CSE 4323 **QUANTITATIVE COMPUTER ARCHITECTURE** **FALL 2015**
(8/26/2015)

COURSE DESCRIPTION

The course will begin with coverage of basic computer architecture concepts such as functional units, processor organization, instruction sets, memory hierarchy, input/output organization, and storage. The course will then investigate architectures for improving performance including pipelined processors, parallel processors including shared and distributed memory, multicore, vector and graphics processors, memory and cache design, computer peripherals, and computer clusters.

STUDENT LEARNING OUTCOMES – By the end of the course, you will have demonstrated an ability to do the following.

1. Apply knowledge of basic mathematical, computer science and computer engineering principles to computer system analysis and design.
2. Understand tradeoffs in performance, cost, and energy usage in computer system design.
3. Understand the basic concepts of qualitative and quantitative computer architecture.
4. Write a technical paper.

INSTRUCTOR

Bill Carroll, Professor, Computer Science and Engineering
Office: ERB 521 Office Hours: TuWeTh 4:00 to 6:00 PM, or by appointment.
Phone: 817-272-3787 Email: carroll@uta.edu
Course web-site: *Blackboard,* https://elearn.uta.edu
Faculty profile: https://www.uta.edu/profiles/bill-carroll

TEACHING ASSISTANT

Walter Oduk, Office: TBA, Office Hours: TBA, Email: TBA

TIME AND PLACE – TuTh 11:00 AM to 12:20 PM, NH 111

PREREQUISITES – CSE 3320 Operating Systems

TEXTBOOK – Hennessy and Patterson, *Computer Architecture: A Quantitative Approach, 5th edition,* Morgan Kaufmann, 2012.

REFERENCE BOOKS

1. Patterson and Hennessy, *Computer Organization and Design, 5th Edition*, Morgan Kaufmann, 2014.
2. Tanenbaum and Austin, *Structured Computer Organization, 6th Edition*, Pearson, 2013.
3. Stallings, *Computer Organization and Architecture: Designing for Performance, 9th Edition*, Pearson, 2013.
4. Comer, *Essentials of Computer Architecture*, Pearson, 2005.
5. Carpinelli, *Computer Systems Organization and Architecture*, Addison Wesley, 2001.
6. Mano, *Computer System Architecture, 3rd Edition*, Pearson, 1993.

HANDOUTS – will be posted on *Blackboard,* https://elearn.uta.edu

GRADING

A: 100-90, B: 89-80, C: 79-70, D: 69-60, F: 59-0 with points computed as follows.

0.25*Exam1 + 0.25*Exam2 + 0.25*FinalExam + 0.25*(HomeWorkAverage&ClassParticipation&TermPaper)

Students not completing one or more of these requirements may receive an Incomplete grade (I) in the course.

EXAMINATIONS

There will be two examinations during the semester plus a comprehensive final exam. See the lecture schedule for the dates. Examinations will be closed book and closed notes.

HOMEWORK

Homework will be given on a regular basis, will be graded, and will count toward your course grade both directly and indirectly. Late homework will generally not be accepted.

ACTIVE LEARNING

Active learning exercises will be performed in class on a regular basis to help you better understand the concepts being covered in the course. These exercises will typically be done in small groups. All students are expected to participate. Some may be graded and count as homework and class participation.

TERM PAPER

There will be an individual term paper due on the last day of classes of the semester (12/9/15). The paper will consist of a comparative survey of key architectural features of classical and current computers. More details on the paper will be provided later in the semester. This paper must be completed and submitted in order to receive a final grade (A,B,C,D,F) in the course. Those not submitting a term paper will get a grade of Incomplete or F depending upon their grade on other course work.

POLICIES

1. **Academic Integrity –** Students enrolled in 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 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.
2. **Attendance –** You are expected to attend class and attendance will be observed on a regular basis. Those with excessive absences will have their final grade reduced appropriately.
3. **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.

4. **Electronic communication –** 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//cs/email/mavmail.php.
5. **Grade appeals** – Should you have a concern about the grade you received on an assignment or exam, you may submit a re-grading request to the instructor or TA in writing within two class days from the day the assignment or exam was returned. Appeal of the final course grade should follow the established UT Arlington policy which begins with a written appeal to the course instructor of record. You can learn more about grade appeals and other academic regulations at http://wweb.uta.edu/catalog/content/general/academic_regulations.aspx#17.
6. **Make-up work –** Late homework will not be accepted and cannot be made up. Make up of missed examinations and laboratory assignments will be handled case-by-case and, generally, be approved only if sufficient justification can be made and documented. Requests for make-up must be made to the instructor within one week of the missed work's due date.
7. **Preparation for class –** You are expected to read the appropriate sections of the textbook and supplemental material prior to each class.
8. **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.
9. **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. Engineering Student Services, 242 Nedderman Hall, is another resource for guidance on academic and career questions.
10. **Cell phones and wireless devices** – Please refrain from using cell phones during class times. All electronic devices must be powered off during examinations. Use of tablets or laptops for viewing class materials is permitted.
11. **Title IX –** The University of Texas at Arlington is committed to upholding U.S. Federal Law "Title IX" such that no member of the UT Arlington community shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity. For more information, visit www.uta.edu/titleIX.
12. **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, which is located down the hallway to the left. 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 arrangements and will make to assist individuals with disabilities.
13. **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://wweb.uta.edu/aao/fao/).

14. **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.