EE361 MICROPROCESSOR-BASED DIGITAL DESIGN
Course Policy
Fall 2009

CAPT Charles B. Cameron

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1 Objective

EE361 Microcomputer-Based Digital Design is a course for students majoring in electrical and computer engineering, as well as for other engineering students interested in the subject. Its purpose is to give students a deeper understanding of digital logic than is accessible through introductory courses. This understanding extends to studying how to include digital computers in larger electronic systems and how to program them to control other equipment. The course emphasizes lab work and requires a course project.

The objectives of the course are to:

- learn how to embed a high-speed microcontroller with on-chip peripheral devices within a larger system;
- become proficient at programming a microprocessor using assembly language.

The course syllabus lays out in detail the topics which we shall cover in the course. The course syllabus, this course policy, and other documents pertaining to the course can be found on the course web site at

`http://www.usna.edu/EE/ee361/`.

2 Textbooks

1. Sid Katzen, *The Quintessential PIC Microcontroller*, Springer, New York, New York, 2005.

   This book uses the PIC16F84 for illustrating the use of microcontrollers in digital designs. This processor is like the PIC16F884 that we will use in this course, but without as many peripheral devices within it.

2. *PIC16F882/883/884/886/887 Data Sheet 28/40/44-Pin, Enhanced Flash-Based 8-Bit CMOS Microcontrollers with nanoWatt Technology*, Microchip Technology Inc., 2008. [1]

3 Homework and Labs

3.1 Homework

Homework assignments are mandatory. You will find them, along with the dates they are due, on the web at

`http://www.usna.edu/EE/ee361/Homework/`.

Your instructor will grade selected problems. There is zero credit for late homework. Exceptions to this policy will be made in cases of illness or other extraordinary circumstances. (Movement orders do not qualify as extraordinary circumstances.) Solutions to the homework problems will be posted on the web shortly after their collection.

Collaboration with your fellow Midshipmen is permitted and encouraged. Such collaboration is a hallmark of all professional officers. However, the assignment you hand in must be your own. Claiming someone else's work as your own—plagiarism—is totally unacceptable. List the names of all midshipmen who assisted you with your assignment or lab, sign the list, and include it when you hand in the assignment. Collaboration is not permitted during quizzes, tests, or exams.

[1] This textbook is also available on the world-wide web in portable document format at
`http://www.usna.edu/EE/ee361/SupplementaryMaterial/`

Homework must be well organized, legible, and self-contained. To be self-contained there must not be any need to look somewhere else to find out what the question was: the question must be reproduced in full, including any diagrams associated with it. Submit your homework on green engineering paper, stapled together, with the name of the course, your section number, your own name, the assignment number, and the number of each problem clearly visible. It is permissible to photocopy the problem statement, if you prefer, before providing your solution.

If your instructor cannot read your solutions, understand them, identify the answer or answers you claim are right, and match all components in your schematic diagrams to symbols in your solutions, then your solutions will not get full—or possibly any—credit. Include all measurement units (e.g., volts or amperes) where appropriate, using standard SI notation. If your effort is inadequate, you will receive no credit.

3.2 Labs

This course is heavily dependent on lab work. You must keep a lab notebook with detailed plans, schematic diagrams, ideas, methods, and observations. From such notes you will find it easy to prepare lab reports. Avoid erasing material from your lab notebook. Cross it out, annotate it if necessary, and press on. The lab notebook is not intended to be beautiful: it is intended to be practical and complete.

You will have to design many circuits in this course and you will have to design many programs to operate the microcontroller in your circuits. The circuits constitute hardware; the programs constitute software. You must include schematic diagram of all circuits, along with an explanation of them. Properly labeled schematics include:

1. A name for the circuit or subcircuit.
2. A unique name on or beside each part. It is customary to use prefixes and suffixes, as $R1, R2, \ldots$ for resistors; $C1, C2, \ldots$ for capacitors; $L1, L2, \ldots$ for inductors; $U1, U2, \ldots$ for integrated circuits; and $D1, D2, \ldots$ for diodes.
3. For integrated circuits, place pin numbers outside the box and internal signal names inside the box. Examples of pin numbers are $1, 2, \ldots$; examples of internal signal names are A1 or D.
4. External signal names appear on wires connecting the components. Examples are Clock or Reset.
5. Electrical quantities which are expected at a certain point should be indicated. For example, if you use a voltage source to provide a five volt DC reference level, mark it as $5\ \mathrm{V}$.

In documenting your computer programs, include the output of the assembler or compiler—the listing file, with extension `.lst`—in your report, along with a clear explanation of its operation. Do not include the input to the assembler or compiler—the source file, with extension `.asm` or `.c`—in your report: it is shown in a more useful form in the listing file, which also shows how well your program passed the syntax checker.

You will be permitted access to the lab after hours. It is unlikely the two hours of scheduled lab time each week will prove sufficient. For a course offering four credit hours, like this one, you should be doing an additional eight hours of work each week outside class time.

You will be permitted but not required to work with one or two lab partners. You will not be permitted to work in teams of more than three, but you should feel free to seek help from other students in the lab. Partners must submit a single lab report with all their names upon it. In all cases, submit your lab reports at the beginning of the Monday class during the second week following that in which the last scheduled session of the lab is held. For example, if the last day devoted to a particular lab were due on Thursday, 10 September 2009, then the report would be due on Monday, 21 September 2009. If you get help from other students, acknowledge this help and name those students in your report.

Further details on lab notebooks, lab reports, and software documentation standards are on the web at

`http://www.usna.edu/EE/ee361/Labs/`.

