ECE 3720 Section 005
Microcomputer Interfacing Laboratory

Class Location: Online
Class Meeting Time: Thursdays: 12:30 – 3:30

Lab Teaching Assistant: Dylan Kensler
Email: dkensle@clemson.edu
Office Hours: By appointment only (on Zoom)

Instructor of Record: Dr. Apoorva Kapadia
Email: akapadi@clemson.edu
Office: 307 Fluor Daniel EIB
Office Hours: By Appointment Only

Course Description

Emphasizes microcontroller programming and interfacing for controlling various types of hardware. Topics include reading and writing to RAM, applications of a digital latch, keypad interfacing, interrupts, clock pulse generation, pulse width modulation, serial interfaces, and A-to-D and D-to-A conversion.

Pre-Requisite or concurrent enrollment: ECE 3720 with a C or better

Course Objectives

- Understand how the C programming language is used to control and interface with hardware.
- Understand how to interface with different types of devices on a microcontroller.
- Learn to search for documentation in the Data Sheets and utilize provided methodologies.

Required Materials

Text: Lab Manual – Download from: http://www.clemson.edu/ces/ece/resources/lab_manuals.html
Data Sheets: Students will be provided data sheets on the microcontroller and its breakout board on Canvas.
C Programming Tutorial: Students will be required to have a basic understanding of the C language. A tutorial or refresher on the language can be found at the following web address: http://www.cs.cf.ac.uk/Dave/C/CE.html.

Topical Outline

Laboratory #	Full Week of Classes #	Laboratory Description
1	2 (starting January 19)	Introduction to PIC32MX150F128D
2	3	Application of a Digital Latch
3	4	Comparator & Potentiometer
4	5	Keypad Interfacing
5	6	Interrupts
6	7	Peripheral Pin Select
7	8	Timers
8	9	Pulse Width Modulation
	10	No Labs – Spring Break
9	11	Serial Peripheral Interface
10	12	Analog to Digital Converter
	13	Make Up / Practice
	14	Design Projects
	15	Design Projects

Grading

A – 90% - 100%
B – 80 to < 90%
C – 70 to < 80%
D – 60 to < 70%
F – < 60%

Distribution

Attendance/Participation	15%
Pre-Labs	5%
Post Lab Reports	40%
Quizzes	15%
Design Project	25%
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Course Grade	100%

Additional Policies

Attendance is mandatory, in person or on Zoom (if your section is entirely online). If you must miss a lab due to special circumstances, please contact the TA who will attempt to find another section of the lab to for you to attend in order to make up for the missed lab. If you cannot do so due to course conflicts then let the TA know, and another course of action will be decided upon. You will receive a score of 0 for any unexcused missed labs that are not completed before the final project submission.

Attendance/Participation
Students must be present and work on the lab during the session's meeting time. Students will only receive full participation points for successful completion of the lab.

Pre-Labs
Prior to each lab, students should read through the entire lab and any relevant portions of the documentation. Students will be required to submit a diagram before each lab illustrating how they intend to wire the microcontroller and other devices. Diagrams should be electronically generated.

Post-Lab Reports
Post-lab reports should be prepared using the format outlined by the rubric on Canvas. Be sure to include a schematic diagram of any circuits along with commented C code. The schematics and figures, as well as the rest of the report, must be electronically generated. Lab reports can only be written for labs which were completed.

Quizzes
Online quizzes will be made available on Canvas at the end of each lab session. These are to be completed prior to the beginning of the next lab's section with any unfinished quizzes at this time being locked and graded and unattempted quizzes receiving a 0. Under no circumstances will quizzes be available to make up. Students will be shown answers once all quizzes have been assigned a grade. These quizzes may cover any and all topics covered in previous sessions as well as the current session's slides.

Design Project
Towards the end of the semester, students will be asked to submit a proposal for a design project. After acceptance of the proposal, the design should be implemented and demonstrated. A full report will then be prepared and submitted.

Accessibility Statement

Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to a class should let the instructor know and make an appointment to meet with a staff member in Student Accessibility Services as soon as possible. You can make an appointment by calling 864-656-6848 or by emailing studentaccess@lists.clemson.edu. Students who receive Academic Access Letters are strongly encouraged to request, obtain, and present these to their instructors as early in the semester as possible so that accommodations can be made in a timely manner. It is the student's responsibility to follow this process each semester. You can access further information here: http://www.clemson.edu/campus-life/campus-services/sds/.

Title IX

Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972.

Safe Campus

Clemson University is committed to providing a safe campus environment for students, faculty, staff, and visitors. As members of the community, we encourage you to take the following actions to be better prepared in case of an emergency:

a. Ensure you are signed up for emergency alerts (https://www.getrave.com/login/clemson)
b. Download the Rave Guardian app to your phone (https://www.clemson.edu/cusafety/cupd/rave-guardian/)
c. Learn what you can do to prepare yourself in the event of an active threat (http://www.clemson.edu/cusafety/EmergencyManagement/)

Academic Integrity

As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a 'high seminary of learning.' Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. In instances where academic standards may have been compromised, Clemson University has a responsibility to respond appropriately to charges of violations of academic integrity. Further information on Academic Integrity can be found in the *Undergraduate Announcements* and in the *Graduate School Policy Handbook*.