Course Summary

Today, virtually every electronic device includes one or more VLSI (Very Large Scale Integration) "chips". This course will look at how such VLSI chips are designed, concentrating on field-programmable logic devices (FPLDs) -- the "chips" most commonly used for small-volume consumer devices. The course will briefly review logic design, and will concentrate on both manual design and design using the VHDL specification language. Students will design and implement projects on actual FPLDs.

During the last full week of class (5/2 - 5/8), we will be in Silicon Valley.

Objectives:

By the time you finish this course, you should have a better understanding of the VLSI design and manufacturing process. You should be able to explain the issues in choosing between ASICs and CPLDs. You should be comfortable designing, simulating, and testing both combinatorial and sequential circuits using the Altera Quartus II software, including both schematic capture (graphical programming) and VHDL (text programming).

Professor: Dr. Ellen Walker

Office: Colton 112
Office Hours: Drop in anytime my door is open, even a little
Office Phone: 569-5250
E-mail: walkerel@hiram.edu (read several times/day)

Required Text:
Rapid Prototyping of Digital Systems, Quartus Ed., James O. Hamblen and Michael D. Furman

Grading:

Laboratory / HW assignments (3) 30%
Individualized Project & Presentation 30%
Journal (in Silicon Valley) 25%
Participation 15%

Academic Honesty Policy:
All assignments must be individual work unless otherwise specified. While you are allowed (and encouraged) to work together in understanding the concepts of the course and even the assigned problems, the solutions that you hand in should be entirely your own. In the case of programs, sharing of algorithms or code is NOT ALLOWED.

**Details and Deadlines**

**Lab / HW (30%)** (See detailed lab handouts)

- Lab 1 (1st tutorial, xor): 10%  **DUE 4/22, noon**
- Lab 2 (2nd tutorial, stopwatch): 10%  **DUE 4/27, 5pm**
- Lab 3 (VHDL state machine): 10%  **DUE 5/1, 5pm**

**Project / Presentation (30%)**

Your project is an original design using all that you have learned. Designs in the past have included a Pong game using a monitor, various electronic locks (including one using the keyboard), games including BlackJack and Tic Tac Toe, and a text editor. Remember all the products you saw at the beginning of the EDA video – many of those products have controllers that would make good projects. I would be very happy to discuss possible project ideas with you at any time. (See detailed project handout for specific requirements).

**Deadlines:**

- Proposals:  **Monday, 4/23, 5pm**
- Presentations:  **Tuesday 5/10, 1-5pm**
- Final Writeup Due:  **Wednesday 5/11, 5pm**

**Journal (25%)**

Your journal will reflect your experiences and observations during the trip. I expect that you will write at least one page (handwritten) or equivalent daily, from May 2 through May 8. Please use a notebook with attached pages for a handwritten journal. If you are bringing a laptop, I will accept the journal by CD ROM or file transfer. The journal will be collected in Atlanta Airport before our plane to Pittsburgh boards on May 8.