Software Testing, Quality Assurance and Maintenance
SE465 (3A), Winter 2015

Patrick Lam

Brief Overview

As you have no doubt discovered, software never works right from the start. A key technique for getting more acceptable software is testing. Organized testing can help identify problems in software systems, enabling developers to fix these problems. This course will introduce software testing techniques; while it's not my goal to produce testers, you should at least be conversant with up-to-date testing methodologies and techniques.

In this class, we will also touch on software maintenance. While we greatly (over?) emphasize design in engineering school, maintenance consumes a large fraction of today's software development resources.

General Information

Course Web Page: `http://patricklam.ca/stqam`
github repo:`git@github.com:patricklam/stqam-2015.git`
other section:`http://www.ece.uwaterloo.ca/~lintan/courses/testing/`
Lectures: MWF 14:30-15:20, RCH 302

Instructor:

Prof. Patrick Lam
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Office Hours: Wednesdays 10:30-12:30, or by appointment
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Lab Instructor:

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Course Description

Objectives

- You will be able to create and evaluate test suites for reasonably-sized software systems.
- You will learn how to use and write tools for software maintenance and verification (particularly automated testing tools).
- You will gain experience with carrying out modifications to a large pre-existing software package.

We hope that you will learn how to test as a developer, thus making you a better developer.

Topics. We've been trying to make this course more practical. Some of the coverage material still follows the book by Ammann and Offutt. I will supplement the material in the book with some additional material. The following list is non-exhaustive.

- Coverage, subsumption and infeasibility
- Graph Coverage (includes control-flow graphs, path and dataflow testing, state-based testing, call-graph-based testing, path-based testing)
- Logic Coverage (includes decision tables)
- Input Space Coverage
- Syntax-Based Testing (i.e. mutation testing)
- Testing in Practice, including concurrency, regression testing, automatic testing tools, mock objects, fuzzing
- Non-testing-based Software Quality Assurance (code reviews, pair programming, software model checking and verification)
- Software Maintenance

Reference Material

Optional textbook:

> Paul Ammann and Jeff Offutt. Introduction to Software Testing. Cambridge University Press, 2008.

I also strongly recommend the following book:

> Andreas Zeller. Why Programs Fail: a Guide to Systematic Debugging. Morgan Kaufmann, 2005.

The Zeller book is quite practical and I expect that it will be useful to you in the future as well.

Evaluation

This course includes assignments, a midterm, a course project, and a final examination.

4 individual assignments	20%	(5% each)
Course project (in groups, up to 3/group)	15%	
Midterm	15%	
Final exam	50%	

The midterm and final exams will be open-book, open-notes.

Schedule. Assignment handin will be done through the git server at `ecgit.uwaterloo.ca`.

January 8	A1 out
January 18	A1 due, A2 out
February 1	A2 due, A3 out
February 9	Midterm (7-9PM)
February 22	A3 due, A4 out
March 8	A4 due
April 5	Last lecture; project due
Exam period	Final exam

You can also find the dates on the following Google calendar:
`bgt2ebdab4eff0ip7b8flgnah8@group.calendar.google.com`

Group work. The project will be done in groups. You may discuss assignments with others, but I expect each of you to do the assignment independently. I will follow UW's Policy 71 if I discover any cases of plagiarism. I will not use turnitin.

Lateness. You have 2 days of lateness to use on assignment submissions throughout the term. Each day you hand in an assignment late consumes one of the days of lateness. If you consume all of your late days, assignments that are still late will get 0. Missed assignments get 0.

For example, you may hand in A1 one day late and A2 one day late if you hand in A3 on time. Or you can hand in A1-A2 on time and A3 two days late.

Differences between sections

Prof. Lin Tan is teaching 2 other sections of this class. We will over similar material. The deliverables and exams will be the same. You can do the project with partners in other sections. Lecture material may differ. If that happens, then we would have exams where you have some choice of which question to answer.

Required inclusions

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check `www.uwaterloo.ca/academicintegrity/` for more information.]

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, `www.adm.uwaterloo.ca/infosec/Policies/policy70.htm`. When in doubt please be certain to contact the departments administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity [check `www.uwaterloo.ca/academicintegrity/`] to avoid committing an academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about rules for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline, `www.adm.uwaterloo.ca/infosec/Policies/policy71.htm`. For typical penalties check Guidelines for the Assessment of Penalties, www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm.

Appeals: A decision made or penalty imposed under Policy 70 (Student Petitions and Grievances) (other than a petition) or Policy 71 (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals) `www.adm.uwaterloo.ca/infosec/Policies/policy72.htm`. Note for Students with Disabilities: The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.