Software Testing, Quality Assurance and Maintenance
SE465, ECE453/CS447/647, Winter 2010

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 discuss 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`

Lectures:

SE465	MWF 11:30-12:20, RCH 309
ECE453/CS447/CS647	MWF 3:30-4:20, MC2038

Instructor:

Prof. Patrick Lam
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Teaching Assistants:

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Course Description

Objectives

- You will be able to create and evaluate test suites for reasonably-sized software systems.

- You will be exposed to tools for software maintenance and verification.

- You will gain experience with carrying out modifications to a large pre-existing software package.

Topics. While the formulation of the topics is a bit different than the standard formulation, I expect that we will cover all of the topics in the standard course description. We will follow the book by Ammann and Offut for most of the class, but I will supplement the material in the book with some additional material.

- Coverage, subsumption and infeasibility

- Graph Coverage (includes path and dataflow testing, state-based testing, call-graph-based testing, path-based testing)

- Logic Coverage (includes decision tables)

- Input Space Partitioning

- Syntax-Based Testing

- Testing in Practice

- Non-testing-based Software Quality Assurance (code reviews, pair programming, software model checking and verification)

- Software Maintenance

Additional topics, as time permits:

- Testing for Performance

- Concurrency (perils of and tools to deal with)

- Failure-obliviousness and exception handling

Reference Material

The textbook for the class will be:

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	5% each
Course project (in groups)	20%
Midterm	10%
Final exam	50%

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

Schedule. Assignment handin will be done on the course webpage (or to me in person). I will personally return assignments in class, or you can pick them up during my office hours.

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

Group work. The project will be done in groups of up to 4. 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 4 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 have their marks halved. You can only hand in an assignment up to the time I return all of the assignments. Missed assignments get 0.

For example, you may hand in A1 one day late and A2 three days late if you hand in A3 and A4 on time. Or you can hand in A1-A3 on time and A4 four days late.

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.