COLLEGE OF INNOVATION & TECHNOLOGY

SWE 488/588 Software Testing and Maintenance

Syllabus V 2.1 – BETA

Course Information

Examination of testing and modification of software in evolving environments. Introduction to tools and techniques used to validate artifacts developed during the software development process. Topics include model validation, maintenance categories, implementation, and specification-based testing.

Associated Term: Winter 2025
CRN:25380 25381 25465
Campus:Main
Schedule Type: Lecture/Discussion
Instructional Method: Face to Face / Asynchronous
Section Number: 01 / W1
Subject: Software Engineering
Course Number: 488/588
Title: Software Testing and Maintenance
Credit Hours: 4
Grade Mode: (A-E) course.

Instructor Information

Mohamed Wiem Mkaouer
mmkaouer@umich.edu
Office: 383J

Student Support Hours will be right after Thursday's class in my office, or via Zoom until 3 PM:

The instructor will try his best to answer questions as soon as possible. The response can be expected within a few hours; however, it can vary depending on the volume of questions and the instructor's determination of the best mode of responding to a student's question (face-to-face, email, Canvas, etc.).

If you need further assistance, please visit the CIS/CSC Support Office in 196 MSB (open Monday-Friday, 8 am – 5 pm).

Course Learning Outcomes and Expectations

Test Execution and Reporting:

- Setting up test environments.
- Executing test cases and recording results.
- Analyzing test results and identifying trends.

Defect Management:

- Identifying and analyzing software defects.
- Prioritizing defect fixes based on severity and impact.
- Debugging techniques to isolate and resolve issues.
- Effective defect tracking and reporting.

Object-oriented metrics:

- Object-Oriented measurement concepts
- Basic metrics for OO systems
- OO analysis and design metrics

Textbook and Course Materials

Software Testing 2nd Edition by Ron Patton **(Optional)**
Amazon - Software Testing
This class closely follows the format and content of this book. Your personal learning style should dictate if you want to purchase the book or not.

The Digital Quality Handbook by Eran Kinsbruner **(Optional)**
Amazon - Digital Quality Handbook
The class is beginning to introduce concepts from this book.

Course Tentative Schedule (https://www.umflint.edu/registrar/semester-calendar)

Week	Topics	Paper Presentation / Actions
W01 01/07	Introduction/Course Overview	Class dynamics and expectations
W01	Presentation Review	The instructor will present “Who should fix this bug?”
W02 01/14	Software Quality	Code Metrics
W02	Software Quality	Best Programming Practices
W03 01/21	Software AntiPatterns	Code and Test AntiPatterns
W03	Test AntiPatterns	Bad testing practices
W04 01/28	Testing Fundamentals	Test Coverage / Unit Testing
W04	Paper Presentations	Paper 01
W05 02/04	Testing Fundamentals	Minimum # of test cases
W05	Paper Presentations	Paper 02
W06 02/11	Test Case Generation	using EvoSuite
W06	Paper Presentations	Paper 03
W07 02/18	Mutation testing	Introduction to the concept
W07	Paper Presentations	Paper 04
W08 02/25	Midterm Exam	
W08	Seminar	Guest Speaker
W09 03/04	No Class	
W09	No Class	
W10 03/11	API Management	API Upgrade and Migration
W10	Paper Presentations	Paper 05
W11 03/18	Bug Management	Bug Localization and Ttriage
W11	Paper Presentations	Paper 06
W12 03/25	Black Box Testing	BVA and BVA+
W12	Paper Presentations	Paper 07
W13 04/01	DecOps/MLOps	Intro to Pipelines
W13	Paper Presentations	Paper 08
W14 04/08	Search-Based Optimization	Intro to evolutionary computing
W14	Paper Presentations	Paper 09 / 10
W15 04/15	Final Project Presentations	Each Team should upload 15 min presentation.
W15	Final Project Presentations	Each Team should upload 15 min presentation.
W16 04/22	Final Project Presentations	Each Team should upload 15 min presentation.
TBD	Final Exam	Check SIS for the exact date

Legend

Red shading	Examination

Yellow shading	No class
Guest Speaker	
Paper Presentation	
Potential Class being only Online or Cancelled	

Individual Assignments

This set of assignments be given throughout the term to reinforce class material and will help students better understand the theoretical part of the course. Every student is required to work individually on the class assignments. No group submission is allowed.

Paper Presentations and Reviews

Every student is required to present one paper and review one or two other paper(s).

For in-person students, presenters must submit their presentation slides before their presentation in class. Reviewers must also submit their reviews before the paper's presentation session. Refer to the course schedule on the course shell for details on when presentations/reviews are due.

