

Microcontrollers

ECE 381-001

Spring 2017

Description:

Microcontroller use in variety of real-time data transduction and control applications. Students build hardware interfaced to a PSoc5 microcontroller using programs they write.

Objectives:

To teach methods of interfacing small computer systems to external circuitry and to control that circuitry with the computer. Extensive in-lab time ensures that students will become able to build and test hardware as well as program the computer for specific applications.

Prerequisites:

Grade of C or better in ECE282

Required texts:

Microcontrollers and Microcomputers 2/e by Fredrick M. Cady

Reference Text: The C Programming Language, 2nd Edition, Kernighan & Ritchie

Location:

Class meets Tuesday and Thursday from 2:00PM to 3:15PM

Lecture room: EB3012, Lab room: EB3013

Professor:

Timothy York

3042 Engineering Building

Office Hours:

Tues/Thur 3:30PM to 5:30PM

E-mail:

tyork@siue.edu

Phone:

Office 650-2615

Secretary 650-2524

Cell 643-9576 (Don't Abuse please!)

Teaching Assistant:

Oren Pincock

Class web site:

<http://www.siue.edu/~tyork/classes/ece381> (Note, pay attention to SIUE e-mail, as labs and other course related files will occasionally be posted to OneDrive. Look for links to such material through your SIUE e-mail address.)

Class Policy:

Attendance:

Class attendance is mandatory, and you may be dropped from the class roster for any of the following:

- Failure to attend the first scheduled class.
- Habitual tardiness. Notify me in writing beforehand if you have extenuating circumstances that will consistently make you late.
- Missing a lab demonstration, exam, or quiz without an acceptable excuse.
- Missing more than 2 consecutive classes or 4 nonconsecutive classes throughout the semester.

It is your responsibility to mark yourself as present if an attendance sheet has been handed out in class or lab. Frequently during the semester, there are no scheduled lectures so that you have time to work on the labs. **Unless you have already successfully demonstrated your lab, you are expected to be in lab during these times.** I will meet with you and your partner during them to see your progress and answer any questions, solve any problems, etc.

In the case of an extended illness, long term absences should be reported to the Office of Dean of Students (618)650-2020, which will send a written notice to all of your instructors and save you the burden of contacting them individually.

Reading Assignments:

Reading assignments assignments from the textbook, as well as various PSoC Application Notes, PSoC Module datasheets, and component datasheets will occasionally be made throughout the semester. It is essential that you read the assigned material. Unannounced quizzes may be given that cover material in the reading assignment.

Lab Policies:

Lab assignments and the project are central to this class and constitute more than two-thirds of the credit you earn. To ensure a grade of "C" or better, the single most important thing you can do is get each assignment **working on time** and be able to answer questions about what you have done. You are expected to spend at least 10 hours per week on this class alone, most of which will be in lab. Debugging some types of errors can take considerable time, so the reality is you will probably end up spending more than 10 hours a week working on the labs. **Get started early!** Getting things to *really work* will likely take more time than you think (at least until you get good at it). You and your partner must give an in person demonstration of the lab to myself or the TA by the stated deadline. The demo grade will be based on functionality (how well it works) and understanding (can you explain what you did and answer our questions). Note, even if you divide the work with your partner, you are both responsible for knowing all aspects of the

project. Saying something like “Well, I just did the hardware” if we ask you a software related question is unacceptable and will result in loss of points for the lab.

Students work as partners on the labs but each student must submit their own individual report for each lab assignment. No report will be accepted until a demonstration has been done.

You are not guaranteed to have a partner in this class. I also reserve the right to change the partners in a group at any time or split up a group into individuals working by themselves.

All wiring must be done neatly, and all wires should be cut only to the length needed. Wires should be routed around chips on the breadboard, not looped over them. All connections from the PSoC to the external circuitry should have a clear entry point on the breadboard, and all signals should be easily accessible to the oscilloscope probes. The TA and I can and will refuse to help you debug a problem with your lab if your circuit is messy. Basically, if we cannot easily follow and probe your connections, we can't reasonably be expected to help you solve your issue.

Also, **keep your lab station tidy**. As engineers working on a project, I know that this can be a difficult thing to do, and we will allow some amount of mess during an assignment. The TA and I, will however, require you to clean up your lab station after each completed assignment before proceeding to the next. This includes returning any equipment not in the parts kit back to us, cleaning any wire scraps or returning them to the used wire bin, etc unless they are used in the following assignment. While not formally part of your grade, those failing to do so will be given a demerit for a habitually unkempt lab station. Multiple demerits may result in the loss of some portion of the class participation and/or lab grade.

