Course Syllabus
SWE 637 Software Testing (3 Credits)
Section 001, Fall 2019

https://cs.gmu.edu/syllabi/

Instructor: Bob Kurtz, rkurtz2@gmu.edu, Adjunct Professor

Schedule: Tuesday 4:30pm – 7:10pm

Location: Art and Design Building, room 2026

Course Description:
Students learn to test software effectively. Programmers learn practical ways to design high quality tests during all phases of software development. Students learn the theory behind criteria-based test design and to apply that theory in practice. Topics include test design, test automation, test coverage criteria, and how to test software in cutting-edge software development environments.

Textbook: *Introduction to Software Testing*, 2nd Edition, Paul Ammann and Jeff Offutt, Cambridge University Press, ISBN 9781107172012 (required)
At the GMU bookstore
Book Website: https://cs.gmu.edu/~offutt/softwaretest/

Prerequisites: SWE 619 is required. While this course provides extremely practical skills, it is, at heart, an applied math course. You will need knowledge of discrete math, programming, data structures and basic software engineering. Most examples will be in Java and some assignments will require JUnit tests.

Office Hours: As an adjunct, I do not keep regular on-campus office hours. I'm happy to have discussions after class, and if you need a more in-depth discussion we can set up an appointment.

Grading: Grade totals are computed based on:

Quizzes:	40%
Final exam:	30%
Assignments:	20%
Class/online participation:	10%

Numeric scores will map to letter grades as follows:

90-100:	A
85-89:	B+
80-84:	B

70-79:   C

below 70:   F

Grades are not "on a curve." However, I may relax the grading scale if the class-wide results of one or more graded works suggest that I got it wrong.

Quizzes: Most classes will have a short quiz, usually at the beginning of class. Quizzes must be taken individually and without written or electronic help. Quiz topics will be taken from course material from one or more previous sessions. Each quiz is graded on a 10-point scale. There will not be a midterm exam.

Missed quizzes: You may miss one quiz without penalty. If you complete all quizzes, I will drop your quiz with the lowest score.

Make-ups: Quizzes can be made up during class the week after the original date. You can also re-take a quiz (only once) if you are unhappy with your original grade; if you re-take a quiz the new grade will count. Make-up quizzes will have different questions but the same general topics as the original. Please let me know by email if you would like to make up a quiz. I understand that work and personal commitments are not always completely under our control, so if legitimate reasons prevent you from attending class and taking a quiz, please contact me by email before (or as soon as possible after) class. All make-up quizzes must be completed before the final exam day.

Final Exam: The final exam will be held during the University-scheduled exam period. The final exam will be closed-book and may contain content from any portion of the course. University policy specifies that missing the final exam without previous notice is an automatic F grade. If you can not make it to class for the final exam, please coordinate with me before the exam.

Assignments: There will be periodic out-of-class homework assignments. Assignments can be turned in during class or submitted by email or Blackboard before the start time of the class. Assignments may be done collaboratively with other students. Collaborative work must list all of the contributors with a brief description of each student's contribution, and every person in the group will earn the same grade. Online discussion of assignments is welcome! Late assignments will be reduced in score by 50%. All assignments must be turned in before the final exam day.

Class/Online Participation:

In addition to in-class discussion, we will use Blackboard for online discussion. Participation in both environments counts toward your grade. I expect you to ask or post questions and contribute answers about assignments, quiz preparation, or other discussion.

In-Class Exercises:

Most classes will have an in-class exercise. You are encouraged to work the exercises in collaboration with other students. In-class exercises are not graded but are often related to the quiz the following week.

Class Meeting Schedule:

The following class schedule is idealized and subject to change as the class progresses.