For Online Asynchronous students, they will record a video of their presentation. Reviewers need to submit a review form. Presenters must submit their presentation slides and video before the paper's presentation in class. Reviewers must also submit their review before the paper's presentation session. Refer to the course schedule on the course shell for details on when presentations/reviews are due.

Group Project

There will be a group project for the course that enforces software engineering practices. Students attending this course will be grouped into X teams (The number varies based on the number of students in the class). Each group will work on a topic related to maintaining or testing software. The instructor will provide topics for the students (e.g., improve an existing tool, literature review, empirical study between several tools, develop a new metric model, etc.). Group creation will be random, and working in a group is mandatory. The students must construct their final report by combining 3 submissions (3 Phases) throughout the semester:

–Phase I -- Introduction and Open Investigation --1-2 pages report -- 20%
–Phase II Solution Design and Preliminary Investigations --3-5 pages report -- 20%
–Phase III Validation and Limitations --8-10 pages report -- 20%
–Pre-Phase IV -- Present your final work -- presentation -- 20%
–Phase IV Final Report --10-∞ pages report -- 20%

Deliverables

All activity submissions are due per the class schedule. All deliverables are through Canvas. If deliverables contain various types of files (documents, source code, videos, etc.) and their upload is tedious, you can use Google Drive to create a submission folder and submit the link as a deliverable. Each student is allowed to be late for submission twice a semester (2 grace periods). The maximum grace period is 24 hours. Late submissions, beyond grace periods, are allowed with a 10% penalty applied to the grade every 24 hours. No individual extensions are permitted

to ensure fairness between students. the professor recommends handing in unfinished work for partial credit instead of no submission at all.

Attendance and Participation Policy

Attending classes in person is mandatory for in-person students. If you need to be absent, you need to email the instructor prior to your absence. Each unannounced absence may result in (-1) penalization from the participation grade (%5). Participation means being active in class and Slack. It is enforced by a participation grade assigned to the students by the end of the semester. You need to listen and contribute to the class discussion in a proactive manner.

Grade Distribution

Midterm Exam 10%

Final Exam 10%

Group Project 30%

Research papers presentations/reviews: 20%

Individual Assignments: 25% (30% for online Asynchronous students)

Attendance and Participation: 5% (NA for online Asynchronous students)

The following tables will be used to determine your letter grade at the conclusion of the course:

Grade	**Range**
A+	97 or above
A	93 or Above
A-	90 or Above
B+	87 or Above
B	83 or Above
B-	80 or Above
C+	77 or Above
C	73 or Above
C-	70 or Above
D	60 or Above
F	<60

Students will be evaluated individually using midterms and the final exam. Teams will be given a single grade for units and project deliverables submitted. Individual team members may have their grades for the units and team projects adjusted up or down based on their contribution to the project. This adjustment will be based on peer evaluations from your teammates.

Meta-Cognition

In order to facilitate learning, we would like you to assess your mastery of the different topics. We refer to your assessment of your own learning as meta-cognition. There may be some aspects included in the course for you to assess your own meta-cognition levels (which are entirely voluntary). Basically, always be aware of your learning (some course activities might help you with this self-assessment), and you can take necessary steps if you believe your learning is not meeting the goals.

Inclusive Classroom

I am committed to creating an inclusive environment in my class where a diversity of ideas and values is welcomed and considered necessary for success. My class is a space for everyone to be "heard" and supported. I will occasionally reach out to get feedback on the classroom environment.

On the use of Generative AI tools

In compliance with the emerging effort to integrate the use of large language models (for example, ChatGPT) in education, students are allowed to use generative AI tools to support their learning goals, including the development of assignments, requests for information, and support in writing reports. However, students are strictly required to declare their usage of generative AI tools and inform the instructor of each usage by coloring in blue all the parts in which ChatGPT answers were used to constitute an answer. For example, if you are using generative AI to improve your writing, all parts where you copied statements from the language model need to be in **blue**. Furthermore, students should complete a quick form every time they use an LLM (https://docs.google.com/forms/d/e/1FAIpQLSdnyNLM6k6qIvb9eRp9qfgWZ8lOSEWdg_901n5MtMJH-16bxw/viewform?usp=sf_link). More details on how this is performed will be given during the first week of class.

Academic Integrity (https://catalog.umflint.edu/content.php?catoid=34&navoid=4129)

Intellectual integrity is the most fundamental value of an academic community. Students and faculty alike are expected to uphold the highest standards of honesty and integrity in their scholarship. No departure from the highest standards of intellectual integrity, whether by cheating, plagiarism, fabrication, falsification, or aiding and abetting dishonesty by another person, can be tolerated in a community of scholars. Such transgressions may result in action ranging from reduced grade or failure of a course, to expulsion from the University or revocation of degree.

