UMBC UGC Instructions for New Course Request Form (revised 4/2016)

Course number & title:

Date submitted:.

Effective date:.

Contact information:

Course number:.

Transcript title:

Recommended Course Preparation: ***Please note that all 300 and 400 level courses should have either recommended course preparation(s) or prerequisite(s) and that 100 or 200 level courses may have them.***

Prerequisite: ***Please note that all 300 and 400 level courses should have either recommended course preparation(s) or prerequisite(s)*** Here fill in course(s) students need to have taken before they enroll in this course. These prerequisites will be enforced through the registration system. Please explain your choices in the "rationale" (discussed below).

NOTE: Please use the words "AND" and "OR", along with parentheses as appropriate, in the lists of prerequisites and recommended preparation so that the requirements specified will be interpreted unambiguously.

NOTE: Unless otherwise indicated, a prerequisite is assumed to be passed with a "D" or better.

# of credits:

Maximum total credits

Grading method(s): Regular Grading Option(A, B, C, D, F)

Proposed catalog description:

Rationale: Please explain the following:

a) Why is there a need for this course at this time?

b) How often is the course likely to be taught?

c) How does this course fit into your department's curriculum?

d) What primary student population will the course serve?

e) Why is the course offered at the level (ie. 100, 200, 300, or 400 level) chosen?

f) Explain the appropriateness of the recommended course preparation(s) and prerequisite(s).

g) Explain the reasoning behind the P/F or regular grading method.

h) Provide a justification for the repeatability of the course. N/A

Cross-listed courses:

Course Outline:

Note: the UGC form is a Microsoft Word form. You should be able to enter most of the information by tabbing through the fields. The document is protected. In the rare case that you need to unprotect the document, use the password 'ugcform'. Beware that you will lose all the data entered in the form's fields if you unlock and lock the document.

UMBC UGC New Course Request: IS 470 Software Testing

Date Submitted: 2/14/2020 Proposed Effective Date: Spring 2021

	Name	Email	Phone	Dept
Dept Chair or UPD	Sreedevi Sampath	sampath@umbc.edu	5-8845	IS
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COURSE INFORMATION:

Course Number(s)	IS470
Formal Title	Software Testing
Transcript Title (≤30c)	Software Testing
Recommended Course Preparation	
Prerequisite **NOTE:** Unless otherwise indicated, a prerequisite is assumed to be passed with a "D" or better.	IS247 **with a C or better**
# of Credits Must adhere to the UMBC Credit Hour Policy	3
Repeatable for additional credit?	☐ Yes X No
Max. Total Credits	3 This should be equal to the number of credits for courses that cannot be repeated for credit. For courses that may be repeated for credit, enter the maximum total number of credits a student can receive from this course. E.g., enter 6 credits for a 3 credit course that may be taken a second time for credit, but not for a third time. Please note that this does NOT refer to how many times a class may be retaken for a higher grade.
Grading Method(s)	☒ Reg (A-F) ☐ Audit ☐ Pass-Fail

PROPOSED CATALOG DESCRIPTION (Approximately 75 words in length. Please use full sentences.**):**
This course will examine concepts and techniques for testing of software in development environments. Topics include, testing software at the unit, subsystem and system levels, approaches to automatic and manual test data generation, creating test oracles, coverage analysis to decide when to stop testing, test prioritization, mutation testing, regression testing, automated software testing tools, and testing trends in current development environments.