We are the only class using EB 3013, and the station that you pick is yours for the duration of the semester. You are free to come-and-go as necessary, but if anyone not in 381 is in the room, feel free to ask them to leave, especially if they are just there for the printer. There are open labs and printers across campus they can use. The TA and I will ensure all stations have the necessary equipment. If, at any point, you have missing/failed equipment notify myself, the TA, or Steve Muren (EB 3034) IMMEDIATELY! DO NOT TAKE EQUIPMENT FROM ANOTHER GROUP'S STATION OR ANOTHER ECE LAB! Anyone caught doing so will be punished! You wouldn't want anyone sabotaging your lab, so don't sabotage theirs.

Exams:

Two scheduled exams will be given during the semester which are split into a written portion and hands-on “mini-lab” practical. If for any reason you are unable to take an exam, you should advise me beforehand. A make-up exam will only be given for an acceptable absence, but it will also be more challenging. An unacceptable absence for an exam will result in a score of zero. I reserve the right to have unannounced quizzes at any time during the semester.

Final Project:

The last two weeks of the course will be devoted to designing and implementing a project of your choice, pending approval by me, the instructor. This project must incorporate several of

the key concepts covered in the class and be sufficiently challenging. To help inform my decision for approval, you will submit a written proposal roughly around Week 12 detailing what you will do. I will discuss the proposal with you in person, and we will come to an agreement as to the final requirements for the project.

Grading:

Letter grades will be assigned according to the following scale:

Lab Work	50%	90% or greater	A
Exam #1	15%	80% to 89-%	B
Exam #2	15%	70% to 79-%	C
Final Project	15%	60% to 69-%	D
Class Participation/Quizzes	5%	60% or less	F

At any time during the semester you may request an estimate of your grade, but only in person, not over email. Allow up to three days for me to compute the estimate.

Partial Credit

If your proposed solution to a particular problem clearly shows that you understand all the concepts involved in solving the problem, but you have made a minor, non-conceptual, error, such as mis-reading a dimension or failing to convert units correctly, then you will receive partial credit for your work. Partial credit is not, however, awarded for a proposed solution which does not demonstrate knowledge of all the concepts required to solve the problem. Partial credit is **not** negotiable. However, if a math error has been made in totaling the points on an exam or homework please feel free to bring it to my attention.

Extra Credit:

I may offer extra credit assignments during the semester. You are not obligated to do them, they are strictly optional.

Joint Work and Outside Help:

The ability to share common interests and ideas is a valuable tool for learning. I encourage you to discuss problems with your fellow students, and to seek outside help when you do not understand something. However, I insist you abide by two rules: First, you must always make a serious attempt to understand the problem and a reasonable attempt to solve it by yourself. Second, you must completely understand your solution method for whatever you turn in; I may challenge you to explain it. If you do not understand your own solution you will not be given any credit for the lab assignment or problem, even if the answer you have provided is correct.

Miscellaneous:

- This course **will** take more time and effort than most any other course you have ever had. Weird stuff always happens all the time during the course of the semester, and often you will spend a few hours debugging a very simple problem. Plan accordingly. **Get started early!**
- I am glad to answer any lab related questions you may have. However, before consulting me about a problem you are having with your lab assignment, make sure you clearly understand your problem and have made a serious attempt at solving it. Simply showing up and saying "It doesn't work" doesn't leave me much to go on. Bring with you specific symptoms and your testing methodology.
- All requests or questions which you have for me which require some action to be taken at a later time (e.g. a request to verify that a grade change was properly recorded) should be written in the form of a memo such as you might write when working as a professional engineer. This memo may either be submitted via electronic mail or written on an 8.5" by 11" paper. Don't count on my short-term memory.
- For your own protection, you should save all lab reports, quizzes, and any written agreements which you have reached with me (such as the conditions for making up a grade of "I" for the course).

Disability Services:

If you are a student with a disability that requires curricular or co-curricular accommodations, please go to Disability Support Services for coordination of these accommodations. All accommodations are individualized and require documentation of the functional impacts of the disability and severity. DSS is located in the Student Success Center, Room 1270; you may contact them to make an appointment by calling (618) 650-3726 or sending an email to disabilitysupport@siue.edu. Please visit the DSS website located online at www.siue.edu/dss for more information.