CS 6340: Software Analysis and Testing
Syllabus, Fall 2017

Instructional Staff

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1. Course Overview

Software development activities other than programming, such as testing, debugging, and conducting security assessments constitute over 50% of the development cost of a modern application. The modern software developer has a wide variety of tools and techniques at their disposal to aid them with these aspects of development.

Software analysis lies at the core of these tools and techniques. Software analysis is a body of work that concerns discovering formal facts about a given program. Many diverse software analysis approaches exist, each with their own strengths, weaknesses, and applications to testing, debugging, performance, and cyber security.

In this course, you will master the underlying principles of software analysis and these approaches and gain hands-on experience applying them to automate testing software and finding bugs in complex, real-world programs.

2. Course Objectives

After successfully completing the course, you will be able to do the following:

- Describe the qualitative properties of different techniques for analyzing and testing software.
- Compute the outcome of a given software analysis or testing technique on a program or library.
- Evaluate the suitability of different software analyses and testing techniques for different types of software and under a given set of constraints.
- Implement and run software analyses to determine useful facts about a given piece of software.

- Apply various software testing techniques rooted in recent research to find bugs in a given piece of software.

3. Course Schedule

The schedule for this course will be made available in a separate document on T-Square in the **Resources** section. It includes a pacing schedule for covering course material, completing assignments, and taking exams, as well as important dates throughout the semester.

4. Prerequisites

Prior to taking this course, you should be or become comfortable with the following:

- Discrete mathematics (especially set theory, logic, and probability)
- Programming in Java, C/C++, or a similar language
- An understanding of object-oriented programming
- Using virtual machines (e.g., VirtualBox or VMWare)
- Using a Linux operating system, including basic shell commands and scripting

5. Required Text

There is no required text for this course. A supplementary reading list in the form of technical papers, books, and online articles will be made available on Piazza. Additionally, readings will be linked in the “Instructor Notes” sections accompanying relevant lecture videos on Udacity.

6. Lessons

Lessons are available in two formats: videos and slides. Videos are available for viewing or download on Udacity, and lesson slides (including transcripts) in both PPT and PDF format are available on T-Square in the **Resources** section.

7. Course Forum

We will use Piazza for all course-related discussion. For questions to the instructional team, please make a private post to “Instructors”. You must initially access the course Piazza forum through the link in T-Square.

We will make important announcements (including updates or clarifications to assignments) on Piazza and pin them to the top of the feed. **We expect you to check Piazza daily for announcements about the course.**

8. Office Hours

Regular weekly office hours will be held by Michael on Saturdays at 10 AM ET, and by Mayur on Wednesday at 7 PM ET. During exam weeks, regular office hours are not held, instead an exam review session will be held that Thursday at 8 PM ET.

Office hours are recorded, so students who are unable to attend live may ask their questions in advance and watch the recording later. Details on how to ask questions and attend office hours will be posted on Piazza at least 48 hours prior to each session.

Office hours sessions are subject to change due to scheduling conflicts or unforeseen events, however this occurs infrequently. Additional sessions held may also be held throughout the semester by other members of the instructional staff.

9. Assignments / Course VM

There are seven graded assignments in this course. Assignments in this course will be made available through T-Square in the **Assignments** section. We will announce on Piazza when assignments have been released. In general, assignments involve using a software analysis or testing tool based on a technique taught in the lessons or implementing a software analysis algorithm using a software analysis library.

To reduce student effort required to set up assignments, we provide a virtual machine (VM) preloaded with tools and libraries required to complete assignments. Assignment instructions assume you are using the course VM. Your completed assignments will be graded in the course VM to ensure that your work runs as expected.

While it is generally fine to install development tools like an IDE on the course VM, you should not run software updates or upgrade installed packages as it could render an assignment inoperable. The username for the VM is ‘cs6340’ and the password is ‘student’.

