CS 4387/5387 Course Syllabus

Software Integration and V&V

General Information

- *Course title*: CS 4387/5387 —Software Integration and V&V
- Semester and sequence number: Spring 2017, 25134 and 23167.
- Time and Location: R 6:00PM-8:50 PM. BUSN 302
- *Professor*: Dr. Omar Badreddin. Email: obbadreddin@utep.edu
- *Office location*: CCSB 3.0610
- *Office hours*: R 2:30 PM – 5:30 PM.
  > By appointment as needed. I am in my office all day with the door open, you are encouraged to drop in any time.

Course Description

The course covers the principles and processes of validation, verification, and integration within a disciplined software development environment. Topics include efficient integration of software systems or components that meet customer requirements and needs; disciplined approaches for integration and testing throughout the development life cycle, selection of alternative methods for integration and testing, and fault diagnosis; use of static and dynamic testing techniques and tools to identify code vulnerabilities; testing based on attack patterns; and penetration testing. Prerequisites: CS 3331 with a grade of C or better. Restricted to Majors of CS.

Course Goals

The intention is to investigate issues related to software test automation, what capabilities are (and are not) available in current test tools, and what is the potential for new capabilities. The course takes a software engineering approach and provides the opportunity for some "hands-on" work with test tools. By completing this course, students will gain in-depth knowledge of software test tools and techniques, and provide the background to design and improve such tools.

Course Prerequisites

CS 3331, Minimum Grade of C. May not be taken concurrently.

Course Structure

This offering consists of lectures and sets of related project and reading assignments. Lectures will meet once a week to discuss the fundamental topics of the course.

Textbook and Required Materials

No text book required ☺ ☺ ☺
All reading materials will be published and made available on Blackboard Learning System.

Suggested references:
1. V. Massol, JUnit in Action (2004)
2. K. Naik, P. Tripathy, Software Testing and Quality Assurance Theory and Practice (2008)

Course Outline[1]

	Topic	Description
A	Introduction to automated verification and validation of software	What is automated verification and validation, when is it feasible (and not feasible)? Types of testing, and the impact on tools.
B	Automated Testing	Test cases, Test automation, testing processes, test levels, Test-First technique, testing tools.
C	The JUnit testing framework	Unit testing using Junit, assertion, test fixtures, setup and tear down, exception testing, ignored and parametrized tests.
D	Automated Test Generation	Structural testing, flow graphs, code coverage, state oriented systems and models, conformance testing,
E	Instrumentation and Code Coverage	Source Code instrumentation, Executable Instrumentation, instrumentation tools, coverage measurements.
F	Software Profiling	Software Profiling, Eclipse TPTP, Virtual Machine (VM) Interfacing.
G	Integration Testing	Introduction to Integration Testing, System Integration, Top-Down Integration, Bottom-Up Integration, Sandwich Integration, Big Bang Integration, Mock Objects, Automated Mock Object Generation, Factory Design Pattern.
H	Database Testing	Data Base Management Systems, Relational database, Database connections.
I	Web Integration and Performance Testing	Testing web-based applications, testing the client, HTTP Commands, Testing Application Server, Cactus testing tool, performance testing, JMeter,
J	State Space Exploration & Model Checking	State space exploration, deadlocks, exploration algorithm, Temporal Logic Model Checking, Linear Time Logic, State Explosion Problem, Model Checking Systems, Promela language.

Assessment of Student Learning Outcomes

Methods of assessment include: In-class midterm around week 8, in-class cumulative final exam during finals week, in-class quizzes at various times during the semester, in-class activities at various times during the semester, in class discussions and group exercises, homework and

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[1] Course outline is subject to change

reading assignments at various times during the semester, and project deliverables.

Grading System

The weight of each course component toward your final grade is as follows:

Assignment	Grade Weight %
Assignments (4 or 5 assignments)	25%
Testing Tool Evaluation	15%
Attendance and Participation (includes in-class announced quizzes)	15%
Midterm Exam	20%
Final Exam[2]	25%

Grading Scale

The course grading scale is as follows:

Percentage Grade	Letter Grade
90% or above	A
80% through 89%	B
70% through 79%	C
60% through 69%	D
59% or below	F

There is no "curve;" your grade is completely up to you and is not in any way affected by the grades of your classmates. If you feel I've made a mistake in grading your assignment, please come visit me during office hours. I will gladly explain my reasoning for deductions and correct any mistakes! However, any corrections must be discussed and made within one week of the assignment's return date.

