1pm-2pm Wednesday - 5pm-6pm and by appointment**
Office:	**ESB 901**
Email:	**cnicklow@mix.wvu.edu**

Course Website: www.eCampus.wvu.edu
The lab handouts, syllabus, etc will all be available through eCampus.

Course Objective:
The students will experiment with digital electronic circuits including number systems, design, application of modern digital circuitry for both combinational and sequential logic circuits. The laboratory work in this class will emphasize simulation using VHDL simulation software and hardware realization using ALTERA FPGAs to demonstrate the concepts presented in CpE271.

Learning Outcomes:
1) Binary Representation and Basic Logic gates.
1) Combinational logic with circuit optimization using K-Maps.
1) Implementation of circuits with GAL chips.
1) Construction of basic blocks like adder, multiplexers, demultiplexers, counters,

etc.,

1) Construction of circuits using FPGA.
1) Implementation of circuits using VHDL.
2) Modular design
3) Sequential Logic design and behavior modeling
4) Functionality of Memories and Arithmetic Logic Units

Attendance:
You are expected to attend every laboratory session.

Not attending lab will result in a zero if the absence is unexcused.

For acceptable excuses (i.e. Emergencies), all missed laboratory sessions must be made up. Although the laboratory can be used during the day time hours on an 'as available' basis for the purposes of making up a lab, we encourage you to finish it during the lab schedule. Students in a scheduled period will always have first priority to the use of the equipment in the lab.

Missed Labs:
No make-up labs will be given unless permission is granted by the professor. Make-up labs must be completed before the next lab session. Lab reports for missed labs must be turned in within one week of completion of the lab, or points will be deducted as indicated by the late policy.

Group Sizes:
No group can have more than two students.

Grading Policy:

Final Grade

1. Labs and Lab Questions: 75% (Equally Weighted)
2. Final Project: 15%
3. Final Quiz: 10%

Lab Grades - Each lab will be graded based on the following:

1. Pre-Lab Questions – 10%
2. Post-Lab Questions – 10%
3. Completion of Lab Work (demonstration) – 40%
   Both partners will be assessed INDIVIDUALLY!
4. Laboratory Reports – 40%

Grading will be based on the normal: A (100-90), B (89-80), C (79-70), D (69-60), F (59-0) scale. The cutoff is 89.50…, 79.50…, 69.50…

Design Demonstration:
During class, each group will be required to construct circuits that make up the experiment. Part of your overall grade will be based upon your in-lab competency. But, the demonstration grade will still be individual. If you are active in performing the experiment and understand the operations of it, you will receive the highest credit. Do not be discouraged from asking for help during the lab if you need it. However, this is meant to encourage you to check the wiring of your circuits and to otherwise attempt to determine where the problem might lie before requesting help. It is important that all lab participants understand the operations of the

experimental circuits as well as the fundamental principles at work. Upon a successful demonstration of the experiment, the instructor will sign his name to confirm that the demonstration was implemented correctly. It is the students' responsibility to not leave the lab environment before the instructor signs of on the demonstration to make sure they receive full points.

Laboratory Report:

A Laboratory report will be required after the completion of each laboratory assignment. Every student must hand in an individual report at the beginning of lab. E-mailed lab reports will not be accepted. Members of the same group may share the design but they must have their own, individual answers and conclusions, including any answers to post lab questions. They will always be due at the beginning of the next laboratory experiment. Any delay will cause -10% penalty per day.

A Lab report should consist of the following parts and should be **WRITTEN IN YOUR OWN WORDS**:

1 Title Page

The title page should include your name, section, experiment number and title, lab partner, and the date the lab was performed.

2 Introduction – 5 %

The introduction section is basically a brief overview of the lab and should not be written in great detail. What is the problem you are trying to solve and why? What useful information should this experiment provide?

3 Experiment – 10 %

Under the experiment heading you should state what you are trying to accomplish on a particular part of the lab and HOW you accomplished it. What methods/techniques did you use? Design work should go in this section. This should include schematics, truth tables, equations, or anything else you used in designing or setting up your experiment.

4 Results – 15 %

The result section should contain the results (data) that you obtained from implementing the experiment as well as an analysis of the results. The results could be a truth table of actual results obtained, or it could be a description of what worked, what didn't work, and why it worked / didn't work.

5 Conclusion – 10 %

The conclusion should state what was learned from the lab experiment and what you thought about it.

The following characteristics are expected of each lab report:

- Professionalism/Neatness
- Well thought out
- Label Figures
- Comment Code
- Decent grammar
- Include wiring information/schematic (Labeled)
- **Don't copy and paste text straight from handout**

The report requires considerable thought to present the information in a logical and concise manner. All reports should be computer generated, using a word processing program and any other applications needed for plotting, drawing, and analysis. Points will be deducted for lab reports with poorly drawn diagrams or hand-written answers.

The "experiment" and "results" section should be based on individual parts of the lab, so it's likely you will have multiple "experiment" and "results" sections. For example, a lab report for an experiment with three parts would be outlined as follows:

Title Page
Introduction
Part I:
  Experiment
  Results
Part II:
  Experiment
  Results
Part III:
  Experiment
  Results
Conclusion

The lab reports should be completed and submitted on an individual basis.

Post-Lab and Pre-Lab Questions:
Post and Pre lab questions will be assigned with each experiment and are to be completed as part of the lab report each week. Attach all post and pre lab questions at the end of your lab report clearly marked as post and pre lab questions (i.e. description in the header of the page).

Laboratory Notebook:
The lab notebook is a record of your idea and design during your lab section and a good reference for your report. The basis behind the lab notebook is to encourage you to keep good records both for yourself and for others. Each student will be

required to keep a proper bound notebook. The notebook is a record of your thought process - it must be brought to the laboratory any time you are working. Every student must have a lab notebook. Any notes given as part of the pre-lab lecture should be written in your notebook. Designs and calculations must also be done in lab notebook. Since you will work as groups, a single notebook will not contain all the records for any design, but will contain all records of your contribution to design.

Troubleshooting:
Basic troubleshooting should be performed by the student during this lab. However, assistance will be offered if needed, but will only be given if the circuits are wired in an acceptable fashion (i.e. no 'spaghetti' wiring).

Important Scoring Points:
- Regular attendance, please do not be late for class.
- Devotion, co-operation and good demonstration in lab.
- Finish the lab on time or make it up within the week.
- Hand in your lab report on time.
- Keep good details in your lab notes, which might help you a lot in final exam.
- Preview the lab handout (if provided in advance), which will save your time in the lab.

Academic Dishonesty:
Dishonesty, cheating and plagiarism will not be tolerated in this laboratory or any other class at West Virginia University. Academic dishonesty takes many forms including copying coursework, cheating on exams, failure to acknowledge a contributing source, and falsely acknowledging a non-contributing source. *If dishonesty occurs in these forms or any others, it may lead to a failing grade for that assignment, failure of the class, or expulsion from WVU. Cheating will not be tolerated in any shape or form.*

Social Justice:
West Virginia University is committed to social justice. We concur with that commitment and expect to maintain a positive learning environment based on open communication, mutual respect, and non-discrimination. Our university does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color, or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration.

If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with Disability Services (293-6700).