

17654

Course logistics

Lecture: Tuesday/Thursday

Time: 10:30 - 11:50 a.m.

Location: SCR 265

Recitation: Monday

Time: 12:00 p.m. - 1:20 p.m.

Location: SCR 265

People

Professor Christian Kästner

Office Hours: By appointment (just send an email or grab me before/after class)

Office: Wean Hall 5123

Email: [kaestner@cs.cmu.edu](mailto:kaestner@cs.cmu.edu)

Instructor Jeff Gennari

Office Hours: Mondays 11 AM - 12 AM in SCR 269

Office: SEI

Email: [jgennari@andrew.cmu.edu](mailto:jgennari@andrew.cmu.edu)

Teaching Assistant: Sebastian Echeverria

Office Hours: By appointment

Office: SEI

Email: [sechever@andrew.cmu.edu](mailto:sechever@andrew.cmu.edu)

Teaching Assistant: Miguel Velez

Office Hours: By appointment

Office: Wean 4105

Email: [mvelezce@andrew.cmu.edu](mailto:mvelezce@andrew.cmu.edu)

This course uses Canvas for homework submission, grading, discussion, questions, announcements, and supplementary documents; slides will be posted here. Please verify that you have access to the Canvas site and promptly contact us if you do not.

We have some office hours on Craig street, but most of us meet on request and try to be available within a day or two. If you are over at Wean hall, feel free to just pop in Christian's or Miguel's office if the door is open and we are not currently meeting with anybody else.

Course philosophy

This class is fundamentally about software quality assurance. Quality is not accidental. Software engineers must consider quality during every phase of a project from inception to delivery and beyond. This course will introduce various quality assurance tools, techniques, and management practices to software engineering students. Students will be given the opportunity to try tools and techniques described on a realistic software project throughout the course. Students 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.

### Grading and assignments

Your grade will be based on the following distribution:

- 35% Group projects
- 15% Individual assignments
- 15% Final exam
- 10% Midterm exam
- 10% Quality plan
- 10% Reading quizzes.
- 5% Participation

### Group projects

Teamwork is an essential part of this course. Group projects are designed to encourage reflection and exploration of the concepts explained in class through hands-on activities. We will periodically check in with the groups to assess the degree to which all members of the group are contributing fairly to the overall effort. We reserve the right to implement peer grading, and modify individual grades, based on the results of these assessments. Otherwise, all members of the group will receive the same grades for all group assignments. Grading for each project will reflect both the quality of the submitted documents and code as well as periodic in-class presentations. Because of the challenges of managing late days for a group, late submissions of group projects will receive no credit. If you have extenuating circumstances (multiple group members traveling for interviews, for example), contact the course staff *in advance of the deadline*. Group projects are designed to explore quality assurance topics in depth. The assignments will provide guidance on required elements but students will be expected to use sound judgement and decision making when crafting deliverables. The group projects require teams to evaluate and extend a software project. Some group projects require coding to complete. The same project and artifacts will be used throughout the course. More information on the group projects will be available when assignments are released.

### Group project acceptance criteria

Each group project will include a set of acceptance criteria. ***Teams must satisfy these criteria for the assignment to be deemed complete.*** Failure to meet the stated acceptance criteria will result in a grade deduction for the team contingent on described circumstances.

Acceptance criteria will be clearly stated for each group assignment. The onus is on the team to provide evidence that acceptance criteria are satisfied. If the team deems that acceptance criteria cannot be met, then they must provide a compelling argument as to why.

#### Group conflict

Teams inevitably encounter challenges and must deal with conflict. Our program emphasizes the development of both technical *and team* skills. You are strongly encouraged to handle team issues on your own. Involving the course staff in team conflicts may result in a less desirable outcome.

#### Individual assignments

The course includes regular individual assignments, intended to complement and integrate the material we cover in class and readings. Some individual assignments ask you to reflect upon your own development experience in the context of specific course material. Good reflections are specific and concrete and go beyond mere recitation of facts to draw insight from past experiences.

#### Readings and quizzes

Various readings throughout the semester will be assigned and made available online on Canvas or through the library. We will have regular quizzes, posted on Canvas, to accompany these readings. These are to be completed before the associated class begins. We will teach class assuming you have read the material. These quizzes are to be completed (and will be graded) individually. There are no late days for readings; late submissions will receive feedback but no credit.

Students can expect a reading quiz to be assigned before every lecture except on days when there is a project presentation.

#### Assignment guidelines

On all assignments, failure to follow the submission guidelines will result in a 10% penalty. All assignments must be submitted to Canvas by the time and date stipulated in the syllabus before class begins that day. There is no late submittal permitted of either group work or reading quizzes. For non-quiz individual assignments, for up to two days, each day late reduces your maximum possible grade by a letter. After two days, submitted assignments will receive no credit.

