If you want truly to understand something, try to change it - Kurt Lewin

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SWE 637: Software Testing
Course Syllabus — Fall 2023

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URL:	cs.gmu.edu/~winglam	Class hours:	**Thurs. 430-710pm**	Office hours:	3-4PM, Mondays
Office:	**Nguyen Engineering Building Room 3507**	Class location:	Horizon Hall 2016	Location:	ENGR 4456
In-person hours:	**3:30-4:30PM, Wednesdays** or by appointment				

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Overview

TEXTS

- **Required**: *Introduction to Software Testing* (**edition 2**), Ammann and Offutt [Book website](#)

CATALOG DESCRIPTION

Students learn the theory behind criteria-based test design and to apply that theory in practice. Roughly 50% of this course is therefore focused on testing theories while the remaining 50% of it is about applying such theories in practice. Topics include test design, test automation, test coverage criteria, and how to test software in cutting-edge software development environments.

LEARNING OUTCOMES

- Students who complete this course will be able to test software in structured, organized ways.
- Programmers will learn effective, practical ways to design and automate high quality tests for unit and integration testing.
- System testers will learn how to efficiently design effective tests. Students will learn how to apply theory in practical ways to design tests based on test criteria.

PREREQUISITES

Most examples and assignments will be in Java and many assignments, quizzes, and exams will require JUnit tests and the Maven build system, so ***Java, JUnit, and Maven experience is important***. If you do not have much experience, I recommended either retaking this course at a later time or be prepared to spend extra time learning Java, JUnit, and Maven. While this course provides extremely practical skills, it is, at heart, an applied math course. You will need knowledge of ***discrete math*** (sets, graphs, logic, and grammars), ***data structures*** (e.g., array/linked list, hash/tree maps, hash/tree sets), and basic software engineering.

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Grading

GRADING FORMULA

- Assignments: 25%
- Quizzes: 30%
- Participation: 15%
- Comprehensive final exam: 30%

We are unlikely to use a traditional grading scale to determine cut off points for A, B, C, etc. As we make changes to the course curriculum each semester, we will determine cut off points only AFTER everything has been graded.

As part of the comprehensive in-class final, we will also have an optional take-home final. If you do this optional take-home final, then the score of your in-class final will be combined with what you turn in. For example, if you only do one question on the take-home final, score 8 / 10 on the question, and the in-class final is worth 100 points, then the total score of your comprehensive final will be (in-class final score + 8)/(100 + 10). If you do not do this take-home final, then the total score of your comprehensive final will be (in-class final score)/100.

GRADED ASSIGNMENTS

Homework assignments will include writing, problem solving, and programming. Unless stated otherwise, you can either work by yourself or collaborate with **two** partners. No other team sizes will be considered. Assignments will be posted on the class schedule page and clarifications and hints will be posted on the discussion board. You may discuss the assignments on the discussion board and even share pieces of code, although not complete solutions. Most submissions will be electronic.

All assignments are due **at the end of the day** on the due date. E.g., Assignment 1 is due Feb. 2nd, which means it is due by **11:59PM US Eastern time February 2nd**.

Timeliness: There will be no late penalties for assignments turned in up to one week after the stated due date/time, but a bonus will be awarded for submitting before the stated due date/time. The bonus will help you if you lose points but it cannot bring your assignment score above 100%.

E.g., If you turn in Assignment 1 by **11:59PM February 2nd**, you will get some bonus points and as many points as the assignment deserves. If you turn in Assignment 1 by **11:59PM February 9th**, you will get no bonus points but as many points as the assignment deserves. If you turn in Assignment 1 on **February 10th**, you will get 0 points for Assignment 1.

Use of Generative-AI models: ChatGPT or other Generative-AI models may be used in this course as an assistant ONLY in assignments unless otherwise specifically stated by the instructor. Any use must follow the fundamental principles of the [Honor Code](#) and include the following statement with the assignment submission:

The ideas in this submission are original and were generated by (my name). ChatGPT (or name other Generative-AI model) was used as an editorial/coding assistant, however, I take full responsibility for the originality and accuracy of the content.

