

## **EE 5313-001 Microprocessor Systems**

### **Spring 2018, MW 4:00-5:20pm, 106NH**

#### **Instructor:**

Jason Losh, Ph.D.

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Office Hours are after 6:50pm MW outside 202NH.

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/>. Materials will also be on reserve in the Science and Engineering Library.

#### **Listserv:**

Please sign up for the EE5313-L listserv to receive the latest updates. Send a message to [listserv@listserv.uta.edu](mailto:listserv@listserv.uta.edu) from your UTA e-mail account with no subject line needed and the command SUBSCRIBE EE5313-L as the message body.

#### **Catalog Description:**

5313. MICROPROCESSOR SYSTEMS (3-0). Hardware/software development techniques for microprocessors and their programmable peripherals, with emphasis on multi-byte width memory design, throughput issues including DMA controller design, coprocessor operation, interrupt-driven i/o, oscillator issues and timer peripherals, analog signal interfacing, and digital buses and interfaces. Topics include: code efficiency issues, hardware-software interactions, and design of memory systems, DMA controllers, and real-world interfacing.

#### **Prerequisites:**

Familiarity with at least one microprocessor microcontroller is required. Essential background includes assembly language programming, memory organization and timing, basic i/o interfacing, and interrupt operation. Also, knowledge of C or C++ is useful

#### **Measurable Student Learning Outcomes**

- Knowledge of microprocessor and microcontroller architectures
- Proficiency in memory organization and interfacing (up to 64-bit widths), refresh, error correction (ECC)
- Application of EEPROM, flash, and RAM (SRAM, DRAM, FPM, EDO, SDRAM, DDRx)
- Analysis of data throughput with programmed i/o and DMA
- Design of SDRAM/DDRx memory controllers
- Use of software and hardware interrupts and interrupt service routines
- Understanding of tradeoffs between interrupts and polling (latency, effective rates, and efficiency)
- Introductory knowledge of coprocessor interfacing and multi-processor
- Knowledge of multiple clock generation, phase locked loop, and handling asynchronous data
- Introduction to interfacing with real-world signals: analog signal interfacing, isolation, ground loops, noise, and EMI
- Working knowledge of I/O buses and interfaces: ISA/PCI/PCle, serial (RS-232/422/423/485), IEEE-1394, and USB

#### **Additional References:**

Many resources will be provided in addition to the textbook. These documents will be posted at <http://omega.uta.edu/~jlosh/>.

#### **Important Dates:**

First Class (Wednesday, 1/17), Census Date (Wednesday, 1/31),

Test 1 (Monday, 3/5), Spring Vacation (3/12-16), Last Drop Date (Friday, 3/30),

Test 2 (Monday, 4/23), and Project Defense (Monday, 4/30 @ 4pm)

(The official dates for registration, census, and dropping are available at [www.uta.edu/acadcal](http://www.uta.edu/acadcal) and supersede these dates if a conflict exists)

**Performance Assessment:**

- Grade scale: A (90-100), B (80-89), C (70-79), D (60-69), and F (0-59)
- Grade calculation: Attendance (10%), Test 1 (30%), Test 2 (30%), Project (30%)
- The instructor reserves the right to make reasonable changes in performance evaluation as needed.

**Graduate Teaching Assistants:**

All office hours are in the lab (NH148 or 129A).  
GTA information will be sent on the class listserv.

**Cost:**

No textbook will be required but you may wish to purchase a textbook for reference.

**Tests:**

- Calculators, rulers, pencils, pens, books, and notes will be allowed during tests.
- Computers are not allowed during tests.
- No makeup will be provided for any test.
- Any request for re-grading must be submitted to the grader within one week of the first return date.

**Project:**

- Project teams will consist of one to three team members.
- Off campus students shall also meet this deadline for the project.

**Attendance Policy:**

At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator in student success. Each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, [insert your attendance policy and/or expectations,

For this section, attendance will be taken on several class days at random, with the provision for one absence without penalty. A grade of zero will be recorded for any exam, test, or project deadline that is missed. The student is responsible for obtaining notes on any material missed.

However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients "begin attendance in a course." UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Blackboard. This date is reported to the Department of Education for federal financial aid recipients.

**Academic Integrity:**

Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and

I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code in their courses by having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System Regents' Rule 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University. Additional information is available at <https://www.uta.edu/conduct>.

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. For more information, contact the Office of Financial Aid and Scholarships (<http://www.uta.edu/aao/fao/>).

**Disability Accommodations:**

UT 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), The Americans with Disabilities Amendments Act (ADAAA), and Section 504 of the Rehabilitation Act. 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 disability. Students are responsible for providing the instructor with official notification in the form of a letter certified by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting:

The Office for Students with Disabilities, (OSD) [www.uta.edu/disability](http://www.uta.edu/disability) or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at [www.uta.edu/disability](http://www.uta.edu/disability).

Counseling and Psychological Services, (CAPS) [www.uta.edu/caps/](http://www.uta.edu/caps/) or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

**Non-Discrimination Policy:**

The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit [uta.edu/eos](http://uta.edu/eos)

**Title IX Policy:**

The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. For information regarding Title IX, visit [www.uta.edu/titleIX](http://www.uta.edu/titleIX) or contact Ms. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or [jmhood@uta.edu](mailto:jmhood@uta.edu).

**Lab Safety Training:**

Students registered for this course must complete all required lab safety training prior to entering the lab and undertaking any activities. Once completed, Lab Safety Training is valid for the remainder of the same academic year (i.e., Fall through Summer II) and must be completed anew in subsequent years. There are no exceptions to this University policy. Failure to complete the required training will preclude participation in any lab activities, including those for which a grade is assigned.

**Electronic Communication:**

UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

**Campus Carry:**

Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit <http://www.uta.edu/news/info/campus-carry/>.

**Student Feedback Survey:**

At the end of each term, students enrolled in face-to-face and online classes categorized as "lecture," "seminar," or "laboratory" are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback via the SFS database is aggregated with that of other students enrolled in the course. Students' anonymity will be protected to the extent that the law allows. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit <http://www.uta.edu/sfs>.

**Final Review Week:**

For semester-long courses, a period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabus. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

**Emergency Exit Procedures:**

Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, one should

never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

**Student Support Services:**

UT 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. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to [resources@uta.edu](mailto:resources@uta.edu), or view the information at <http://www.uta.edu/universitycollege/resources/index.php>.