Teaching Staff:

Instructor:
- Dr. Aline Yurik
- Email: ayurik@fas.harvard.edu
- Phone: (617) 512-7485

Teaching Assistant:
- Dr. Andrey Sivachenko
- Email: asivachenko@fas.harvard.edu

Course Description

In this course we will review the traditional software testing techniques that are applicable to any software product, as well as learn techniques for the paradigm of test-driven development. Continuous delivery and its impact on testing will be discussed. We will also discover how innovative companies are able to build testing and quality into every stage of the development process and deliver a multitude of releases with a relatively small testing organization. We will practice test creation and testing techniques through assignments, individual and group projects. Concepts covered include test cycles; testing objectives; testing in the software development process; types of software errors; reporting and analyzing software errors; problem tracking systems; test case design; testing tools; test planning; test documentation; managing a test group; test-driven development principles; continuous delivery principles and their impact on testing.

Textbooks

- Jez Humble, David Farley, *Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation*, 2010, Addison-Wesley, 978-0321601919

Course Objectives

The course is intended to provide students with an understanding of:

- Core Testing Concepts
- Functional and Non-Functional Testing
- Integration Testing and System Testing
• User Acceptance Testing and End-to-End Testing
• Test-Driven Development
• Continuous Delivery Model and Its Impact on Testing
• Testing Best Practices

Course Outcomes

Upon successful completion of this course, the student will be able to:

• Plan and apply the appropriate level of testing within the context of a software development application to the satisfaction of its beneficiaries.
• Design specific and measurable test cases to ensure coverage and traceability to requirements.
• Use problem reporting techniques, metrics, and testing status reports to communicate testing results to colleagues, managers, and end users.
• Select and apply testing models, processes and practices appropriate for the software development lifecycle model of a project
• Apply principles and practices of test-driven development to improve testing quality and reduce delivery times
• Integrate testing processes within a continuous delivery model of software development

Assignments and Grading

• Homework 1: Case Study on Testing Processes and Software Development Lifecycle
• Project 1 (Individual): Test Plan and Test Cases Creation Project 1
• Homework 2: Testing Tools Analysis
• Project 2 (Group): Testing Team - Plan and Test Cases Creation Project 2
• Team Discussions: Case Study - students are grouped into teams for case discussions and each team presents one case study analysis
• Final Project: Research paper covering course topics

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<th>Grade Weight</th>
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<td>15%</td>
<td>Homework 1</td>
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<td>20%</td>
<td>Project 1 (Individual)</td>
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<td>15%</td>
<td>Homework 2</td>
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<td>20%</td>
<td>Project 2 (Group: 10% testing team group grade + 10% individual contribution grade)</td>
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<td>Team Discussions: Case Study</td>
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<td>Final Project</td>
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<td>Week 1: 8/31-9/6</td>
<td>Overview of the Software Testing Process.</td>
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<td><strong>Readings:</strong></td>
<td>• Watkins, Mills, Testing IT: Ch. 2</td>
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<td>• Whittaker et al., How Google Tests Software: Ch. 1</td>
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<td><strong>Readings:</strong></td>
<td>• Watkins, Mills, Testing IT: Ch. 3</td>
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<td>• Whittaker et al., How Google Tests Software: Ch. 2, pp. 15-34</td>
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<td>• Watkins, Mills, Testing IT: Ch. 4</td>
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<td>• Project 1 (Individual) Assigned: Test Plan and Test Cases Creation</td>
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<td>• Watkins, Mills, Testing IT: Ch. 6</td>
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<td>• Whittaker et al., How Google Tests Software: Ch. 3, pp. 134-185</td>
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| Week 6: 10/5-10/11 | System Testing – Approach and Techniques, Data Requirements. Test Engineering Manager Role.  
Readings:  
- Watkins, Mills, Testing IT: Ch. 7  
- Whittaker et al., How Google Tests Software: Ch. 4  
Assignments:  
- Project 1 Due on 10/11 |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Week 7: 10/12-10/18 | System Integration Testing – Approach and Techniques, Data Requirements. Test Process Evaluation.  
Readings:  
- Watkins, Mills, Testing IT: Ch. 8  
- Whittaker et al., How Google Tests Software: Ch. 5  
Assignments:  
- Homework 2 Assigned: Testing Tools Analysis |
| Week 8: 10/19-10/25 | User Acceptance Testing – Approach and Techniques, Data Requirements. Test Plan Example.  
Readings:  
- Watkins, Mills, Testing IT: Ch. 9  
- Whittaker et al., How Google Tests Software: Appendix A  
Assignments:  
- Homework 2 is Due on 10/25 |
Readings:  
- Watkins, Mills, Testing IT: Ch. 10  
- Whittaker et al., How Google Tests Software: Appendix B  
Assignments:  
- Project 2 (Group Project) Assigned: Testing Team – Plan and Test Cases Creation Project 2 |
Readings:  
- Watkins, Mills, Testing IT: Ch. 11, 15  
- Humble, Farley, Continuous Delivery: Ch. 1, 2  
Assignments: |
Readings:  
- Watkins, Mills, Testing IT: Ch. 12, 16  
- Humble, Farley, Continuous Delivery: Ch. 3  
Assignments:  
- Project 2 Continued  
- Team Discussions: Case Study 1 (Team 1) |
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Readings:  
- Watkins, Mills, Testing IT: Ch. 14, 17  
- Humble, Farley, Continuous Delivery: Ch. 4  
Assignments:  
- Project 2 Is Due on 11/22  
- Team Discussions: Case Study 2 (Team 2) |
Readings:  
- Watkins, Mills, Testing IT: Ch. 18  
- Humble, Farley, Continuous Delivery: Ch. 5, 7  
Assignments:  
- Final Project Assigned  
- Team Discussions: Case Study 3 (Team 3) |
Readings:  
- Watkins, Mills, Testing IT: Ch. 19  
- Humble, Farley, Continuous Delivery: Ch. 8, 9  
Assignments:  
- Final Project Work Continued  
- Team Discussions: Case Study 4 (Team 4) |
| Week 15: 12/7-12/13 | Test Data Management. Continuous Delivery Management.  
Readings:  
- Watkins, Mills, Testing IT: Ch. 20  
- Humble, Farley, Continuous Delivery: Ch. 12, 15 |
Assignments:
- Final Project is Due on 12/15
- Team Discussions: Case Study 6 (Team 6)

Course Policies

Learning Disabilities

The Extension School is committed to providing an accessible academic community. The Disability Services Office offers a variety of accommodations and services to students with documented disabilities. Please visit www.extension.harvard.edu/resources-policies/resources/disability-services-accessibility for more information.

Academic Integrity

You are responsible for understanding Harvard Extension School policies on academic integrity (www.extension.harvard.edu/resources-policies/student-conduct/academic-integrity) and how to use sources responsibly. Not knowing the rules, misunderstanding the rules, running out of time, submitting "the wrong draft", or being overwhelmed with multiple demands are not acceptable excuses. There are no excuses for failure to uphold academic integrity. To support your learning about academic citation rules, please visit the Harvard Extension School Tips to Avoid Plagiarism (www.extension.harvard.edu/resources-policies/resources/tips-avoid-plagiarism), where you'll find links to the Harvard Guide to Using Sources and two, free, online 15-minute tutorials to test your knowledge of academic citation policy. The tutorials are anonymous open-learning tools.

Assignment Late Policy

All course assignments are expected to be submitted by the assignment deadline. Any extenuating circumstances that prevent a student from submitting an assignment on time need to be discussed with the instructor.