



Carnegie Mellon University  
Master of  
Software Engineering

### 17-323: Quality Assurance

[M/W 8:00-9:20am, Remote]

[A2, Fall 2020, 6 Units]

#### Instructor

Prof. Jeffrey Gennari

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#### Office Location & Hours

Remote, by appointment

Remote, by appointment

#### Teaching Assistants

TBD

**Course Description.** This class is fundamentally about software quality assurance and control. This course will introduce various quality assurance tools and techniques. We will build their quality toolbox not only with useful tools and techniques, but with the knowledge of when those tools should be used, how to evaluate their results, and what assurances they can provide. Specific quality assurance and control areas covered include code/artifact review techniques, software testing, static analysis, and demonstration.

**Prior Knowledge.** Students should know at least one common programming language, such as Python, Java, or C++. Familiarity with software development tools such as version control and deployment systems is expected. Finally, students should have completed at least one class in discrete mathematics and/or logic.

**Learning Objectives.** After completing this course, you will be able to:

- Understand software quality: how to define it, analyze it, and measure it.
- Select the proper analytical tool/technique for a given situation and explore how to analyze results.
- Understand the strengths and weaknesses of different quality assurance techniques, such as software testing, static analysis, code review, and demonstration.
- Learn to collect, manage, and evaluate quality metrics.
- Analyze and verify a variety of software properties including, but not limited to functionality, security, reliability, and performance.
- Gain experience with real quality assurance tools including static analysis tools, software testing frameworks, and software quality measurement tools.

**Learning Resources.** Quality assurance is a diverse and dynamic area of software engineering. To accommodate a diverse set of topics we will primarily use a collection of articles and research publications.

**Use of Zoom in the Class.** In our class, we will be using Zoom. The link is available on Canvas. Please make sure that your Internet connection and equipment are set up to use Zoom and able to share audio and video during class meetings. Let us know if there is a gap in your technology set-up via email as soon as possible, and we can see about finding solutions.

During our class meetings, please keep your mic muted unless you are sharing with the class or engaged in a breakout group.

If you have a question or want to answer a question, please use the chat or the “raise hand” feature (available when the participant list is pulled up). One of the instructors or TA will be monitoring these channels in order to call on students to contribute.

**Assessments.** Students learn more by applying and explaining ideas to others, thus, the course requires the following activities:

- **Individual assignments**, these assignments are intended to complement and integrate the material we cover in class and readings. Students will be expected to install and use various software quality tools and then analyze your results. The goal of individual assignments is to provide students opportunities to use quality assurance tools and techniques on actual software artifacts.
- **Reading quizzes**, various readings throughout the course will be assigned and made available online on Canvas or through the CMU library. We will have regular quizzes, posted on Canvas, to accompany these readings. These are to be completed **before** the associated class begins
- **Course Project**, the course project will require students to extend and evaluate the quality of an existing software project. The project will require students to assess the quality of a realistic software project using techniques introduced in the course. Students will be expected to demonstrate sound engineering judgement when conducting their evaluation.
- **Class participation**, to enrich the discussion with your insight, relevant experience, critical questions, and analysis of the material. The quality of contribution is more important than the quantity.

Assessment	Final Grade %
Individual assignments	50%
Course project	30%
Reading quizzes	10%
Class participation	10%

## Course and Grading Policies

- **Grade assignment:** This course does **not** have a fixed letter grade policy (i.e., the final letter grades will **not** be A=90-100%, B=80-90%, etc.).
- **Late-work policy:** All work is expected to be handed in at the indicated due date and time. Our philosophy is that our late work policy includes built-in flexibility but that the policy will be uniformly applied to all students in all circumstances. For most homework deadlines, you may turn in your work up to two days late using (1) free late days (see below) or (2) 10% per day penalties. **Work turned in more than two days late will receive feedback but no credit (i.e., a 100% penalty).** Some homework deadlines explicitly disallow late work, and you are responsible for correctly understanding the late policy for each homework assignment and its sub-parts.
- **Late days:** Each student starts the semester with **three free late days** which will automatically be applied to your assignments until you have used all three free late days. A late day is automatically applied when your work is late; you may not defer a free late day to be used on a later assignment.
- **Participation policy.** Class participation will be graded by in-class engagement, including asking relevant questions based on a critical review of required readings, lectures, and comments made by your peers. A lack of attendance will count against your participation grade.

This semester involves regular use of technology during class. Research has shown that divided attention is detrimental to learning, so we encourage you to close any windows not directly related to what we are doing while you are in class, and turn on your camera. This will create a better learning environment for everyone.

**Recording of Class Sessions.** All synchronous classes will be recorded via Zoom so that students in this course (and only students in the course) can watch or re-watch past class sessions. Please note that breakout rooms will not be recorded. We will make recordings available on Canvas as soon as possible after each class session (usually within 3 hours of the class meeting). Recordings will live on our Canvas website. Please note that you are not allowed to share these recordings. This is to protect your FERPA rights and those of your fellow students.

**Course Schedule.** The following schedule provides a general overview of topics and assignments. Please refer to the syllabus online in Canvas for specific lecture topics, reading assignments and due dates.

Class	Topic and Readings	Assignments
1	Introduction	
2	Software testing strategies	Individual assignment 1: Preliminaries
3	Blackbox testing	

4	Whitebox testing	
5	System-level testing (Chaos engineering)	Individual assignment 2: Test case design
6	Mocking, dependency injection, and fixtures	
7	Static analysis introduction	Individual assignment 3: Mocking
8	Static analysis tools & techniques I	
9	Static analysis tools & techniques II	
10	Symbolic execution and miscellaneous topics	Individual assignment 4: Applied static analysis
11	Code review	
12	Maintainability & design analysis	
13	Special Topic: QA & security	Course project

**Accommodations for Students Disabilities.** If you have a disability and have an accommodations letter from the Disability Resources office, we encourage you to discuss your accommodations and needs with us as early in the semester as possible. We will work with you to ensure that accommodations are provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with the Office of Disability Resources, we encourage you to contact them at [access@andrew.cmu.edu](mailto:access@andrew.cmu.edu).

**Academic Integrity.** Honesty and transparency are important to good scholarship. Plagiarism and cheating, however, are serious academic offenses with serious consequences. If you are discovered engaging in either behavior in this course, you will earn a failing grade on the assignment in question, and further disciplinary action may be taken.

For each major assessment, you will be asked to sign a statement affirming that you will not cheat, plagiarize, or receive unpermitted assistance on the work that you turn in. For a clear description of what counts as plagiarism, cheating, and/or the use of unauthorized sources, please see the [University's Policy on Academic Integrity](#).

If you have any questions regarding plagiarism or cheating, please ask me as soon as possible to avoid any misunderstandings. For more information about Carnegie Mellon's standards with respect to academic integrity, you can also check out the [Office of Community Standards & Integrity](#) website.

**Student Wellness.** As a student, you may experience a range of challenges that can interfere with learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may diminish your academic performance and/or reduce your ability to participate in

daily activities. CMU services are available, and treatment does work. You can learn more about confidential mental health services available on campus at the [Counseling and Psychological Services](#) website. Support is always available (24/7) from Counseling and Psychological Services: 412-268-2922.

This semester is unlike any other. We are all under a lot of stress and uncertainty at this time. Attending Zoom classes all day can take its toll on our mental health. Make sure to move regularly, eat well, and reach out to your support system or class staff if you need to. We can all benefit from support in times of stress, and this semester is no exception.

**Respect for Diversity.** It is our intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength, and benefit. It is our intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know if any of our class meetings conflict with your religious observations so that we can make alternate arrangements for you.