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://mentis.uta.edu/explore/profile/yu-lei

Office Hours
Tue & Thu: 10am to 11am (on Microsoft Teams)

Course Information

Section Information
CSE 6324, Section 003

Time and Place of Class Meetings
This is an online class. There will be both pre-recorded lectures (posted on Canvas) and live QA sessions (on Microsoft Teams). Live QA sessions will be held using Microsoft Teams on Thursday, 11am to 12.20pm. Exams will be conducted online in a synchronous manner.

Pre-recorded lectures can be watched at your own pace, but weekly targets will be given. Attendance for live QA sessions is not required, but strongly encouraged.

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 can be divided into two parts. The first part highlights basic concepts, principles, and techniques that are underlying the design, development, debugging, and testing of concurrent software systems. The second part provides an introduction to formal methods in modeling, specification and verification of concurrent software systems.
Student Learning Outcomes

- Understanding the basic concepts, principles, methods, and techniques of concurrent/multithreading programming.
- Understanding a set of commonly encountered synchronization problems as well as their solutions.
- Ability to analyze, design, implement, and test concurrent code for solving common synchronization problems.

Required Textbooks and Other Course Materials

Textbook:

References:

Descriptions of major assignments and examinations
There will be four homework assignments, a midterm exam, and a project. The project can be a literature review project or a programming project. In the literature review project, you will conduct a literature review on a concurrency-related topic. In the programming project, you will apply the techniques covered in this course to build a software application that demonstrates a significant degree of concurrency.

No make-up assignments, projects, or exams will be given.

Technology Requirements
This course will be mainly managed using Canvas. You are expected to check Canvas regularly. Live sessions (for QA and Project) will be on Microsoft Teams.

The exams will be conducted online. The exams will be released on Canvas. Your exam answers can be hand-written or typed, but must be submitted digitally using Canvas. The exams will be timed in a way that there will be no time to search for answers and/or get help from others.

Other Requirements
Basic understanding about software engineering and operating systems. Moderate proficiency in Java programming.

Grading Information

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

Homework Assignments - 20%
Midterm Exam - 50%
Project - 30%

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

Expectations for Out-of-Class Study
Beyond the time required to watch prerecorded lectures and attend live QA sessions, students enrolled in this course should expect to spend at least an 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 a schedule in which the major topics will be covered in this class. Each HW assignment will be released after the corresponding topic is finished, and will be due typically two weeks after the release. The Project will be due by the last day of class.

The midterm exam will cover topics up to and including Message Passing.

The reading materials indicate the chapters in the textbook.

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

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Reading Material</th>
<th>Assignment</th>
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</thead>
<tbody>
<tr>
<td>1/19</td>
<td>Syllabus/Course Admin</td>
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<tr>
<td>1/21, 1/26</td>
<td>Introduction to Concurrent Programming</td>
<td>Chapter 1</td>
<td></td>
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<tr>
<td>1/28</td>
<td>Java Threads</td>
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<tr>
<td>2/2, 2/4</td>
<td>The Critical Section Problem</td>
<td>Chapter 2</td>
<td>HW 1</td>
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<tr>
<td>2/9</td>
<td>Tracing and Replay for Programs using Shared Variables</td>
<td>Chapter 2</td>
<td></td>
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<tr>
<td>2/11, 2/16, 2/18</td>
<td>Semaphore &amp; Lock</td>
<td>Chapter 3</td>
<td>HW 2</td>
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<tr>
<td>2/23 (.5)</td>
<td>Project Kick-off</td>
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<tr>
<td>2/23 (.5), 2/25</td>
<td>Tracing and Replay for Programs using Semaphores &amp; Locks</td>
<td>Chapter 3</td>
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<tr>
<td>3/2</td>
<td>Advanced Locking</td>
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<tr>
<td>3/4, 3/9, 3/11</td>
<td>Monitor</td>
<td>Chapter 4</td>
<td>HW 3</td>
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<tr>
<td>3/23, 3/25</td>
<td>Message Passing</td>
<td>Chapters 5 &amp; 6</td>
<td>HW 4</td>
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<td>Spring Break</td>
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<tr>
<td>3/30, 4/1</td>
<td>Tracing, Replay, and Testing for Programs using Monitors</td>
<td>Chapter 4</td>
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<tr>
<td>4/6</td>
<td>Midterm Exam Review</td>
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<td>4/8</td>
<td>Midterm Exam</td>
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<tr>
<td>4/13, 4/15</td>
<td>CCS (Calculus of Communicating Systems)</td>
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<td>4/20</td>
<td>Race Condition Analysis (Optional)</td>
<td>Chapter 7</td>
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<tr>
<td>4/22</td>
<td>Concurrency Testing (Optional)</td>
<td>Chapter 7</td>
<td></td>
</tr>
<tr>
<td>4/27, 4/29, 5/4</td>
<td>Project Presentations</td>
<td>PRS: Chapters 1, 2, 3, 4</td>
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### 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

Mandatory Face Covering Policy
All students and instructional staff are required to wear facial coverings while they are on campus, inside buildings and classrooms. Students that fail to comply with the facial covering requirement will be asked to leave the class session. 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. Students who refuse to wear a facial covering in class will be asked to leave the session by the instructor, and, if the student refuses to leave, they may be reported to UTA’s Office of Student Conduct.

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, I will not take attendance, but strongly encourage students to attend the live QA sessions. 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 must report 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.

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/)