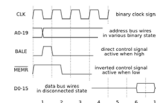




ECE 3710-400
3 Credits

Microcontroller Interfacing

Summer I, 2024



Tuesday, May 14th – Friday, June 21st

Instructor – Dr. William J. (Bill) Reid III **Office** – 207 B, Riggs Hall **Phone** – 864-656-5932
E-Mail – breid@clermson.edu **Cell** – 864-506-1792

Required Materials –

- **Embedded Computing and Mechatronics with the PIC32 Microcontroller**, by Lynch, Marchuk, & Elwin, Elsevier, Newnes, 2016.
- **Lecture Slides, Homework Solutions**, etc... online on *Canvas*
- **C Programming Tutorial**, online at <http://www.cs.cf.ac.uk/Dave/C/CE.html>
- **Manufacturers’ Notes on Microcontroller**, online at <http://www.microchip.com>
- **Laptop computer for taking quizzes and tests** – All or part of your tests and final exam will be taken on your laptop computer using the Respondus Lockdown Browser.
- **Respondus Lockdown Browser** – For installation of the browser on your laptop, please see the following: <https://www.clemson.edu/online/tools/responduslockdown.html>
- **Proctor to take tests** – See information on *Canvas*.

Topics Covered

- Introduction to Microcontrollers
- Introduction to the PIC32MX & MC9S12
- Hardware & Software Tools
- Memory Interfacing on MC9S12
- I/O and keypad Interfacing
- Power and real-world constraints
- Exception Processing (Resets and Interrupts, Real-Time Interrupts)
- Timers and Counters
- Pulse Width Modulation
- Comparators
- Analog-to-Digital Conversion
- Digital-to-Analog conversion
- Synchronous Serial Comm. (SPI, I2C)
- Asynchronous Serial Comm. (UARTs)
- Engineering Ethics (for Clemson Students)

Grading Policy – Your final grade for this course will be determined by the following averaging procedure:

Tests	≈ 55 %
Homework	≈ 15 %
Final Examination	≈ 30 %

A = 90 – 100, B = 80 – 89, C = 70 – 79, D = 60 – 69, F = 0 – 59

Goals – Interfacing of microcomputers to peripherals or other computers for purposes of data acquisition, device monitoring and control, and other communications. The interfacing problem is considered at all levels including computer architecture, logic, timing, loading, protocols, and software for building and simulating designs. The course goals are satisfied by studying the widely used PIC32MX microcontroller chip family.

Prerequisites – ECE 262 (Circuits II) and ECE 272 (Computer Organization) with a C or better grade. It is crucial for all ECE 371 students to have a good working knowledge of low-level C programming.

Tests – Tests will be taken online, and test passwords will be e-mailed to your proctor the day before the scheduled test. Please refer to the **ProctorInfo.pdf** file in the course information on *Canvas*. All work on tests is to be entirely the student's with no aid from any other source unless specifically stated.

Homework – You will receive one point per each homework problem found on Canvas unless otherwise stated. All work on homework is to be entirely the student's with no aid from any other source unless specifically stated. All homework is due by the final exam unless otherwise stated.

Academic Integrity, Manners, and Title IX statement – Please refer to the **Academic Integrity, Manners, and Title IX pdf** files in the **INFORMATION** folder on *Canvas*.

Legal Disclaimer – Any portion of this syllabus may be changed during the semester. Adequate notice will be given in class when necessary.