EE 5314-001 Embedded Microcontroller System Design
Fall 2011
4:00-5:20pm MW, 105 NH

Instructor:
Jason Losh, Ph.D.
jlosh@uta.edu
Office Hours are after 5:20pm MW outside 112NH or in 148NH as lab activities increase.
E-mail is the quickest method of contacting me on non-class days.
No phone or office has been assigned by the University.

Textbook:
No textbook will be required for this course. Extensive references, datasheets, application notes, and class notes will be provided on the course web site at http://omega.uta.edu/~jlosh/.

Listserv:
Please sign up for the EE5314-L listserv to receive the latest updates (goto http://listserv.uta.edu to manage your subscriptions or send a message to listserv@listserv.uta.edu with no subject line and the command SUBSCRIBE EE5314-L as the message body).

Catalog Description:
5314. EMBEDDED MICROCONTROLLER SYSTEMS (3-0). Hardware/software development techniques for microcontroller systems with emphasis on hardware-software interactions, programming internal peripherals, and real-time control and conditioning of external devices. Topics include: code efficiency issues, pin reuse issues, interrupt-driven processing, USART operations, I2C and SPI bus peripherals, and use of internal peripherals.

Requirements:
Very good knowledge of at least one microprocessor or microcontroller is mandatory. Essential background includes assembly language programming, memory organization, memory mapping, bus timing, basic i/o interfacing, and interrupt operation.

A good understanding of BJT and FET circuits, Fourier series and transforms, 1st and 2nd order control loops, and basic communications will also be very useful.

Measurable Student Learning Outcomes:
- Differences between Harvard and von Neuman architectures
- Differences of microcontroller and microprocessor architectures
- Comparison of standard microprocessor and digital signal processor memory bus and ALU architectures
- Study of 33FJ128MC802 microcontroller built-in devices including timers, PWM, interrupts, GPIO ports, and a/d converters
- Determining microcontroller memory, speed, and capabilities to solve a task
- Interfacing with SPI, serial, and CAN buses
- Measurement and instrumentation applications
- Digital filtering applications
- Device control: Motors, servos, relays, heavy AC and DC loads
- Real-time control applications

Important Dates:
First Class (Monday, 8/29), No Class (Monday, 9/5), Census Date (Monday, 9/12), Test 1 (Wednesday, 10/19), Last Drop Date (Friday, 11/4), Test 2 (Wednesday, 11/30), and Project Defense (Wednesday, 12/7 @ 4pm)

Performance Assessment:
- Grade scale: A (90-100), B (80-89), C (70-79), D (60-69), and F (0-59)
- Grade calculation: (Test 1 + Test 2 + Project) / 3
- The instructor reserves the right to make reasonable changes in performance evaluation as needed.

Shared Graduate Teaching Assistants:
All office hours are in the lab (148 NH).
Hours and GTAs to be announced.

Tests:
- Calculators, rulers, pencils, pens, books, and notes will be allowed during tests.
- Any device capable of compiling or emulating microcontrollers or microprocessors can not be used during in-class portions of the tests.
- Any take home portions of Test 1 will be due within one week of assignment.
- No makeup will be provided for any test.
- Any request for re-grading must be submitted to the grader within one week of the return date.

Cost:
No textbook will be required.

An in-circuit debugger will be provided to check out for the semester to teams of 3 and off-campus students. If adequate numbers of programmers are available, teams of 1 and 2 members will also be provided in-circuit debuggers for check out. Programmers are also available for use in 148NH. For students unable to utilize the provided programmers, a programmer will need to be purchased.

Parts required for the project will generally be less than $25 per team.

Projects:
- The project will consist of hardware construction and firmware development and is expected to require approximately 100 hours to complete.
- Project teams will consist of one to three team members. No teams of 4 or more will be allowed under any conditions, without exception.
- Projects will be defended on the last class day during class hours.
- A lab in 148NH is available to construct the hardware portion of your project and test your project, provided you attend a mandatory lab safety orientation.

Attendance Policy:
Attendance is not required, but a grade of zero will be provided for any quiz, test, or project deadline that is missed. The student is responsible for obtaining notes on any material missed.

Academic Integrity:
It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. According to the UT System Regents' Rule 50101, §2.2, "Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts."

EE Department Policy requires that you sign and return a letter acknowledging the College of Engineering Ethics policy.

Drop Policy:
Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late

registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. Students will not be automatically dropped for non-attendance**.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. Contact the Financial Aid Office for more information.

Americans with Disabilities Act:
The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Student Support Services:
The University of Texas at Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. These resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals to resources for any reason, students may contact the Maverick Resource Hotline at 817-272-6107 or visit www.uta.edu/resources for more information.

Electronic Communication Policy:
The University of Texas at Arlington has adopted the University "MavMail" address as the sole official means of communication with students. MavMail is used to remind students of important deadlines, advertise events and activities, and permit the University to conduct official transactions exclusively by electronic means. For example, important information concerning registration, financial aid, payment of bills, and graduation are now sent to students through the MavMail system. All students are assigned a MavMail account. Students are responsible for checking their MavMail regularly. Information about activating and using MavMail is available at http://www.uta.edu/oit/email/. There is no additional charge to students for using this account, and it remains active even after they graduate from UT Arlington.

To obtain your NetID or for logon assistance, visit https://webapps.uta.edu/oit/selfservice/. If you are unable to resolve your issue from the Self-Service website, contact the Helpdesk at helpdesk@uta.edu.

Lab Safety Training:
EE department policy requires that students utilizing 148NH attend a safety orientation session.