

CSE 2100 - All Sections: Practical Computer Hardware/Software Systems Fall 2016

Official Location of This Document:

<http://crystal.uta.edu/~zaruba/CSE2100/CSE2100-syllabus.pdf>

Short Course Description:

A practical approach to hands-on computer hardware and software systems in a laboratory environment. Students will be exposed to basic design concepts using off-the shelf hardware components and to tools that enable the design of complex software systems.

Co-requisite:

- Computer Organization and Assembly Language (CSE 2312)

Instructors in charge: Christopher D. McMurrough and Gergely Záruba

- Chris McMurrough: Office: 511 ERB; Phone: (817) 272-785 ; Office hours: Wednesdays 2:00pm–4:00pm (other consultations by appointment only.) ; e-mail: mcmurrough@uta.edu
- Gergely Záruba: Office: 523 ERB; Phone: (817) 272-3602 ; Office hours: Thursdays 2:00pm–4:00pm (other consultations by appointment only.) ; e-mail: zaruba@uta.edu

Laboratory Instructors: TBA

- GTA: TBA ; Office hours: TBA

Objectives:

The objective of this laboratory class is to expose students to hand-on skills in hardware and software design/ design tools. There will be about 10 laboratory sessions throughout the semester, organized into three modules:

- Module 1: Embedded Linux Computers: Raspberry Pi 3.
 - Raspberry Pi basics, setup, basic LaTeX
 - Essential Linux shell commands, shell scripting
 - Development tools: Git/SVN,cmake,make
- Module 2: User-Friendly Microcontrollers (Arduino) and Basic Electronics
 - Arduino IDE, programing Arduinos
 - Serial communication: the basis of interfacing embedded applications
 - Basic Electronics, Analog/Digital Conversion, and PWM basics
- Module 3: Software System Development
 - IDE (e.g., Eclipse, Atom) and debugging
 - Graphical User Interfaces
- Module 4: Useful Tools
 - Wireshark
 - Virtual Machines
 - LaTeX and Doxygen

Specific Student Learning Outcomes:

Students successfully completing this course will be able to:

- Use software versioning systems
- Work on embedded Linux computers and understand the file system
- Write shell scripts for scheduling tasks
- Create simple microcontroller based LED control circuit and program it
- Make two computers (computing units) talk through a serial interface
- Use PWM signals for power control of actuators (LEDs, motors)
- Acquire simple analog signals with a microcontroller
- Use cmake to create “make” files; understand “make” concepts
- Use IDEs such as Eclipse for development and debugging
- Build event driven graphical user interfaces
- Compile code for a different system (than the development system)
- Obtain network traces and provide basic analysis over them
- Create basic LaTeX documents and compile them into pdf
- Set up a virtual machine with an operating system on a host system
- Use Doxygen to create simple code documentation

Details of Curriculum:

- Labs meet Wednesdays OR Thursdays (depending on section) 5:30pm-7:30pm in ERB Rooms 126 and 127 (depending on section)
- Lab WWW site: <http://crystal.uta.edu/~zaruba/CSE2100/>
Note: Please check WWW site for up to date information
- Students need to be responsible users of Blackboard.
- **All students are required to own a Raspberry Pi 3** (with appropriate accessories to power it and make it work).

We recommend the CanaKit Raspberry Pi 3 kit: <https://www.amazon.com/CanaKit-Raspberry-Complete-Starter-Kit/dp/B01C6Q2GSY/>

Students do not need to buy the above kit, however they need to at least have the following components:

- Raspberry Pi 3 motherboard (preferably with heat sinks)
- Power supply to power Raspberry Pi 3
- A 16GB micro SD card that works with the Raspberry Pi 3 (and a micro SD card reader to be able to read/write the SD card on a regular 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 video cable (Raspberry Pi 3 has an HDMI socket)

- Students are also recommended to own an Arduino or Arduino-like product. Options will be discussed in class.
- Text Books:

There are a wide range of books on this topic, all of which cover many of topics covered in the course and can be used as references for the course. However, none of them covers everything in the course. As a consequence the course does not follow any one specific textbook. However, recommendations will be made throughout the course.

Details of Class Policies:

Course Grades:

Tentatively, course grades will be based on the following:

- Lab deliverables and reports (100% - 10% each for the ten labs)
 - For each lab, a lab report will have to be prepared.
 - In addition to the report, deliverables may be due.
 - Students may have to demonstrate work in lab for credit.
 - Pop-quizzes may be possible at the beginning of each lab; they will form a part of the score for that lab.
 - The maximum grade given for individual labs will decline by 20% of the total grade each calendar day the work is overdue starting razor sharp after the deadline.
 - Missing more than three labs will result in an automatic F grade.

Tentatively, course grades are determined from the total points (100) earned as follows, (but the instructors reserve the right to “grade over the curve,” or even to give everyone the best grade):

90-100: A ; 75-89: B ; 60-74: C ; 50-59: D ; <50: F

Make-ups:

Make-ups for graded activities may be arranged if the student's absence is caused by illness or work/personal emergency. A written explanation (including supporting documentation) must be submitted to the instructors. If the explanation is acceptable, an alternative to the graded activity will be arranged. Make-up arrangements must be arranged prior to the scheduled due date.