It is the responsibility of all students and faculty to know the policies on academic integrity in the instructional units at the University of Michigan-Flint. Information about these policies and the appeals process is available from the appropriate administrative office of the instructional units: in the College of Arts and Sciences, the Office of the Dean of the College of Arts and Sciences; in the College of Innovation and Technology, the Office of the Office of the Dean of the College of Innovation and Technology, in the School

of Education and Human Services, the Office of the Dean of the School of Education and Human Services; in the School of Management, the Office of the Dean of the School of Management; in the School of Health Professions and Studies, the Office of the Dean of the School of Health Professions and Studies and for graduate students, the Office of Graduate Programs.

Departments and programs within these instructional units may have specific policies and procedures which further delineate academic integrity. In such cases, students are bound by the University policy on academic integrity as well as these department or program policies.

Procedural Rights of the Accused Student. A student who is charged with academic dishonesty by an instructor, administrator, or another student may be assured that he/she has the right to a fair hearing of the charges and the evidence, the right to question witnesses, to invite witnesses on his/her behalf, and to introduce whatever other evidence may be relevant to the charge.

Code of Academic Conduct. The University, like all communities, functions best when its members treat one another with honesty, fairness, respect, and trust. Therefore, an individual should realize that deception for the purpose of individual gain is an offense against the members of the community. Such dishonesty includes:

Plagiarism: taking credit for someone else's work or ideas, submitting a piece of work (for example, an essay, research paper, assignment, laboratory report) which in part or in whole is not entirely the student's own work without fully and accurately attributing those same portions to their correct source.

Cheating: using unauthorized notes, or study aids, or information from another student or student's paper on an examination; altering a graded work after it has been returned, then submitting the work for regrading; allowing another person to do one's work, then submitting the work under one's own name.

Fabrication: fabricating data; selectively reporting or omitting conflicting data for deceptive purposes; presenting data in a piece of work when the data were not gathered in accordance with guidelines defining the appropriate methods of collecting or generating data; failing to include a substantially accurate account of the method by which the data were gathered or collected.

Aiding and Abetting Dishonesty: providing material or information to another person when it should reasonably be expected that such action could result in these materials or information being used in a manner that would violate this code of academic integrity.

Falsification of Records and Official Documents: altering documents affecting academic records; forging a signature of authorization or falsifying or omitting necessary information on an official academic document, election form, grade report, letter of permission, petition, or any document designed to meet or exempt a student from an established College or University academic regulation; falsification or unauthorized altering of information in any official academic computer file.

Identity Theft: Assuming another person's identity or role through deception or without proper authorization. Communicating or acting under the guise, name, identification, email address, signature, or indicia of another person without proper authorization, or communicating under the rubric of an organization, entity, or unit that you do not have the authority to represent.

Misrepresentation and Other Acts of Academic Dishonesty: fraudulently obtaining and/or using academic materials that would give oneself an unfair advantage over other students or would deceive the person evaluating one's academic performance.

Attempts. An attempt to commit any act prohibited by this code may be punished to the same extent as a completed violation.

Classroom Etiquette:

We understand that different people have different life situations and responsibilities. We would like to emphasize that the focus is on learning, and we want you to take ownership of your learning and to ensure that the learning of others is not impacted.

Student Life and Services:

Please refer to: https://catalog.umflint.edu/content.php?catoid=34&navoid=4131 for information about Disability and Accessibility Support Services, Counseling and Psychological Services (CAPS), Health Services, Child Care, and other services available to all UM Flint students.

Tutoring Support Services:

Please refer to: https://www.umflint.edu/studentsuccess/tutoring-supplemental-instruction/ if you would like to make use of tutoring services provided.

Notes:

The instructor reserves the right to modify course policies, the course calendar, assignment point values, and due dates. Any extenuating circumstances that hinder your participation in the course should be discussed with me as soon as those circumstances are known. Make-ups for graded activities may be arranged if an absence is caused by documented illness or personal emergency. A written explanation, including supporting documentation, must be submitted to me; if the explanation is acceptable, then an alternative to the graded activity will be arranged. Whenever possible, make-up arrangements must be completed prior to the scheduled activity.

Only properly documented reasons may be a valid cause to change the exam or other grading requirements of this course for possible make-up or some re-arrangements. Taking a vacation early is NOT a valid excuse to change any of the above.

Syllabus ChangeLog

1/8/24 V 2.1 – BETA. Changed the type of deliverables for the project.

1/7/24 V 2.0 – ALPHA.Updated Lectures, Exams, and Assessments.

1/4/24 V 1.0 – ALPHA. Created initial content.