CSE 4321: Software Testing and Maintenance

Fall 2020

Instructor Information

Instructor(s)
Jeff Lei

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ERB 531

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

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

Course Information

Section Information
CSE 4321, Sections 002 & 900

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.

Pre-recorded lectures can be watched at your own pace, but weekly targets will be given. Attendance for live QA sessions is 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
Software testing and maintenance play a critical role in ensuring the quality, and thus success, of a software product. Software testing is one of the most widely used approaches to ensuring software quality, and often consumes more than 50% of the total cost of a software project. Software maintenance is key to provide continuity of service, and is mainly concerned with how to control and manage software changes and evolution after the major features are released.

This course is designed to cover the fundamental concepts, principles, methods, and techniques for performing effective software testing and maintenance. Examples of the topics to be covered include the notion of test adequacy, combinatorial testing, control flow testing, data flow testing, security testing, regression testing, code review, configuration management and software refactoring.

Student Learning Outcomes

- Understand the significance of software quality assurance and the role of software testing and maintenance in ensuring software quality.
- Understand the basic concepts, principles, methods, and techniques for effective software testing and maintenance.
- Demonstrate the ability to apply the concepts, principles, methods and techniques that are covered in this course to solve software testing and maintenance problems.

Required Textbooks and Other Course Materials

Textbook (strongly recommended)

- Paul Ammann and Jeff Offutt, Introduction to Software Testing, ISBN 9781107172012, Cambridge University Press, 2016.

References

- Aditya P. Mathur, Foundations of Software Testing (2nd edition), ISBN 81-317-9476-8, Addison-Wesley Professional, 2014.
- Penny Grubb and Armstrong A. Takang, Software Maintenance: Concepts and Practice (2nd Edition), ISBN 981-238-425-1, 2003
- Martin Fowler, Refactoring: Improving the Design of Existing Code (2nd Edition), ISBN 0-201-48567-2, Addison-Wesley, 2018.
- Karl Wiegers, Peer Reviews in Software: A Practical Guide, ISBN 0-201-73458-0, Addison-Wesley Professional, 2001.

Descriptions of major assignments and examinations
There will be eight homework assignments, two exams (midterm and final), and a project. The final exam will be comprehensive. 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. The live QA sessions 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
This course uses Java as the main programming language. Knowledge about Boolean Logic (a topic in CSE 2315, Discrete Structure) is required to understand part of the course materials.

Grading Information

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

Homework Assignments: 15%
Midterm Exam: 25%
Final Exam: 40%
Project: 20%

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 one week after the release. The Project will be due by the last day of class.

The midterm exam will cover topics up to and including Data Flow Testing. The final exam will be comprehensive.

The reading materials indicate the chapters in the following books: IST – Introduction to Software Testing; FST – Foundation of Software Testing; SM – Software Maintenance: Concepts and Practice; R – Refactoring: Improve the Design of Existing Code; PRS: Peer Reviews in Software: A Practical Guide.

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

Date	Topic	Reading Material	Assignment
8/27	Syllabus/Course Admin		
9/1, 9/3	Introduction to Software Testing	IST: Chapters 1, 2	HW 1
9/8, 9/10	Input Space Partitioning	IST: Chapter 6	HW 2
9/15, 9/17	Combinatorial Testing	FST: Chapter 4	HW 3
9/22	JUnit	IST: Chapters 3, 4	
9/24, 9/29	Control Flow Testing	IST: Chapter 7	HW 4
10/1	Data Flow Testing	IST: Chapter 7	HW 5
10/6	Test Data Generation		
10/8	Project		
10/13	Midterm Review		
10/15	Midterm Exam		
10/20, 10/22, 10/27	Predicate Testing	IST: Chapter 8	HW 6
10/29	Mutation Testing	IST: Chapter 9	HW 7
11/3, 11/5	Regression Testing	FST: Chapter 5	HW 8
11/10	Security Testing		
11/12, 11/17	Overview of Software Maintenance	SM: Chapters 1, 3, 5, 6, 7	
11/19	Version Control	SM: Chapter 11	
11/24	Code Review	PRS: Chapters 1, 2, 3, 4	
12/1	Refactoring	R: Chapters 1, 2, 3	
12/3	Final Review		
12/8	Preparation for Final Exam		
12/10	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

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/)