The course VM can be downloaded here. It is supplied in a format that can be imported into a hypervisor program like VirtualBox (recommended) or VMWare Workstation/Fusion. You can ensure that the VM is intact with one of the following hashes:

MD5: B9F133AF4D4233D30A82C24D22E8A1E2
SHA-1: 92F1A32886C39BF1589333A3D5E46E56CCAB65A7

10. Exams

We will administer two proctored exams, a midterm exam and a final exam, to evaluate your conceptual understanding of the course material. Exams are not comprehensive. Logistical details for each exam will be posted on Piazza, typically a week prior to the exam. You are permitted to use the course lesson PDFs (on screen only) during exams. No other resources are permitted.

We will provide exam preparation resources (including solutions) for you to use to prepare for the exams this semester. They will be made available on T-Square in the **Resources** section.

Exams are delivered using the Proctortrack proctoring system. Shortly after the start of the semester, you will be granted access to an "Orientation Exam" on Proctortrack you can use to test your computer before taking a graded assessment this semester.

11. Grading Policy

We will post grades in the **Gradebook** section on T-Square. We will post an announcement on Piazza when grades have been released. Your final course average will be computed as follows:

- Assignments 1, 3, 6, and 7: 30% total, each weighted equally (7.5% each)
- Assignments 2, 4 and 5: 30% total, each weighted equally (10% each)
- Midterm Exam: 20%
- Final Exam: 20%

We will assign letter grades to averages as detailed below. The instructor **may** relax the ranges at the end of the semester, but individual assignment/exam scores will not be "curved".

- A: Course average ≥ 90%
- B: Course average ≥ 80%
- C: Course average ≥ 70%
- D: Course average ≥ 60%
- F: Course average < 60%

12. Regrade Requests

You have **one week** after the release of a grade to request that it be regraded. To request a regrade, make a private post on Piazza to all instructors and explain why you believe an error was made in grading your work. We will not process regrades or increase scores on assignments or exams for reasons other than errors in grading - do not submit regrade requests asking for a higher score in order to meet OMSCS program requirements or because you believe the rubric was too harsh.

If the regrading process reveals an error the grader overlooked initially, you may receive a lower score.

13. Deadlines and Extensions

Assignments and exams are due at 8:00 a.m. Eastern Time on their respective due dates. We **do not** accept late submissions.

We **will only** grant extensions to assignment/exams deadlines for students with documented, excused absences approved by the Office of the Dean of Students. Typical situations where an

absence will be excused include illness, hospitalization, death in the family, or a military deployment.

To start the process of verifying an absence, file a care request with the Office of the Dean of Students. They will handle verifying your documentation and dates of absences. Also, please notify the the instructors via a private Piazza post to all instructors. It is important that are requests are filed in a timely manner, please do not wait until a deadline has passed to start this process.

Excused absences **will not** be granted for personal travel, social events, or work conflicts, and as such are not justification for an extension.

14. Academic Integrity Policy

All Georgia Tech students, including students in the OMSCS program, must read and uphold the Georgia Tech Academic Honor Code. Georgia Tech expects honest and ethical behavior of you at all times. We will report all incidents of suspected dishonesty to the Office of Student Integrity (OSI).

In this course, ***you must complete all assignments and exams by yourself***. You may not collaborate with classmates or people outside the class on any of the assignments or exams, and you may not use code from online sources (except those we specifically allow). We take this rule very seriously, and we run a plagiarism detector on all submissions. Additionally, use of resources other than those specifically permitted on exams may constitute a violation of the Honor Code.

If OSI finds you responsible for violating the Honor Code you can expect, at minimum, to receive a score of zero on the assignment or exam in question and to receive a warning posted to your academic record. Repeat offenders may receive increased penalties such as automatic course failure, suspension, or expulsion.

15. Technical Requirements

To use the Udacity platform, you must meet these minimum requirements. Additionally, Georgia Tech's Office of Student Computer Ownership issues minimum hardware requirements to incoming undergraduates; you should meet or exceed these guidelines as well. Finally, you must also meet the technical requirements for taking exams using Proctortrack.

16. Disability Services

Georgia Tech is an ADA-compliant educational institution. If you have a disability that requires accommodations, contact Disability Services. To receive accommodations, ask Disability Services to forward the instructor a letter specifying the accommodations you should receive. Do this as soon as possible, as it can take up to 15 business days for the office to process your initial application.