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## ECE 3720 Section 001

### Microcomputer Interfacing Laboratory

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**Class Location:** 322 Riggs Hall

**Class Meeting Time:** Thursday 9 a.m. – 12 p.m.

**Lab Teaching Assistant:** James Bittner

**Email:** [jbittne@clemson.edu](mailto:jbittne@clemson.edu)

**Office and Office Hours (or meeting location):** By Appointment

**Instructor of Record:** Dr. Apoorva Kapadia

**Email:** [akapadi@clemson.edu](mailto:akapadi@clemson.edu)

**Office:** 307 Fluor Daniel EIB

**Office Hours:** By Appointment Only

### Course Description

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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

### Course Objectives

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- Understand how the C programming language is used for interfacing and controlling 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

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**Text:** Lab Manual – Download from: [http://www.clemson.edu/ces/ece/resources/lab\\_manuals.html](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

<u>Laboratory #</u>	<u>Full Week of Classes #</u>	<u>Laboratory Description</u>
1	2 (starting September 4)	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
		No Lab during the week of Fall Break
7	9	Timers
8	10	Pulse Width Modulation
9	11	Serial Peripheral Interface
10	12	Analog to Digital Converter
		No Lab during the week of Thanksgiving
	14	Design Projects
	15	Design Projects

## Grading

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

<b>Distribution</b>	
Post Lab Reports	40%
Attendance & Performance	15%
Quizzes	15%
Design Project	30%
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Course Grade	100%

## Additional Policies

Attendance is mandatory. 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 missed labs that are not completed before the final lab exam.

### Lab Performance

Prior to each lab, read through the entire lab and any portions of the microcontroller or project board documentation that relate to the lab. Students will be graded depending on their lab performance with the details found in the rubric on Canvas. Students will be required to submit material as a part of their performance, a pre-lab circuit prior to attending that weeks' lab.

**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 labs section with any unfinished quizzes at this time being locked and graded and unattempted quizzes being given 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.

**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 must be generated by a computer and not hand-drawn, as well as all other aspects of the report, which should also be prepared on a word processor. Lab reports can only be written for labs which were performed and completed.