Instructor:  Dr. Charles W. Neville

Prerequisites:  CS 254 and Math 218.

Corequisites:  Computer Science majors in some programs taking CS 354 are required to take Physics 338 concurrently.  It serves as a lab for CS 354.  Other students are strongly advised to take Physics 338 concurrently.

Course Description:  This is a course in how to design digital circuits at the gate level.  Students will analyse and design circuits with pencil and paper (75% of the time), and with industry standard circuit design software (25% of the time).

In electrical engineering departments, this course is often called a "basic logic" course, because the design of digital circuits without feedback can be analysed in terms of basic AND-OR-NOT logic.  Students will learn and use Boolean algebra to design digital circuits without feedback.

The design of digital circuits with feedback is more complicated, but they too can be analysed in terms of certain basic components called flip flops and latches.  Students will learn to use characteristic tables and excitation tables to analyse the behavior of flip flops, and will learn to use finite state machines to analyse and design circuits with feedback.

At the end, students will use their knowledge to design a simple computer central processing unit.


Required Software:  A digital circuit simulator allowing hierarchical design, such as:

- Digital Works 2.0 (freeware, allows hierarchical design) http://www.cs.ccsu.edu/~neville/Courses/Spring00/CS353/CS354Resources/digwork.zip

Digital Design Resources Page:  There is a comprehensive Digital Design Resources page immediately off my Web page, http://www.cs.ccsu.edu/~neville/.  (No period at the end of the URL.)  This page includes links to the software packages listed above.

CS 354 Course Web Page:  There is a CS 354 course page immediately off my Web page at the URL listed above.  This page includes project descriptions and the course syllabus, as well as a link to the Digital Design Resources Page.

Assignments and Exams:  Reading and problem assignments are listed below.  Problems are to be done, but do not need to be handed in.  Problems will be worked in class.  Each exam date is denoted by **.  Make-up exams are scheduled by appointment only.

Projects:  There will be three projects.  Project assignments are listed on a separate sheet, with due dates and instructions for handing in.  In addition, each project will be announced in class, and the project assignments are also available on the CS 354 Course Web page, immediately available off of my home page (see above).

Grading:  Your final grade will be based on project assignments (1/3), in-class exams (1/3), and the final exam
(1/3), and will be affected by classroom participation, conduct and attendance. The exams will include questions from the textbook, questions from the lectures, and questions from the assigned projects. The numerical grades will be averaged and then converted to a letter grade.

**Attendance:** Two unexcused absences are allowed, and any work missed must be made up. The student should notify the instructor concerning absences, or there will be a grade penalty.

**Student Conduct.** It is expected that all students will conduct themselves in a respectful manner, and will assist in maintaining an atmosphere conducive to learning in the classroom.

**Honesty Policy.** It is expected that all students will conduct themselves in an honest manner (see the CCSU Student Handbook), and NEVER claim work which is not their own. Violating this policy will certainly result in a substantial grade penalty, and could result in expulsion from the University. However, students are allowed to discuss projects with others and receive debugging help from others.

**Office Hours:** MW 2:00 - 2:50 PM, Tue--Thur 10:00 -- 10:50 AM and 4:30 -- 5:00 PM, or by appointment, especially before and after class. Feel free to stay for help, and feel free to stay to chat. My office is in room 205 Maria Sanford Hall. In an emergency call me at 832-2719 (work). My Web page URL (Web address) is http://www.cs.ccsu.edu/~neville/. (Again, no period at the end of the URL.)

**Week No.** **Reading and Problem Assignments**

1. 1/22 Chapter 2 Boolean Algebra and Logic Gates.
2. 1/29 Chapter 2 continued. Problems: Chapter 2: 1 -- 13, 17, 20, 22, 23 (think about).
3. 2/5 Chapter 2 continued. **2/7** **Exam 1** (chapter 2).
4. 2/12 Chapter 3 Simplification of Boolean Functions.
5. 2/19 Lincoln’s and Washington’s Birthday, No Classes!
  2/21 Chapter 3 continued. Problems: Chapter 3: 1 -- 6, 10, 11, 12, 15, 22, 23, 24, 25.
6. 2/26 Chapter 3 continued.
7. 3/5** **Exam 2** (chapter 3).
  3/7 Chapter 4 Combinational Logic.
8. 3/12 Chapter 4 continued. 3/17 to 3/25 Spring Recess, No Classes!
9. 3/26 Chapter 5 MSI and PLD Components. Problems: Chapter 5: 18, 22 (very simple), 23, 29, 30 (logic pins only).
10. 4/2 Chapter 5 continued.
11. 4/9** **Exam 3** (chapters 4 and 5).
  4/12 Chapter 6 Synchronous Sequential Logic.
12. 4/16 Chapter 6 continued. Problems: Chapter 6: 1 and/or 2, 4 (even though it violates hierarchical design principles), 5, 6, 8, 13, 14 (and draw state diagram for the reduced machine).
13. 4/23 Chapter 6 continued.
14. 4/30 Chapter 6 continued.
15. 5/7 Catch up.
  5/9 Review
16. 5/14 Exam Week, No Classes!
  5/18** **Final Exam, 11 AM to 1PM**

**Have a Good Summer!**