CSE2312 Computer Organization and Assembly Language Programming
Summer 2019

Instructor Information

Instructor:
Jason Losh, Ph.D.

Office Number:
649 ERB

Office Telephone Number:
+1 817-272-3785 (CSE Department)

Email Address:
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Faculty Profile:
https://mentis.uta.edu/explore/profile/jason-losh

Office Hours:
MW 12:30-1pm, 2:50-3:30pm, 5:45-6pm, and by appointment. Additional hours will be added as needed as the semester proceeds.

Graders:
Xuan Wang, xuan.wang2@mavs.uta.edu, T 2-5pm. W 2-5pm in 126ERB and by apt in SEIR building
Farnaz Farahanipad, farnaz.farahanipad@mavs.uta.edu, Th 2-5pm in 126 ERB

Course Information

Section Information:
001

Time and Place of Class Meetings:
MW 6-7:50pm, 131 ERB

Description of Course Content:
Computer organization from the viewpoint of software, including: the memory hierarchy, instruction set architectures, memory addressing, input-output, integer and floating-point representation and arithmetic. The relationship of higher-level programming languages to the operating system and to instruction set architecture are explored. Some programming in an assembly language. Prerequisite: CSE 1320.

Student Learning Outcomes:
Upon successful completion of this course, students will understand the design concepts used to establish the interface between hardware and software in modern computer systems. Students will also be able to solve problems with assembly language programming while understanding the advantages and disadvantages of various approaches.

Class Web Page:
Additional files will be provided as needed on the course web site at http://omega.uta.edu/~jlosh/.

Communication:
All class-wide communication by the instructor, including distribution of homework sets, will occur via the class listserv. Please sign up for the CSE2312-L listserv by sending an e-mail from your UTA e-mail account to listserv@listserv.uta.edu from your UTA e-mail account (no subject line needed) and the command SUBSCRIBE CSE2312-L as the message body. You will then receive an e-mail from the listserv server to which you must acknowledge to join the listserv.

Canvas will be used for homework submission to the Grader and for viewing your Test 1, Test 2, and homework grades.

Textbooks and Other Course Materials:
Raspberry Pi Assembly Language RASPBIAN Beginners, 3rd ed., Bruce Smith, CreateSpace Independent Publishing Platform, ISBN 978-1492135289 (required)

Computer Organization and Design – The Hardware/Software Interface, ARM Edition, David A. Patterson and John L Hennessy, Morgan Kaufman Publishers, ISBN 978-0-12-801733-3 (not required)

All students are required to own a Raspberry Pi 3 (with appropriate accessories to power it and make it work) for both CSE2100 and CSE2312 Sections 001.
The CanaKit Raspberry Pi 3 kit has been used by many students in the past and is recommended: https://www.amazon.com/CanaKitRaspberry-Complete-Starter-Kit/dp/B01C6Q2GSY/.
Students do not need to buy the above kit, however they need to at least have a Raspberry Pi 3 motherboard, power supply, and 16GB or larger (32GB is better) and reader for your PC.
In addition, students will need the following components at home to work with the Raspberry Pi 3 natively:

- USB keyboard and mouse (will be provided for the labs in the labs)
- Monitor accepting HDMI or DVI and a proper HDMI to DVI cable

Major Assignments and Examinations:
Test 1 (Monday, July 8)
Test 2 (Monday, August 12 during regular class time)
Homework (various dates dependent on class progression)

Grading Information

Grading:

- Grade scale: A (90-100), B (80-89), C (70-79), D (60-69), and F (0-59)
- Grade calculation: Test 1 (30%), Test 2 (30%), Homework (40%)
- The instructor reserves the right to make reasonable changes in performance evaluation as needed.
- Any request for re-grading must be submitted to the Grader within one week of the completion of grading.

Tests:

- Tests are open-book, open-notes, calculators allowed.
- No makeup will be provided for any test missed.

Homework:

- Plan to submit your homework online at least two hours before the deadline to mitigate any potential connectivity issues.
- Homework that is submitted late will be assessed a 50% penalty.
- Homework late by more than 48 hours will not be accepted.

Course Schedule

- Integer Numbers (1.5 hrs)
- ALU and Flags (1.5 hrs)
- Bitness of Processor, ALU Register Interface (1.5 hrs)
- Load/store interface, addressing modes, endianness (4 hrs)
- Instructions and Fetch Logic, Basic Program Flow (2 hrs)
- Configuring the Raspberry Pi (static IP, SSH) (1.5 hrs)
- ALU Opcodes (1.5 hrs)
- Flow control Opcodes (1.5 hrs)
- Using the GDB debugger (0.5 hrs)
- Calling convention (1 hr)
- MOV/MOVN/LDR for constant encoding (1 hr)
- Arrays of characters and integers (3 hrs)
- Bit operations, string to/from integer conversion (1 hr)
- Calling subfunctions, register saving convention, PUSH/POP (1 hr)
- Floating-point numbers and encoding (1 hr)
- Floating point examples (2 hrs)
- Comparison of 8088 and ARM7TDMI architectures (1 hr)
- Pipeline and cycle-accurate timing analysis (2 hrs)
- Virtualization, page tables/faults, memory fragmentation issues, memory security (2 hrs)
- Interrupts (2 hrs)
- Cache (4 hrs)

The instructor reserves the right to make changes in the schedule as needed as the class progresses.

The official dates for registration, census, and dropping are available at www.uta.edu/acadcal

Institution Information

UTA students are encouraged to review the below institutional policies and informational sections and reach out to the specific office with any questions. To view this institutional information, please visit the Institutional Information page (http://www.uta.edu/provost/administrative-forms/course-syllabus/index.php) which includes the following policies among others:

- Drop Policy
- Disability Accommodations
- Title IX Policy
- Academic Integrity
- Student Feedback Survey
- Final Exam Schedule

Additional Information

Attendance:
At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator of 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, 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 must 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 Canvas. This date is reported to the Department of Education for federal financial aid recipients.

Emergency Exit Procedures:
Should we experience an emergency event that requires evacuation of the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, do not take an elevator but use the stairwells instead. 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 Success Programs:
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 by appointment, drop-in tutoring, etutoring, supplemental instruction, mentoring (time management, study skills, etc.), success coaching, TRIO Student Support Services, and student success workshops. For additional information, please email resources@uta.edu, or view the Maverick Resources website.

Emergency Phone Numbers

In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911. Non-emergency number 817-272-3381