

CSE 6331: Advanced Topics in Database Systems
Spring 2020

Instructor(s): Prof. Sharma Chakravarthy

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Section Information: CSE 6331 - 003

Time and Place of Class Meetings: Tu/Th 9:30 am to 10:50 am, WH 210

Canvas URL: uta.instructure.com

Research URL: <http://itlab.uta.edu/sharma>

Description of Course Content: See UTA catalog

Objective: The objective of this course is to introduce the student who is interested (and have a background) in databases to some of the advanced topics that are currently being used/applied in industry, and researched by academics. This course is very useful for MS and Ph.D. students who are interested in the general area of advanced database topics, such as stream/complex event processing, data mining including graph mining, and developing complex algorithms using the Map/Reduce framework. In this course, a few topics are chosen to go into sufficient detail so that the student can understand the relevance of the techniques from these areas to the overall use of various Big Data Analysis techniques for very large real-world applications.

Course Outline: This offering of the course will cover the following topics as related to databases and information technology:

- **Stream Data Processing (SP):** pervasive applications, monitoring, principles of stream data processing and its synergy with complex event processing; application to video situation analysis
- **Graph Analysis:** substructure discovery algorithms, big data analysis of complex graphs using community and hub detection. Multilayer approach and analysis
- **Cloud computing:** map/reduce paradigm, solving data and computation intensive problems (e.g., graph mining, page rank) using the new paradigm
- **Block Chain 101:** Basics of block chain computing. Its relevance to various applications. Relationship with distributed transactions.

Student Learning Outcomes: A clear understanding of the areas covered for pursuing research and developing advanced applications using the techniques and results taught in the course. Ability to read technical papers in advanced research areas and understand them as well as review them objectively and technically as expected by the academic community, improve writing and presentation skills.

Required Textbooks and Other Course Materials: As it is very difficult (and almost impossible) to find a single textbook that covers the topics chosen at the level of detail intended for the course, we will not have a textbook for the course. Instead, I will refer to some reference books for each topic that we cover, and provide references to a number of papers that you will be expected to read. You are expected to read these paper thoroughly, some of which will be presented by you in the class.

Descriptions of major assignments and examinations: Project: A semester-long implementation project is expected by each student. Either IT Lab prototypes of video stream processing, and graph mining systems can be used or new projects implemented based on students interest. Students will be given projects based on their module of interest (you can also propose) and develop/implement it over the semester. A non-trivial project is expected which will be demonstrated to the entire class at the end of the semester during class presentation. Milestones will be established and progress will be presented to the class periodically and grading for the project is based on all the presentations including the final one and the demo. Several reports are expected during the semester to monitor the progress made on the project. The expectation for the project is that it can be packaged into a paper either by doing some additional work or combining results from multiple projects. For projects with more than 1 member (max is 2), the same grade/penalty will be given to all team members.

Attendance: If you are serious about learning and doing well in the course, you should not only attend lectures but participate during the lectures by asking questions in the class. Class participation (asking good questions during presentations, attending all classes, asking questions during lectures) will constitute **10% of overall grade**.

Grading: There will be 1 semester long project which needs to be demonstrated at the end of the semester for **30% of the overall grade**. There will also be a presentation on the project halfway through the semester (immediately after spring break when taught during the Spring semester). There will be a presentation of one/two technical papers at the end of each module for which it is relevant (and 1 presentation overview after all students choose the paper). This will constitute **30% of the overall grade**. There will be one or two examinations which will together constitute **30% of the overall grade**. **Passing grade is 50%. Note that you have to do consistently do well on all components to earn an A grade. 10% of overall grade is for class participation (not just attendance!) No pre-defined cut-offs. Based on past observations, typically, class average corresponds to a B grade. One standard deviation above the class average is guaranteed to earn an A; passing grade is 50%.**

Make-up Exams: **No makeup tests or exams will be given unless there is a justifiable, documented reason.** The class schedule, exam, and project due dates are tentative. Project deadlines and exam dates may be changed (with sufficient notice) based on the progress made in the class.

How to Do Well in This Course: Based on the feedback I have received over the years, Students who get the most out of this course will be the ones who keep up with the material covered in the class on a regular basis. If you want to do well, attend all the lectures, read the assigned sections of the book/papers, and start early on your projects. Working out the assigned sample questions and questions from book chapters will immensely help in doing well on quizzes/tests. If you are having difficulty, you owe it to yourself to get help. **We will be more than happy to help you. Don't be lazy or afraid to come and see us. We will hold extensive office hours. If you can't make it to office hours but really need help, contact one of us for an appointment. I sincerely want all of you to do well. It is your responsibility to check the web site at least twice a week.**

Grade Grievances: Once the grade of a quiz/exam/project is distributed, you will have 5 business days to dispute it and get it re-evaluated. No re-evaluation will be entertained after the 5 day period. For projects, as

part of the document, what has been designed and implemented by each partner (if it is done as a team) should be clearly stated and documented. All team members will get the same grade on the project.

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/ao/fao/>).

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.

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.

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 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.

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>.

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 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, or view the information at www.uta.edu/resources.

Course Schedule

A detailed course schedule is provided on the first day of class and it is also posted on the course web site.

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.

[We strongly recommend that you place this information at the very end of your course syllabus or in the footer of the first page. We further recommend that you enter the UTA Police Department's emergency phone number into your own mobile phone. For non-emergencies, contact the UTA PD at 817-272-3381.]

This final section is not part of the syllabus template, but a message from the UT Arlington Library.

Faculty members should feel free to incorporate any of the following information into your course syllabus or other course materials.

- Library Home Page <http://www.uta.edu/library>
- Subject Guides <http://libguides.uta.edu>
- Subject Librarians..... <http://www.uta.edu/library/help/subject-librarians.php>
- Database List <http://www.uta.edu/library/databases/index.php>
- Course Reserves..... <http://pulse.uta.edu/vwebv/enterCourseReserve.do>
- Library Tutorials <http://www.uta.edu/library/help/tutorials.php>

Connecting from Off- Campus <http://libguides.uta.edu/offcampus>

Ask A Librarian <http://ask.uta.edu>

The following URL houses a page where we have gathered many commonly used resources needed by students in online courses: <http://www.uta.edu/library/services/distance.php>.

The subject librarian for your area can work with you to build a customized course page to support your class if you wish. For examples, visit <http://libguides.uta.edu/os> and <http://libguides.uta.edu/pols2311fm> . If you have any questions, please feel free to contact Suzanne Beckett, at sbeckett@uta.edu or at 817.272.0923.