

# Syllabus for CSCI 499: Testing and Analysis of Web and Mobile Apps

**Course Overview:** This course will introduce students to basic techniques for the analysis and testing of web and mobile apps. Students will learn to write automated test cases that can run on apps, code analysis techniques that can extract information from the implementation of apps, and bytecode rewriting techniques for modifying apps' runtime behavior.

## Basic Course Information

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**Class location:** WPH B28

**Date and time:** Fall 2018, Monday and Wednesday, 3:30-5:25

**Class website:** <http://blackboard.usc.edu/>

**Instructor:** William Halfond, Ph.D.

Office: SAL 330

Contact Info:

Email: [halfond@usc.edu](mailto:halfond@usc.edu) (preferred)

Phone: (213) 740-1239

Office hours:

Tuesday and Thursday, 4-5pm

## Overview of Class Topics and Learning Objectives

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In this class, students will learn basic techniques for the testing and analysis of web and mobile applications. Course material will introduce students to the theories and concepts that underpin modern automated large-scale testing infrastructure. Throughout the course, students will learn common testing processes, terminology, and concepts. Conceptual material will be reinforced by a series of assignments that ask students to progressively implement parts of modern testing and analysis infrastructure. Students

will apply the developed techniques to modern software systems, such as mobile and web apps.

Conceptual topics that will be addressed in the class include:

1. The role and importance of testing in the software engineering process
2. Build integration for automated testing
3. The testing process
4. Test coverage criteria
5. Test case generation
6. Automated oracles
7. Program analysis, including control-flow analysis, data-flow analysis, and slicing
8. Fault localization
9. Regression testing

In the course of learning about these testing and analysis techniques, students will learn to master three general skill sets as well:

- Test automation: techniques for automatically running tests on web browsers and mobile devices, collecting the resulting test data, and analyzing the test data.
- Static analysis of bytecode: techniques for analyzing the bytecode of web and mobile apps and extracting information about the structure of the code and possible runtime behaviors.
- Program transformation: techniques for rewriting the bytecode of web and mobile apps to change their behavior.

## Course Grading

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The course grade will be determined through a series of programming homeworks and in-class quizzes to check the students' knowledge of conceptual topics. The course grading will be letter grade based.

Grade distribution:

- Quizzes: 20%
- Programming assignments: 80%

Grades will be based on a scale that operates in favor of the students, with at least the following grades for a given percentage  $x$ . If the average in the class is lower than 80%, the average will become the cut-off between a B- and a C+.

$x \geq 93$ A	$73 \leq x < 77$ C
$90 \leq x < 93$ A-	$70 \leq x < 73$ C-
$87 \leq x < 90$ B+	$67 \leq x < 70$ D+
$83 \leq x < 87$ B	$63 \leq x < 67$ D
$80 \leq x < 83$ B-	$60 \leq x < 63$ D-
$77 \leq x < 80$ C+	$x < 60$ F

## Course Policies and Requirements

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### Technological Proficiency and Hardware/Software Required

Some classes will include demos and interactive working sessions with the tools and technologies used for the assignments. For this reason, it will be beneficial, but not required, for students to bring their laptops to class on a regular basis. Other software needed for the class is freely available online.

### Required Readings and Supplementary Materials

Software Testing and Analysis. Process, Principles, and Techniques. By Mauro Pezze and Michal Young. Published by John Wiley and Sons, any edition. Denoted as "STA." Readings from this book will be assigned on a weekly basis.

### Description and Assessment of Assignments

Regular programming-based assignments will be given throughout the semester. Grading criteria for each homework assignment will be provided with the assignment, and will generally focus on accuracy, efficiency, and effectiveness of the testing and analysis techniques developed as part of the assignment.

### Assignment Submission Policy

All assignments are to be submitted via the class Blackboard web site by the time specified for the assignment. Late work is not accepted without the prior approval of the instructor.

## Statement on Academic Conduct and Support Systems

### Academic Conduct

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* <http://equity.usc.edu> or to the *Department of Public Safety* <http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us>. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage <http://sarc.usc.edu> describes reporting options and other resources.

### Support Systems

A number of USC’s schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* [http://sait.usc.edu/academicsupport/centerprograms/dsp/home\\_index.html](http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html) provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* <http://emergency.usc.edu> will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.