New Paltz
STATE UNIVERSITY OF NEW YORK

Department of Electrical and Computer Engineering

Course Title: Digital Logic Laboratory **Course Number:** EGC-208 **Credit:** 1 **Co-requisite:** EGC230 **URL:** http://www.engr.newpaltz.edu/~bai	**Instructor:** Dr. Baback Izadi **Office:** 103 Resnick Engineering Hall **Phone:** (845) 257-3823 **FAX:** (845) 257-3730 **Email:** bai@engr.newpaltz.edu
Days: Wednesday **Time**: 9:25 – 12:05 PM **Room**: REH 210	**Office Hours:** Tuesday 10:45 AM – 12:15PM Wednesday 1:30 PM – 2:30 PM Friday 10:45 AM – 12:15 PM And by appointment

1. Calalog Description

Experiments in both combinational and sequential logic circuits - BCD to 7-segment display decoders, full adder, adder-subtractor, and arithmetic and logic unit (ALU). VHDL implementation. Synchronous sequential circuits using D flip-flops, counter designs. This lab uses software tools such as Electronic WorkBench and Xilinx ISE. Designs are finally downloaded into FPGA boards.

2. Desired Learning Outcomes (LO's)

I. Students will learn digital design principles and practices and implement large-scale digital systems, which incorporate digital devices at all complexity levels.

II. Students will utilize state-of-the-art design entry tools such as schematic capture and VHDL to design and implement their circuits in Field Programmable Gate Arrays.

III. Students will work in teams to design, simulate, and implement digital circuits.

3. Course Contribution to Student Outcomes

This lab contributes to our program outcomes as specified in the following table:

Student Outcome	Contributed Learning Outcome	Level of Contribution 3 /3 = strong; 2/3 = moderate; 1/3 = marginal
a) An ability to apply knowledge of mathematics, science and engineering	I	2/3
b) An ability to design and conduct experiments, as well as to analyze and interpret data.	II	3/3
d) An ability to function on multidisciplinary teams.	III	3/3
k) An ability to use the techniques, skills, and modern engineering tools necessary for	II	3/3

engineering practice.		

* ABET: Accreditation Board for Engineering and Technology

Design Team:

Teams of two students will complete each lab as a unit. Team members must be active in all phases of the lab. Inactive team member can be removed at the discretion of other team member or the instructor. Inactivity of team members should be brought to the attention of the instructor. Please note that **attendance is compulsory.**

General Instructions:

All materials related to the lab will be available on course website (http://www.engr.newpaltz.edu/~bai/CSE45208/EGC208_fall.htm.) The students should review the lab prior to the scheduled lab period and be prepared for the lab. A brief overview of the lab experiment will be given at the beginning of each new lab session.

Each student must keep a separate lab notebook, and record all their work (preparatory work and all their observations during the lab session) in it. Each lab should begin on a new page (with no pages left blank) and should include the **Title of the lab, Experiment #, and the Date**.

Once the lab is completed, the teaching assistant or the instructor will sign off both the cover sheet and the notebook.

The lab notebook must be available for inspection by the instructor and /or TA. It will be reviewed periodically and will be graded. You need to turn in your lab notebook at the end of the semester for grading.

Lab Report Guidelines:

A final report (only one report per team) is to be turned in for each lab. **Late lab reports will not be accepted.** If your report is not complete by the due date, you should hand in an incomplete report for a partial credit. You should use a word processor and CAD tools to professionally document your work. The report should have the following sections:

- Departmental cover sheet (**use standard template, a copy can be found at:** http://www.engr.newpaltz.edu/~bai/CSE45208/EGC208_fall.htm) indicating title of the Lab, course name and number, date (semester and year), and the name of each team member.
- Table of contents.
- Introduction – A brief introduction to the topic, and the experiment being carried out.
- Procedure - all design steps should be documented including the truth table, state table, state diagram, Karnaugh maps, circuitry, etc.
- Simulation results if needed.
- Conclusion (problems encountered, lessons learned, etc.).
- References

Your report should be free of grammatical and spelling errors. Your lab report should reflect only your team's work. If unreasonable similarities are recognized between the turned in reports, they will receive failing grades.

