## Major Curricular Change Form - New/Restore Course

- Please attach rationale for your request, a complete syllabus, and explain how this impacts other units in Pullman and other campuses (if applicable).
- Obtain all required signatures with dates.
- Provide original stapled packet of signed form/rationale statement/syllabus PLUS 10 stapled copies of complete packet to the Registrar’s Office, campus mail code 1035.
- Submit one electronic copy of complete packet to wsu.curriculum@wsu.edu.

### New Course

- **Cpt_S**: 582
- **Course Subject/Crosslist**: 3 (3, 0)
- **Graduate Standing**: Yes
- **Credit Hours**: Lecture Hours: 3, Lab or Studio Hours: 0, Hrs per Week: 0
- **Software Testing**: Testing Levels, Testing Objectives, Testing Techniques, Related Measures, Testing Tools

### Additional Attributes
- Crosslisting (between WSU departments)*
- Variable Credit:
- Conjoint listing (400/500):
- Repeat credit (cum. max. hrs):
- Special Grading: S, F; A, S, F (PEACT only); S, M, F (VET MED only); H, S, F (PHARMACY, PHARDSCI only)
- Cooperative with UI
- Other (please list request):

### The Following Items Require Prior Submission to Other Committees/Depts. (See Instructions.)
- Request to meet Writing in the Major [M] requirement (Must have All-University Writing Committee Approval.)
- Request to meet UCORE in ____________ (Must have UCORE Committee Approval) See instructions.
- Special Course Fee ____________ (Must submit request to University Receivables.)

---

**Contact:**

- **Josh Whiting**
- **joshwhiting@wsu.edu**

**Phone number:** 5-2446

**Instructor, if different:**

---

**Chair/Date:** 9/29/15

**Dean/Date:** 9/29/15

**All-University Writing Comm/Date:**

---

**Catalog Subcommittee Approval Date**

**GSC or AAC Approval Date**

**Faculty Senate Approval Date**

---

*If the proposed change impacts or involves collaboration with other units, use the additional signature lines provided for each impacted unit and college.*
This new course is required as part of the newly proposed BS SE or MS SE degrees as mandated by the State Legislature and to meet the state industry demand for trained workforce in the computer and software sectors. Full justification and rationale for offering these new degrees and courses are outlined in the corresponding new degree proposals to the Faculty Senate.
Software Testing

Course Name: Software Testing
Course Number: Cpt S 582
Credits: 3
Lecture Hours: 3
Schedule: Offered online (asynchronously) via Global Campus
Prerequisites: Graduate standing.
Course required/elective: required.
Professors/Coordinators: Venera Arnaoudova, Bolong Zeng, and Evan Olds.

Textbook(s):

Additional journal/conference articles:

Course description: software testing, testing levels, testing objectives, testing techniques, test related measures, testing tools.

Overview and Course Goals: The course teaches students the fundamentals of software testing. It teaches how to perform testing at different levels (e.g., unit testing, integration testing) and for different objectives (e.g., alpha testing, performance testing, stress testing). Students will learn to apply different testing

techniques (e.g., boundary-value analysis, decision tables), how to evaluate the results of the tests as well as the quality of the tests.

**Course topics and the corresponding program learning outcomes**
- Fundamental software testing concepts [1,2,3,4,5,6,7,8,9]
- Different test levels (e.g., unit testing, integration testing, system testing) [2,3,4,5,6,7,8,9]
- Objectives of testing: acceptance testing, installation testing, alpha/beta testing, performance testing, etc. [1,2,3,4,5,6,7,8,9]
- Testing Techniques (e.g., black box, white box, mutation testing, etc.) [2,3,4,6,7,8,9]
- Reliability Evaluation [2,3,4,5,6,7,8,9]
- Test-related measures (e.g., fault density, mutation score) [2,3,4,5,6,7,8,9]
- Test planning and documentation [2,3,4,5,6,7,8,9]

**Learning outcomes:**

Students that successfully complete the course will be able to:

1. Describe different test levels and testing objectives.
2. Apply test methods for the different phases of development and life cycle of the software.
3. Identify coverage and acceptance criteria for the test based on the programming language activities, phase of development.
4. Assess the quality and reliability of the software system.
5. Plan and appropriately document for software testing activities.