#### Submission guidelines

Individual assignments should be submitted in PDF or an otherwise specified file format with the following file naming convention:

- I<AssignmentNumber>\_<FamilyName\_GivenName>.pdf

Example: I1\_Doe\_John.pdf

Group assignments should be submitted in a single .ZIP file per group. Follow the naming conventions below:

- G<AssignmentNumber>\_<AnalysisGroupNumber>.ZIP

Example: G1\_Group1.zip

The contents of the zip file should be easy to follow and obvious to decipher. We expect professional quality work from our students.

#### Late work

The course staff will consider extenuating circumstances such as illness or business/interview travel in terms of extensions, but you ***must contact us in advance of the deadline***. Many of the assignments build on a semester-long project. This project is described in additional documentation on Canvas. We encourage you to read the overview document ASAP.

#### Participation

The participation component is 10% of your grade, and note that we use the full scale (it can make a letter-grade difference in your overall grade). We will note participation throughout the semester, and reach consensus between the instructors/TA for overall grading. We will take the higher of your recitation and lecture participation grades and we will provide feedback at mid-semester so you can check in on how you're doing.

#### Quality plan project for studio/practicum

The capstone project for this course is to develop an actionable quality plan for your Studio/Practicum project. Basic activities the plan should consider include: process compliance, inspections, testing, analysis, demonstration, defect logging, defect classification taxonomy, tracking and measurements. The plan must be doable in the context of your project. A list of all techniques studied is not a plan. More information on the quality plan will be available on Canvas.

#### Exams

The midterm and final exams can include all content covered in the course from lecture, readings, individual assignments, and group assignments up to the date they are administered. The exams will be closed book. Exam is meant to reinforce the most important topics described in the course; it is not designed to be punitive; rather it is meant to ensure that critical concepts are sufficiently understood.

#### Classroom etiquette

Your conduct has an impact on the educational experience of others. You are not required to attend class, although not doing so will likely impact your participation grade. If you do attend, however, certain behaviors are unacceptable and discourteous to the instructor and your classmates. Among them sleeping, texting, reading, and talking to classmates during lecture. The class will begin promptly at the scheduled time and you are expected to be in your seat at that time. Please try to sit in the same place; this makes it easier for us to track your participation.

Use of headphones, tablets, smart phones, laptop computers, or any other electronic equipment is NOT allowed during class without instructor authorization.

#### Time Management

This is a 12-unit course, and it is our intention to manage it so that you spend close to 12 hours a week on the course, on average. In general, four hours/week will be spent in class and eight hours on reading and assignments. Please feel free to give the course staff feedback on how much time the course is taking for you.

#### Academic honesty and collaboration

We have zero tolerance for academic integrity violations, and especially at the graduate level, the University does too. We encourage you to read and understand the University Policy on Academic Integrity to help guide your choices.

Many of the assignments are done in groups. We expect that group members collaborate with one another on such assignments, but that groups work independently from one another, not exchanging results with other groups. Within groups, we expect you to be honest about your contribution to the group's work. This implies not taking credit for others' work and not covering for team members that have not contributed to the team. Otherwise, our expectations regarding academic honesty and collaboration for group work are the same as for individual work, substituting elevated to the level of "group."

That said, the high-level definition of academic integrity is as follows: You may not copy any part of a solution to a problem that was written by another student. You may not develop a solution with another student. You may not copy from any other unauthorized source, including those found on the Internet. You may not look at another student's solution, even if you have completed your own. You may not give or show your solution to another student, nor knowingly leave your solution where another student could see it. That is: helping another student cheat *is also cheating*.

To illustrate, here are some examples of inappropriate behavior:

- Copying, retyping, or referring to, files or parts of files (e.g., source code, written text, or unit tests) from another person or source (whether in final or draft form, regardless of the permissions on the associated files) while producing your own. This is true even if your version includes modifications.
- Getting help that you do not fully understand, and from someone whom you do not acknowledge on your solution.
- Coaching or providing help to another step-by-step without them understanding your help.
- Writing, using, or submitting a program that attempts to alter or erase grading information or otherwise compromise security of course resources.
- Lying to course staff.
- Giving copies of your work to others, or allowing someone else to copy or refer to your code or written assignment to produce their own, either in draft or final form. *This includes making your work publicly available in a way that other students (current or future) can access your solutions, even by accident.* Beware the privacy settings on your open source accounts!

If any of your work contains any statement that was not written by you, you must put it in quotes and cite the source. If you are paraphrasing an idea you read elsewhere, you must acknowledge the source. Using existing material without proper citation is plagiarism, a form of cheating. If there is any question about whether the material is permitted, you must get permission in advance. It is *not* considered cheating to discuss and clarify vague points in the assignments, lectures, lecture notes; to give help or receive help in using the computer tools, systems, compilers, debuggers, profilers, or other facilities; or to discuss ideas at a very high level, without referring to or producing code.