Assignments:

Assignments will be posted on the course web site:
http://www.engr.newpaltz.edu/~bai/CSE45208/EGC208_fall.htm

Tentative lab schedules are as follows:

Lab number	Title
1	**Introduction**
2	**A 4-bit Adder**
3	**Design of a Combinational Logic Circuit**
4	**Design of Full Adder**
5	**Design of a Seven Segment Display**
6	**Design of an Adder/Subtractor unit**
7	**Design of a four-bit ALU using Xilinx**
8	**VHDL implementation of a four-bit ALU using Xilinx**

Grading Policy:

	Grading weights
Completed lab notebook with 100% of labs signed off **(partially completed lab notebook with at least 70% of labs (4 labs) signed off**	15% (10%)
Presentation	5%
Formal lab report:	80%
Total:	100%

Each lab report is graded on a 0-10 point scale. A report without a signature is graded on a 0-5 point scale.

Presentation:

Each team is expected to make a Power Point presentation of 10 to 15 minutes on the last day of lab. You may consult with me and choose one the labs. Your presentation should include your design problem and your solution at the appropriate detail. You should conclude with encountered problems and lesson learned.

Incompletes:

"I" indicates that the student has done satisfactory work in the course, but because of circumstances beyond his control has been unable to finish all requirements. It is not to be given to enable a student to do additional work to bring up a deficient grade.

Relevant Web Sites

- Digital Logic Fundamentals: http://www.williamson-labs.com/480_logic.htm
- Digital logic tutorial: http://www.play-hookey.com/digital/
- Combinational Logic Tutorial: http://www.ee.surrey.ac.uk/Projects/Labview/combindex.html
- Latches and Flip flops: http://vorlon.cwru.edu/~jackie/eces301/hw/HW2/lab2.html
- Texas Instruments Digital Logic Families: http://focus.ti.com/docs/logic/logichomepage.jhtml
- To download a demo version of Electronic Workbench click on http://www.interactiv.com/html/demo.html
- Xilinx: http://www.xilinx.com/programs/xds1.htm
- If you need software to view and print PDF files under Windows: http://www.adobe.com/products/acrobat/readstep.html
- If you need software to view and print Postscript files: http://www.cs.wisc.edu/~ghost/

Special dates:

Monday September 5	No class (Labor Day)
Sept 29 - Sept 30	No class (Rosh Hashanah)
Friday Oct 7	No class (Yom Kippur) - classes meet until 3:00 p.m.
Monday Oct 10	No Class (Columbus Day)
Tuesday Oct 11	No Tuesday Class - Monday classes meet
Friday October 17	Mid-Point of Fall 2011 semester
Friday November 4	Last day for Course Withdrawal
November 23 – 25	No classes (Thanksgiving)
December 7	Last lab and class presentation

Academic Integrity Statement

(From Student Catalog)

Students are expected to maintain the highest standards of honesty in their college work. Cheating, forgery, and plagiarism are serious offenses, and students found guilty of any form of academic dishonesty are subject to disciplinary action.

Cheating is defined as giving or obtaining information by improper means in meeting any academic requirements. The use for academic credit of the same work in more than one course without knowledge or consent of the instructor(s) is a form of cheating and is a serious violation of academic integrity.

Forgery is defined as the alteration of college forms, documents, or records, or the signing of such forms or documents by someone other than the proper designee.

Plagiarism is the representation, intentional or unintentional, of someone else's words or ideas as one's own. Since words in print are the property of an author or publisher, plagiarizing is a form of larceny punishable by fine. When using another person's words in a paper, students must place them within quotation marks or clearly set them off in the text and give them appropriate footnoting. When students use only the ideas and change the words, they must clearly identify the source of the ideas. Plagiarism, whether intentional or unintentional, therefore, is a violation of the property rights of the author plagiarized and of the implied assurance by the students when they hand in work that the work is their own. If students have any questions about what constitutes plagiarism, it is their responsibility to clarify the matter by conferring with the instructor. Faculty members must report in writing cases of cheating, plagiarism or forgery to their department chair and their academic dean.

ADA Policy Statement:

Students with documented physical, learning, psychological and other disabilities are entitled to receive reasonable accommodations. If you need classroom or testing accommodations, please contact the Disability Resource Center (Student Union Building, Room 205, 257-3020). The DRC will provide forms verifying the need for accommodation. As soon as the instructor receives the form, you will be provided with the appropriate accommodations. Students are encouraged to request accommodations as close to the beginning of the semester as possible.