Mapping student learning outcomes, course topics, and evaluations:

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>Course topics/dates</th>
<th>Evaluation of Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Software testing levels (weeks 2 and 3)</td>
<td>Mid-term 1</td>
</tr>
<tr>
<td>2</td>
<td>Software testing techniques (weeks 4-11)</td>
<td>Mid-term 1, mid-term 2, and project.</td>
</tr>
<tr>
<td>3</td>
<td>Software testing fundamentals and key issues (weeks 1 and 2)</td>
<td>Project</td>
</tr>
<tr>
<td>4</td>
<td>Quality and reliability evaluation (week 12, 13, and 14)</td>
<td>Final exam</td>
</tr>
<tr>
<td>5</td>
<td>(Week 15)</td>
<td>Final exam</td>
</tr>
</tbody>
</table>

**Week-by-week schedule:**

---

6 The student learning outcomes for the MSSE program are labeled from ‘1’ to ‘9’.
<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Testing Fundamentals: terminology and key issues (e.g., adequacy criteria, oracle, infeasible paths).</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Test levels: the target of the test (unit testing, integration testing, system testing).</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Objectives of testing: acceptance testing, installation testing, alpha/beta testing, performance testing, etc.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Testing Techniques: techniques based on intuition and experience.</td>
<td>Project deliverable 1</td>
</tr>
<tr>
<td>5</td>
<td>Black box testing techniques. Data equivalence classes (boundary partitions) and the category-partition method.</td>
<td>Mid-term 1</td>
</tr>
<tr>
<td>6</td>
<td>White box testing techniques. Edges, expressions, data streams.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Fault-based testing techniques: mutation testing.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Usage-based techniques: operational profiles.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Model-based techniques: finite-state machines.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Techniques based on nature of application: concurrent, web, embedded, and real-time systems.</td>
<td>Project deliverable 2</td>
</tr>
<tr>
<td>11</td>
<td>Techniques based on nature of application: object-oriented programs. E.g., Members Draw Minimal Data Usage Matrix (MADUM), Order for Inter-Class Integration Testing of Object-Oriented Software.</td>
<td>Mid-term 2</td>
</tr>
<tr>
<td>12</td>
<td>Reliability Evaluation.</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Processes and techniques for developing highly dependable software.</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Test-related measures: evaluation of the program under test and evaluation of the performed tests.</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Test process. Planning for testing activities and documentation.</td>
<td>Project deliverable 3</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>Final exam</td>
</tr>
</tbody>
</table>

**Grading framework:** Course grades are based on 3 exams (two mid-terms and one final) totaling 50% of the final grade and a project totaling 50% of the final grade.

The project consists of applying several testing techniques learned in class. In the first project deliverable students will be asked to implement a software system given a description of a client need. For the second deliverable, students will test the system using black box and white box testing techniques. For the third
deliverable students will be given the software artifacts of another team and they will 1) evaluate the quality
of the tests performed by the original developers, 2) further test the system using operational profiles and
mutation testing, and 3) evaluate the program under test and the quality of the performed tests.

Final grades will be awarded on the following scale:

<table>
<thead>
<tr>
<th>Interval</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>[90,100]</td>
<td>A</td>
</tr>
<tr>
<td>[87,90)</td>
<td>A-</td>
</tr>
<tr>
<td>[83,87)</td>
<td>B+</td>
</tr>
<tr>
<td>[80,83)</td>
<td>B</td>
</tr>
<tr>
<td>[77,80)</td>
<td>B-</td>
</tr>
<tr>
<td>[73,77)</td>
<td>C+</td>
</tr>
<tr>
<td>[70,73)</td>
<td>C</td>
</tr>
<tr>
<td>[67,70)</td>
<td>C-</td>
</tr>
<tr>
<td>[63,67)</td>
<td>D+</td>
</tr>
<tr>
<td>[60,63)</td>
<td>D</td>
</tr>
<tr>
<td>[0,60)</td>
<td>F</td>
</tr>
</tbody>
</table>

**Course rules:**

You must take exam during the assigned test period. Failure to do so will result in a score of zero. However,
in extraordinary circumstances and at the discretion of the instructor, a make-up exam may be offered. An advanced notice must be given to the instructor beforehand.

Unless posted otherwise, assignment documents shall be submitted electronically.

Late penalty is a flat 10% deduction per day. Late assignments may be turned up to one week after the original due date, and an advanced notice must be given to the instructor beforehand for the late submission. No homework will be accepted after its due day without advanced notice or special permission from the instructor.

Bonus points will be added to your total class score for attendance as follows: 0 absence = 5% of the final grade, 1 absence = 4 %, 2 absences = 3%, and 3 or more absences = 0% bonus.

**Reasonable Accommodation:**

Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center.

**Academic Integrity:**

I encourage you to work with classmates on assignments. However, each student must turn in original work. No copying will be accepted. Students who violate WSU’s Standards of Conduct for Students will receive an F as a final grade in this course, will not have the option to withdraw from the course and will be reported to the Office Student Conduct. Cheating is defined in the Standards for Student Conduct WAC 504-26-010 (3).
It is strongly suggested that you read and understand these definitions. (Read more: http://apps.leg.wa.gov/wac/default.aspx?cite=504-26-010)

**Safety:**

Washington State University is committed to maintaining a safe environment for its faculty, staff, and students. Safety is the responsibility of every member of the campus community and individuals should know the appropriate actions to take when an emergency arises. In support of our commitment to the safety of the campus community the University has developed a Campus Safety Plan, http://safetyplan.wsu.edu. It is highly recommended that you visit this web site as well as the University emergency management web site at http://oem.wsu.edu/ to become familiar with the information provided.