CSE 6324: Advanced Topics in Software Engineering
Spring 2023

Instructor Information

Instructor(s)
Jeff Lei

Office Number
ERB 531

Office Telephone Number
817 272 3785 (Department Office, UTA no longer provides office phone for regular faculty)

Email Address
ylei@cse.uta.edu

Faculty Profile
https://ranger.uta.edu/~ylei/

Office Hours
Tue & Thu: 9am to 10am (on Microsoft Teams) or by appointments

Course Information

Section Information
CSE 6324, Section 002

Time and Place of Class Meetings
Tue & Thu, 11am to 12.20pm, ERB 130 (This is scheduled as an on-campus class. Adjustments may be made as the COVID situation evolves.)

For a full definition of the course modalities, please go to https://www.uta.edu/academics/courses-and-schedules.

Description of Course Content
Recent years have seen a proliferation of concurrent software systems. Allowing multiple threads and/or processes to execute simultaneously increases resource utilization and improves computing efficiency. However, concurrent software systems are inherently nondeterministic. As a result, it is notoriously difficult to build these systems and ensure their correctness.

The focus of this course is on the construction of concurrent software systems with high assurance. The topics covered by this course include basic concepts, principles, and techniques that are underlying the design, development, debugging, and testing of concurrent software systems.

Student Learning Outcomes

- A solid understanding about the basic concepts, principles, and techniques of concurrent programming.
- A solid understanding about a set of classic synchronization problems as well as their solutions.
- Ability to analyze, design, implement, and test concurrent software applications.

Required Textbooks and Other Course Materials

Textbook (strongly recommended)

- Richard H. Carver and Kuo-Chung Tai, Modern Multithreading, John Wiley & Sons, 2005, ISBN: 0-471-72504-8

References

- Maurice Herlihy, The Art of Multiprocessor Programming, Morgan Kaufmann, 2012, ISBN: 978-0123973375.
- Robin Milner, Communication and Concurrency, Prentice Hall, 1989, ISBN: 0-13-115007-3

Descriptions of major assignments and examinations
There will be several (four or five) homework assignments, two exams (midterm and final), and one project. The final exam will be comprehensive. No make-up assignment, project, or exam will be given.

Technology Requirements
This course will be mainly managed using Canvas. You are expected to check Canvas regularly. Online meetings and office hours will be conducted using Microsoft Teams.

Other Requirements
Basic understanding about software engineering and operating systems is required to follow the course material. Java will be used as the main programming language.

Grading Information

Grading
The final grade will be determined according to the following percentages:

Homework Assignments - 15%
Midterm Exam - 25%
Final Exam - 30%
Project - 30%

Homework assignments will be graded for completion, and exams will be graded for accuracy.

Make-up Exams
No make-up exam will be given.

Expectations for Out-of-Class Study
Beyond the time required to attend the classes, students enrolled in this course (for a regular semester) should expect to spend at least additional 9 hours per week of their own time in course-related activities, including reading required materials, completing assignments, preparing for exams, etc..

Course Schedule

The following table shows the major topics that will be covered as well as the estimated number of 80-minute lectures for each topic. These topics will be covered in the order as they appear in the table. The rest of the class meetings will be given to project presentations.

The midterm exam will cover materials covered up to and including Advanced Locking. The final exam will be comprehensive.

The instructor reserves the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course.

Major Topics	# of Lectures
Syllabus	1
Introduction	2
Java Threads	1
Critical Section	1 ~ 2
Replay Shared Variables	1
Semaphore and Lock	2 ~ 3
Replay Semaphore and Lock	1
Advanced Locking	1 ~ 2
Midterm Exam	
Monitor	3
Replay Monitor	1
Message Passing	1 ~ 2
Race Analysis	1
Concurrency Testing	1 ~ 2
Memory Consistency Model (time permitting)	1 ~ 2
Calculus of Communicating Systems (time permitting)	1 ~ 2
Final Exam	

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 (https://resources.uta.edu/provost/course-related-info/institutional-policies.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

Face Covering Policy

While the use of face coverings on campus is no longer mandatory, all students and instructional staff are strongly encouraged to wear face coverings while they are on campus. This is particularly true inside buildings and within classrooms and labs where social distancing is not possible due to limited space. If a student needs accommodations to ensure social distancing in the classroom due to being at high risk they are encouraged to work directly with the Student Access and Resource Center to assist in these accommodations. If students need masks, they may obtain them at the Central Library, the E.H. Hereford University Center's front desk or in their department.

Attendance

As the instructor of this class, I will not take attendance, but strongly encourage students to attend the regular class meetings. However, attendance for project presentations will be required to show support for your fellow students. *I reserve the right to change this policy if necessary.*

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 exits. Please see the evacuation map at https://www.uta.edu/campus-ops/ehs/fire/Evac_Maps_All/Evac_ERB/Evac_ERB_130A.pdf. 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.

The IDEAS Center (https://www.uta.edu/ideas/) **(**2nd Floor of Central Library) offers **FREE** tutoring and mentoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. Students can drop in or check the schedule of available peer tutors at www.uta.edu/IDEAS, or call (817) 272-6593.

Librarian to Contact
Each academic unit has access to Librarians by Academic Subject that can assist students with research projects, tutorials on plagiarism and citation references as well as support with databases and course reserves.

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

Library Information

Research or General Library Help
Ask for Help
- Academic Plaza Consultation Services (library.uta.edu/academic-plaza)
- Ask Us (ask.uta.edu/)
- Research Coaches (http://libguides.uta.edu/researchcoach)

Resources
- Library Tutorials (library.uta.edu/how-to)
- Subject and Course Research Guides (libguides.uta.edu)
- Librarians by Subject (library.uta.edu/subject-librarians)
- A to Z List of Library Databases (libguides.uta.edu/az.php)
- Course Reserves (https://uta.summon.serialssolutions.com/#!/course_reserves)
- Study Room Reservations (openroom.uta.edu/)