Any violation of this policy is cheating. The *absolute minimum* penalty for cheating (including plagiarism) will be a zero grade for the whole assignment. Cheating incidents will also be reported through University channels, with possible additional disciplinary action (see the above-linked University Policy on Academic Integrity).

If you have any question about how this policy applies in a particular situation, ask the instructors or TAs for clarification. Note that the instructors respect honesty in these (and indeed most!) situations.

Lecture plan

The plan is preliminary and will be adjusted throughout the semester.

Lecture	Date	Area	Topic	Assignment due (Reading quizzes not listed)	Readings
		<b>Monday, January 14, 2019</b>	<b>No Recitation</b>		
	0	Tuesday, January 15, 2019	Intro	Introduction & course logistics	
	1	Thursday, January 17, 2019	QA overview	Measurement	
	<b>HOLIDAY</b>	<b>Monday, January 21, 2019</b>	<b>No Recitation</b>		
	2	Tuesday, January 22, 2019	QA overview	Introduction to verification	Individual assignment 1: Mea
	3	Thursday, January 24, 2019	QA overview	Dynamic analysis and code review	
	Rec. 1	Monday, January 28, 2019		Quality assurance project introduction	
	4	Tuesday, January 29, 2019	QA overview	Static analysis, formal methods, and process quality	Individual assignment 2: Hea
		<b>Thursday, January 31, 2019</b>		<b>Class canceled</b>	
	Rec. 2	Monday, February 4, 2019		Infrastructure, JUnit, Jenkins	
	5	Tuesday, February 5, 2019	Testing	Black box testing	
	6	Thursday, February 7, 2019	Testing	Whitebox testing	Group Project 1A: Test Assign presentation)
	Rec. 3	Monday, February 11, 2019		Mutation testing	
	7	Tuesday, February 12, 2019	Testing	DevOps and testing in production	Individual assignment 3: Com
	8	Thursday, February 14, 2019	Testing	Distributed systems and robustness	
	Rec. 4	Monday, February 18, 2019		Stubs and Mocks	
		Tuesday, February 19, 2019	Testing	Student presentations	Group Project 1B: Test Assign
	9	Thursday, February 21, 2019	Testing	QA for ML & data quality	
	Rec. 5	Monday, February 25, 2019		Docker	
	10	Tuesday, February 26, 2019	Design	Design quality	Individual assignment 4: Test
	11	Thursday, February 28, 2019	Process	Process integration	

Rec. 6	Monday, March 4, 2019		Review session	
	Tuesday, March 5, 2019		Student presentations	Group Project 2: DevOps, Mo
	Thursday, March 7, 2019		Midterm Exam	
<b>SPRING BREAK</b>	<b>Monday, March 11, 2019</b>	<b>No Class</b>		
<b>SPRING BREAK</b>	<b>Tuesday, March 12, 2019</b>	<b>No Class</b>		
<b>SPRING BREAK</b>	<b>Thursday, March 14, 2019</b>	<b>No Class</b>		
Rec. 7	Monday, March 18, 2019		Machine learning tools	
12	Tuesday, March 19, 2019	Process + Modeling	Security	
13	Thursday, March 21, 2019	Analysis	Data-flow analysis	
Rec. 8	Monday, March 25, 2019		Static analysis	
	Tuesday, March 26, 2019		Student presentations	Group Project 3: Quality in M
14	Thursday, March 28, 2019	Analysis	Taint analysis	
Rec. 9	Monday, April 1, 2019		Quality plan assignment introduction	
15	Tuesday, April 2, 2019	Analysis + Modeling	Safety and formal methods	Individual assignment 5: Thre
16	Thursday, April 4, 2019	Modeling + Testing	Performance	
Rec. 10	Monday, April 8, 2019		Performance and JMeter	
	Tuesday, April 9, 2019		Student presentations	Group Project 4: Static Analy
<b>SPRING CARN.</b>	<b>Thursday, April 11, 2019</b>	<b>No Class</b>		
Rec. 11	Monday, April 15, 2019		No recitation	
17	Tuesday, April 16, 2019	Process	Technical debt	Individual assignment 6: Perf
18	Thursday, April 18, 2019	Process	Process integration 2	



	Rec. 12	Monday, April 22, 2019		No recitation	
		Tuesday, April 23, 2019		Student presentations	Group Project 5: Technical d
	19	Thursday, April 25, 2019	Analysis + Process	ML for QA	
	Rec. 13	Monday, April 29, 2019		Review Session 1	
		Tuesday, April 30, 2019		Student presentations	Studio/Practicum Project Qua
	20	Thursday, May 2, 2019		Class Summary	
	Rec. 14	Monday, May 6, 2019		Review Session 2	
	29	Tuesday, May 7, 2019		Final Exam 1-4pm	