Attendance:

At The University of Texas at Arlington, taking attendance is not required. Rather, 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. The following specific rules apply to this section. Students are required to attend all laboratories. Missing more than three labs will result in an automatic F grade. No cell phones, loud talking, and sleeping in the classroom, please. **No eating or drinking in the laboratories.**

Notes:

- The Instructors reserve the right to modify course policies, the course calendar, and assignment or project point values and due dates.
- All students are expected to be responsible users of the computer systems used for this course.

Accepted file formats for papers/reports:

The Instructor requires students to turn in their papers and reports in *.pdf* (Adobe's portable document format. Source files (!) must be turned in along with the paper in a zip or a gzip (or tgz, .tar.zip) archive. Students are encouraged to use the Latex language and its appropriate compilers (please see the Instructor if you intend to use anything else). If viruses are submitted along with the files a student turns in, the Instructor may degrade the assignment.

In case of doubts regarding the use of a particular programming language or software package, contact the instructor prior to its use.

Grievance Procedure:

Anyone feeling that a dispute exists after the grading of any assignment or exam may submit a written grievance. This grievance should identify the item in dispute and arguments supporting the student's position. Grievances must be submitted in writing within two class periods following the return of the assignment. The instructor or GTA agrees to return a written response to the student's grievance within two class periods from receipt of the grievance. If the error is due to wrongful calculation of points, then no grievance needs to be submitted. If a written grievance is received, the instructor and GTA reserve the right to re-grade the entire exam (not just the specific point in question). If the student finds the result unsatisfactory, then any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current University Catalog.

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/>).

Title IX:

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 or contact Ms. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or jmhood@uta.edu.

Academic Integrity:

Students enrolled in this course 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 as they see fit in their courses, including (but not limited to) 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.

Any student found guilty of academic dishonesty will receive a -100% for that work (project, exam, homework, etc.) as well as having the course grade lowered one full letter grade - in addition to any other penalties assessed (suspension, expulsion, probation). These and other applying UTA rules, will be strictly enforced. Any case of academic dishonesty will be treated in accordance with the UTA *Handbook of Operating Procedures* or the Judicial Affairs website at <http://www2.uta.edu/discipline>. If you do not understand this policy, it is your responsibility to obtain clarification or any additional information you may require

Students are allowed to discuss homework with classmates, but are **not** allowed to copy the solutions of others or share solutions with others. All work turned in for grading must be the student's own work.

Students will be required to sign an academic honesty letter to be kept with the instructor. Failing to provide with such a letter by census day will result in the respective students' withdrawal from the class.

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). 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 or calling 817-272-3364. Counseling and Psychological Services, (CAPS) www.uta.edu/caps/ or calling 817-272-3671.

Electronic Communication Policy

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>.

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, or view the information at <http://www.uta.edu/universitycollege/resources/index.php>.

The IDEAS Center (2nd Floor of Central Library) offers free tutoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. To schedule an appointment with a peer tutor or mentor email IDEAS@uta.edu or call (817) 272-6593.

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 classes categorized as “lecture,” “seminar,” or “laboratory” shall be 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 enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <http://www.uta.edu/sfs>.

Final Review Week:

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 exits which are located both left (west) and right (east) after you exit Room 126ERB or 127ERB (a map with detailed red arrows showing the paths is located next to the classroom door). Detailed maps can also be found here:

https://www.uta.edu/campus-ops/ehs/fire/Evac_Maps_All/Evac_ERB/Evac_ERB_126A.pdf and here:
https://www.uta.edu/campus-ops/ehs/fire/Evac_Maps_All/Evac_ERB/Evac_ERB_127A.pdf. 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 handicapped individuals.

Wk.	Date	Topic of Lab	Lab Report Due
1.	8/31 and 9/1	Introduction to CSE2100	
2.	9/7 and 9/8	L1: Raspberry basics	
3.	9/14 and 9/15	L2: Unix Shell/shell scripting	L1
4.	9/21 and 9/22	L3: Development tools (git,make)	L2
5.	9/28 and 9/29	L4: Arduinos and the Arduino IDE	L3
6.	10/5 and 10/6	L5: Serial communication	L4
7.	10/12 and 10/13	L6: Basics of applied electronics	L5
8.	10/19 and 10/20	L7: Using IDEs	L6
9.	10/26 and 10/27	L8: Graphical User Interfaces	L7
10.	11/2 and 11/3	L9: Wireshark/virtual machines	L8
11.	11/9 and 11/10	L10: LaTeX and Doxygen	L9
12.	11/16 and 11/17	make-up and overflow	L10
14.	11/30 and 12/1	make-up and overflow	

(note, that there are no labs scheduled on Thanksgiving week or on “orphan” weeks)

As the instructors for this course, we reserve the right to adjust this schedule in any way we deem beneficial; this includes adding to or omitting topics listed above. – Christopher McMurrough and Gergely V. Záruba