4 Quizzes

There will be four short quizzes as shown in the syllabus. All quizzes will be open-book, open-notes. You will also be permitted to use the Internet. You will not be permitted to communicate with anyone else, of course, by any means whatever. Sharing of calculators, batteries, any written materials, or anything else at all with other students in the class during quizzes is likewise prohibited.

Let your instructor know in advance if you will not be able to attend during a quiz. Unexcused absences will result in a grade of zero for that quiz. In the case

of excused absences your overall quiz grade will be the average of all quizzes taken.

5 Tests and Exams

There will be two midterm tests of 50 minutes length. The final exam will be three hours in length. You may use any books, notes, or computer programs you like during tests and exams.[2] However, any program or device that lets you receive help from anyone else is specifically prohibited. Sharing of calculators, batteries, any written materials, or anything else at all with other students in the class during tests and the exam is likewise prohibited.

Let your instructor know in advance if you will not be able to attend during an exam. Unexcused absences will result in a grade of zero for that exam.

Exams will have a strict start/stop time. Your instructor will announce the start and end of each exam by the commands "*Begin work*" and "*Cease work.*" You shall immediately place any writing instrument in your hand on the desk/table top and close the exam (cover sheet on top). Your instructor will keep the class apprised of the time remaining.

6 Calculators

You may use a calculator in every class, lab, quiz, test, and exam. Your instructor will not permit you to share calculators or batteries during tests, exams, or quizzes. If your calculator doesn't work and you have not brought spare batteries, plan to do arithmetic manually. In the case of tests and exams, when a computer is available, you may use calculator programs on the computer if you wish.

7 Grades

Your instructor will mark all problems in quizzes, tests, and homework assignments on a 4.0 scale with a weighting factor proportional to the difficulty of the problem.

[2]This open-book policy makes it unlikely that the tests will ask you merely to regurgitate facts. Of much more interest is your ability to synthesize information from various sources. You will need to study in advance of tests and the exam to be successful in this.

Nominal grades are found using the weightings shown in Table 1 on page 4. However, your instructor reserves the right to alter course letter grades up or down based on your class participation, performance trends, and his overall impression of your performance.

8 Extra Instruction

You may make an appointment for EI by e-mail.

For EI, bring your course notes, homework problems, and specific questions or problems confronting you. If you are having trouble learning the material and applying it to solving problems, designing circuits, or designing programs, it would be wise to get extra instruction.

You may reach your instructor by e-mail:
CAPT Cameron: cameronc@usna.edu
Prof. Ngo: ngo@usna.edu

9 Administrative Matters

9.1 Questions

Feel free to ask questions in class. It is better to clear up a difficulty immediately than for you to cease all progress because of a misapprehension. If it is indicated, it may be necessary to ask you to schedule extra instruction.

9.2 Sleeping in Class

Even if you are drowsy, *do not sleep in class*. Stand up quietly and go to the back of the room. You do not need permission to do so. When you are ready, quietly return to your seat.

9.3 Omitted Material

It is not possible to cover everything during class. If some topic or example is not covered, that does not mean it is unimportant. Refer to the EE361 course objectives on the course home page to make sure you have not overlooked anything.

9.4 E-mail and the Web

We rely heavily on e-mail and the web to communicate with you. Check your e-mail at least daily so you don't miss something we send you. Bear in mind that e-mail

	6-week	12-week	16-week	Final Grade
Final Exam	—	—	—	30.0%
Lab Project	—	—	21.4%	15.0%
Test 2	—	18.2%	14.3%	10.0%
Test 1	22.2%	18.2%	14.3%	10.0%
Quizzes	22.2%	18.2%	14.3%	10.0%
Homework	11.1%	9.1%	7.1%	5.0%
Lab Reports	44.4%	36.4 %	28.6%	20.0%
Class Participation	subjective			

Table 1: Grade Weightings

is not instantaneous: although the mail may be in my box, we may not read it for some hours.

9.5 Absence/Makeup Policy

You must notify your instructor prior to missing class if you will be absent. Arranging for makeups of exams or labs is *your responsibility* and must be done within one week.

9.6 Section Leader's Duties

Your instructor will appoint a Section Leader and an alternate during the first class. The alternate will fill in for the Section Leader if the latter is absent. The Section Leader is required to

- call the section to attention and report the names of absent students at the start of class;
- collect and submit all homework and other assignments to the instructor at the start of class. Separate different assignments into different piles;
- call the class to attention for dismissal at the end of class;
- muster the class in the Maury Hall parking lot during emergencies, fire drills, etc., and report absences to the instructor; and
- contact the ECE Department by phone (3-6150) if the instructor is more than 10 minutes late for class to ask his whereabouts. If he is not expected to arrive at all, the Section Leader must direct the class in a study period, collect all homework, and deliver it to the ECE Office before the close of business that day. Do not dismiss the class early.

The Academy obliges instructors to report Midshipmen who are late or absent or who leave early. Deciding whether absences are justified is a responsibility of the Commandant's organization.

9.7 Eating and Drinking in Class

Food and covered drink containers are allowed in the classroom. You are both collectively and individually responsible for keeping the classroom clean. Abuse of this privilege will result in food and drinks being banned altogether.

9.8 Contacting the Instructor

Instructor: CAPT Charles B. Cameron
Telephone: (410) 293-6181 (Work)
(410) 757-8876 (Home, up to 2200)
E-mail: mailto:cameronc@usna.edu
Office: Maury Hall 336

Instructor: Asst. Prof. Hau Ngo
Telephone: (410) 293-6179 (Work)
E-mail: mailto:ngo@usna.edu
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