Week#	Date	Topic	Text Chapter	Quiz Prep	Asmt Due	In-Class Exercise	ShowMe
1	8/27	Class Overview; Why Test?	1			Ex 0a Ex 0b	
2	9/3	Faults, Failures, and Errors; Model-Driven Test Design	1 2	Q1	Asmt 1	Ex 1	Faults, Errors, Failures
3	9/10	Test Automation: JUnit	3.1 3.2 3.3	Q2		Ex 2	JUnit Theories
4	9/17	Test Doubles; Putting Testing First; Coverage Criteria	12.2 4 5 videos	Q3	Asmt 2	Ex 3	Test Doubles
5	9/24	Input Space Partitioning	6.1 6.2 6.3	Q4		Ex 4	
6	10/1	More Input Space Partitioning	6.4	Q5	Asmt 3	Ex 5	Iterator IDM Example
7	10/8	Graph Coverage	7.1 7.2	Q6		Ex 6	
n/a	10/15	Fall Break on Monday, no Tuesday classes this week					
8	10/22	More Graph Coverage	7.3 7.4 7.5 7.6	Q7	Asmt 4	Ex 7	
9	10/29	Semantic Logic Coverage	8.1 videos	Q8		Ex 8	ACC ICC DeterminationA DeterminationK
10	11/5	Syntactic Logic Coverage	8.2	Q9		Ex 9	
11	11/12	Applying Logic Criteria	8.3 videos	Q10	Asmt 5	Ex 10	CUTPNFP

12	11/19	Syntax-Based Testing	9.1 9.2	Q11		Ex 11	
13	11/26	Mutation Testing in Practice; Input Syntax Testing	Paper	Q12	Asmt 6	Ex 12	
14	12/3	Course Wrap-Up	Final exam notes	Q13			
n/a	12/10	No class – study/exams period					
15	12/17	Final Exam (normal place and time)					

See Dr. Amman's course page at https://cs.gmu.edu/~pammann/637-sched.html for links if you have any problem with the links above.

In-Class Communication:

Laptops, tablets, and other electronic devices may be used in class for class purposes. However, phone calls, text messages, emails, web browsing, and other non-course-related activities are disruptive to other students. Please be considerate in class and do not distract others. If you receive a call or message that you must respond to immediately, please quietly leave the room. Misuse of electronic devices in class will impact your participation grade.

Disability Accommodation:

Disability Services at George Mason University is committed to providing equitable access to learning opportunities for all students by upholding the laws that ensure equal treatment of people with disabilities. If you are seeking accommodations for this class, please first visit http://ds.gmu.edu/ for detailed information about the Disability Services registration process. Then please discuss your approved accommodations with me. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu, phone: (703) 993-2474.

Honor Code: Mason is an Honor Code university; please see the Office for Academic Integrity for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. In this course, quizzes and the final exam must be exclusively your own work. Homework assignments that are done in collaboration with other students must give appropriate credit for the work of each student. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.

Discrimination:

George Mason University is committed to providing equal opportunity and an educational and work environment free from any discrimination on the basis of race, color, religion, national origin, sex, disability, veteran status, sexual orientation, gender identity, age, marital status, pregnancy status or genetic information. George Mason University shall adhere to all applicable state and federal equal opportunity/affirmative action statutes and regulations.

The University is dedicated to ensuring access, fairness and equity for minorities, women, individuals with disabilities, and veterans (as covered by law) in its educational programs, related activities and employment. George Mason University shall thus maintain a continuing affirmative action program to identify and eliminate discriminatory practices in every phase of university operations.

Students shall interact in class and online with respect for other students, faculty, and staff.

About the Instructor

I'm a Senior Principal Software Engineer at Raytheon with more than 30 years of experience in software design, implementation, and testing with a background in real-time embedded systems, command and control systems, and intelligence collection and management systems. I have a PhD in Information Technology from GMU (2018), an MS in Software Systems Engineering from GMU (2000), and a BS in Computer Science from SUNY Empire State College (1991). My PhD dissertation, *Improving Mutation Testing with Dominator Mutants*, examined the use of machine learning to reduce the overhead of mutation testing. My publications and associated presentations are available at my personal website.

Outside of work and school, I enjoy boating and training, playing, and hunting with my dogs, two Golden Retrievers and a Flat-Coated Retriever.