Risk accompanies use of any powerful tool. Students are cautioned that sharing their own original ideas with Generative-AI models can lead to loss of control and ownership of those ideas and coding. Furthermore, in terms of learning in this class, students who replace their own learning and project work with materials prepared by Generative-AI models:

- Surrender control over the material's truthfulness and accuracy, and violate the university's Honor Code.
- Sacrifice the opportunity to acquire the knowledge, skills, and critical thinking taught in the course.
- Risk being unable to perform to expectations when Generative-AI models are unavailable, such as in *quizzes and exams*.
- Ultimately endanger their employability if they are unable to produce work other than that produced by Generative-AI models.

QUIZZES

Quizzes will be given during class. The quizzes will focus on material from the last two classes **and** from the reading assigned for that day. It may be possible for quizzes to contain a small amount of material outside of the last two classes, but such material will be minimal. Unless you are told by the teaching staff beforehand, you are guaranteed 20 minutes to take any given quiz. Any time beyond the 20 minutes is a privilege and is NOT guaranteed. If there are less than 20 minutes left in office hours and you still wish to retake a quiz, then you are guaranteed time only up to the end of office hours to take the quiz.

Re-take policy: students who miss or perform badly on a quiz can have **one retake** per quiz.

- **Scoring**: The maximum score on a retake quiz is 80%. If you ask for a quiz retake, you **must turn-in** the retake for us to grade. For one quiz retake in the whole semester, you are allowed to ask us to not grade it after you turn it in.
- **Replace**: If you take the retake, your new score will count and the first score is dropped regardless of which score is higher.
- **Scheduling**: Students who want to retake a quiz can do so during any office hours. Please only email us about a quiz retake if you cannot make it to ANY office hours of the teaching staff.
- **Content**: The retake quiz will differ from the in-class quiz, but will cover the same topics.
- **Timing**: The retake quiz must be taken **within two weeks** of the original in-class quiz. All retakes must be completed before the end of the reading period.

Unless stated otherwise, ALL exams and in-class or retake quizzes carry an implicit statement that it is the sole work of the author. Help may be obtained from the instructor or the TA to understand the description of the problem and any technology, but the solution, must be the student's own work. There is no talking, joint work, or use of any technology for ALL quizzes unless they are explicitly authorized.

The teaching staff will NOT answer any questions during quizzes or exams. You may however inform us of a potential bug or problem on the quiz. If we confirm that there is a problem, we will then announce it to the class. If we do not confirm that there is a problem, you should do your best to answer the question.

ATTENDANCE

Coming to class is worth five points per day towards participation. You will need to check in and participate in the in-class exercises for each class period so that we know you attended. I will give instructions during class.

IN-CLASS EXERCISES

I strongly believe that active exercises during class meetings enhance learning. Dr. Ammann has a [good summary of why](). Thus, we will have many in-class exercises. Some will be done in small groups, and a few may be individual exercises. They count towards your participation grade and earn 1 point for a minimal effort or 5 points for a strong effort. They will be announced during class.

Important: In-class exercises must be done in class to get participation credit. If you miss class, you will not be able to get the in-class exercise points for that day, but you should do the posted in-class exercises on your own to prepare for the quizzes and final exam.

Do NOT have someone turn in the in-class exercise for you if you did not attend class. Doing so will be considered an honor code violation.

Missing class policy: All students can miss 1.5 classes without their grades being affected. That is, the total score that anyone can achieve for participation will be calculated as ((the number of classes * 5) - 7.5). Students participation points will be ceilinged at 100%, i.e., your score will simply be 100% if you do not miss more than 1 class.