Sometimes instructors make mistakes, and I am no exception: exams are harder than expected, or assignments are just too optimistic for the time allotted. In these rare cases, I reserve the right to modify the class's grades before their final submission. This modification is subject to the following rules: (1) the same modification will be applied to the grades of all students, and (2) the modification will always result in a higher grade.

Course Policies

Exams and Quizzes

Without prior notice of illness or documented substantial extenuating circumstances, there are no make-ups for exams and quizzes. Please be prepared to provide supporting documentation to substantiate circumstances, as needed.

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[2] To pass the course, you must pass the final exam

Attendance

It is critical that you attend every lecture and group meeting. In this course, the readings and lectures will go hand-in-hand and will not necessarily cover the same material. One will reinforce the other, and -- to do well -- you should be prepared to come to lecture having read through the reading assignments for the day. Exam content will be drawn from both lectures and readings.

Please be cautious about attending class and meetings if you are feeling ill. Please inform me by email if you are feeling unwell; if you are experiencing flu-like symptoms, you should not attend class and seek medical attention.

Excessive absence can result in an automatic F in the course.

Class Conduct

Appropriate in-class student conduct is a critical component of a smoothly running course. Please be courteous in your interactions with me and other students and ensure that your behavior supports a positive learning environment and is not disruptive to the normal flow of the course. Examples of disruptive behavior include, but are not limited to, the following:

- Showing up late to class;
- Preparing to leave before the instructor has dismissed the class;
- Maintaining conversations with neighboring classmates at inappropriate times;
- Speaking without being recognized, asking questions or making comments irrelevant to course material; Interrupting the instructor or other students;
- Being obviously disengaged or disinterested in the subject matter;
- Refusing to comply with an instructor's request;
- Making calls or holding text-message conversations using your cellphone;

These rules of conduct apply to any online discussions (such as BBLearn) used in the course.

All that said: Healthy discussion, at times permitted by the instructor, is highly encouraged!

Late Submissions

Assignments are to be submitted on BBlearn. Late assignments are not accepted.

Electronic Devices

Feel free to bring your laptops and take electronic notes or try things out as we talk about them during lecture. Note that watching YouTube videos or updating your Facebook page does not count as taking notes and trying things out. Please be courteous to your classmates and me by silencing your cell phones. I reserve the right to ask you to stop using any device if I feel its use is bothersome or distracting to the class.

Contact Methods

Please don't hesitate to drop by my office or send me an email with any personal concerns. I will happily do my best to answer your questions and address your concerns. I reserve the right to ask

you to come in for a chat during office hours for long answers, and reserve email for shorter answers. I will answer your emails as soon as I possibly can, but don't bank on a response time measured in minutes (though, that may sometimes happen too). <u>Please make sure that you put your name and course number somewhere in the message.</u>

Academic Integrity

One of the foundations of academic life is honesty. Assignments and exams are ways to measure your understanding of the material being covered in the course, not medieval implements of torture. By cheating, you are cheating yourself out of the chance to have your understanding accurately evaluated. Grades are an indication of your final proficiency over the material, and not a form of punishment. Be honest and fair to your fellow classmates: do your own work. You'd also be surprised at how easy it is to spot cheating.

Cheating and any other form of academic dishonesty will be dealt with seriously. Consequences to incidents of academic dishonesty may include a zero grade in the assignment in question, an F in the course, or may be referred to the university's channels and result in expulsion from UTEP -- any and all at my discretion.

<u>Just don't do it!</u>

University Policies

This course is conducted in accordance with all applicable university policies.

Disability and Special Accommodations

If you have or suspect a disability and need accommodation you should contact CASS at 747-5148 or dss@utep.edu or visit Room 106 Union East Building.