PARTICIPATION

You earn participation points in two ways: (1) attending class and (2) submitting in-class exercises. The exact number of total points possible will depend on the number of classes.

RECORD KEEPING

We will use Blackboard to maintain RAW scores and attendance data. I compute grades according to this syllabus in a private spreadsheet. There is a column in BB labeled "TOTAL": Ignore it; it's meaningless for

this class. (BB will not allow me to disable or hide this column.) If you see an error in the BB records, please inform us.

Policies

OFFICE HOURS

As usual, office hours are times that I commit to being in my office, first come, first served, no appointments necessary. I will hold office hours in person. If you would like to meet with me during my office hours on Zoom instead, please send me an email (ideally before the office hours) and I will reply back with a link for us to meet. If you come to Zoom office hours, please come with audio and video on, and speak up when you have joined in case my zoom window is minimized. If I have to miss office hours, I will inform you in class or on the discussion board. If your schedule prohibits you from making my office hours, then we can set up an appointment.

READINGS

Readings allow you to understand the concepts and the theory behind the applications. I expect you to read the relevant material before the class meets. The lectures may not cover everything in the readings and will often include material not found in the readings. If you read the material before class, you will learn more in class. If you miss class, you will not learn important concepts that are not in the books.

DISCUSSION BOARD USE

All students will be enrolled in the discussion forum for SWE 637 on piazza. You will receive an invitation via your Mason email. We will use the discussion board throughout the semester. **Ask all technical questions about the material or the assignments on piazza.** You can also post about software failures, errors in the books or slides, or about topics that extend from our classroom discussion. Do NOT post questions about the content of this course anywhere else without explicit authorization from the teaching staff.

IN-CLASS COMPUTER USE

Computers may be used extensively during in-class exercises, discussions, and examples, but not while I am lecturing from slides. I want you to pay attention to the class material. Dr. Jeff Offutt has a detailed explanation why, but here is the short summary: Computers interfere with your classmate's ability to concentrate on the educational material, my concentration, and your learning. Taking notes by hand is much more effective than typing notes on a computer. If you have to check your email or text messages, or take a phone call, please sit near the door so you can politely step out. I will ask you to close your computers while I lecture, and if that doesn't work, will ask you to leave the classroom.

EMAIL

I send course announcements to you through Piazza, so you must read it regularly. For private matters, you may email me. When you send emails to the professor or TA, please start the subject with "**swe 637**." If not, we may not notice it. Questions about the technical material and class policies should be posted on the discussion board, not sent through email.

TECHNOLOGIES USED

You will need access to a computer for this course. We will often use computers during class meetings, and a phone will usually not be enough. We will use quite a few free technologies: Java, JUnit, web browsers, blackboard, piazza, and zoom. You will need accounts for several services, but will **not** need to purchase anything.

Miscellaneous

HONOR CODE STATEMENT

As with all GMU courses, SWE 637 is governed by the [GMU Honor Code](). In this course, **all** graded submissions carry with them an implicit statement that it is the sole work of the author or authors, including joint work when explicitly authorized. When joint work is authorized, all contributing students must be listed on the submission. Any deviation from this is considered an Honor Code violation, and as a minimum, will result in failure of the submission and as a maximum, **failure of the class**. You are NOT allowed to talk, collaborate, or use various technologies unless explicitly authorized to do so for quizzes, finals, and assignments. If you are unsure, please check with the teaching staff first.

OFFICE OF DISABILITY SERVICES

If you need academic accommodations, please contact the [Disability Resource Center]() (DRC) at 993-2474 and let me know what you need. All academic accommodations must be arranged through the DRC.

OTHER USEFUL CAMPUS RESOURCES

Writing Center: A114 Robinson Hall; (703) 993-1200; [writingcenter.gmu.edu]()
University Libraries "Ask a Librarian"; [library.gmu.edu/ask]()
Counseling and Psychological Services (CAPS): (703) 993-2380; [caps.gmu.edu]()