RATIONALE FOR NEW COURSE:

a) Why is there a need for this course at this time?
In the software development lifecycle, after a system is developed, it typically enters the testing phase. We develop software systems or programs in various classes in the IS department but there isn't a class that covers the importance of testing or how to go about doing systematic testing when verifying whether a program behaves correctly. This topic is not covered by any other course in the department. The topics covered are relevant to students who are entering the industry workforce in various capacities, like project managers, systems analysis, business analysts etc., as all these types of users are involved in testing software in the industry. The course provides a very important skill to students. It also shapes their understanding of how to write and test software, which can be applied in other courses that they take in the IS department at UMBC.

b) How often is the course likely to be taught?
The course will be offered once a year.

c) How does this course fit into your department's curriculum?
The course covers several programming concepts as it pertains to software testing and so will be used to satisfy the 3rd programming course requirement in the IS major.

d) What primary student population will the course serve?
The primary population it will serve is IS undergraduate students.

e) Why is the course offered at the level (ie. 100, 200, 300, or 400 level) chosen?
The course is offered at the 400 level because the course requires a basic understanding of how to develop software which they learn from the first two programming course sequence (IS147 and IS247) in the department. It has concepts and critical thinking aspects that lend to a 400 level course.

f) Explain the appropriateness of the recommended course preparation(s) and prerequisite(s).
The course expects students to come in with programming knowledge that they would get in IS247, the second course in our programming sequence. The course tackles the next stage after software is developed and also places an emphasis on automated testing, for which programming skill is required. Also, all of the upper-level 3rd programming courses in the department have IS247 as a pre-requisite.

g) Explain the reasoning behind the P/F or regular grading method.
The course will include assignments and exams with corresponding grading criteria. Therefore, this will be a regular graded course.

h) Provide a justification for the repeatability of the course.
N/A

ATTACH COURSE SYLLABUS (mandatory):

Information Systems Department

University of Maryland Baltimore County

Baltimore Maryland 21250

Departmental Office: Room ITE 404 ph. 410-455-3206

IS 498/740 Fundamentals of Software Testing
Spring 2020
Syllabus

Professor: Dr. Sreedevi Sampath
Professor Office hours: Tuesday and Thursday 4 to 5pm
Professor Office: ITE 403
Email: sampath@umbc.edu
Phone: 410-455-8845 (preferred method of contact is by email)

Class time: Tuesday and Thursday, 02.30 to 03.45pm
Class location: ITE 468

Teaching Assistant: Mr. Dae-young Leroy Kim
TA Office hours: Wednesdays 2 to 4pm

TA Office: ITE 448
TA email: leroy.kim@umbc.edu

Course Description

This course will examine the fundamentals of software testing by looking at the main phases in the software testing process, and the different types of software testing methods that are available. Problems that arise from testing different types of software, such as object-oriented, distributed, Graphical User Interfaces, cloud and web software will be discussed, and the relevant program analysis techniques will be studied. Topics include, but are not limited to, a general overview of the software testing process, approaches to automatic test case generation, test oracles, coverage analysis to decide when to stop testing, test prioritization, mutation testing, regression testing, and automated software testing tools.

Course Objectives

At the end of the semester, a student completing the course should have:

- solid knowledge of the fundamentals and the state of the art in software testing
- hands-on experience with using existing software testing tools
- keen awareness of the open problems in software testing and maintenance
- improved skills in reviewing research papers critically

Required Textbook

Introduction to software testing, Second edition. Authors: Paul Ammann and Jeff Offutt. Cambridge university press. ISBN: 978-1-107-17201-2.

Pre-requisites

You must have completed IS247 with C or better for the IS498 section of the course.

Instructional Methods

In-class lectures, discussion and programming labs

Blackboard site

A Blackboard site will be maintained for the course throughout the semester. It can be accessed through myUMBC or at

http://blackboard.umbc.edu

The page will contain all project deliverable descriptions, lecture slides, solutions to exams, grades and all announcements pertinent to the course. **Each student is responsible for checking the web page regularly, and for being aware of any information posted there.**

Grading

The University's Undergraduate Catalog states that, "A, indicates superior achievement; B, good performance; C, adequate performance; D, minimal performance; F, failure". There is specifically no mention of any numerical scores associated with these letter grades. Consequently, there are no pre-defined numerical boundaries that determine final letter grades. These boundaries can only be defined at the end of the semester after all scores have been earned. At that point, numerical boundaries for final letter grades can be defined (usually using a "curve") such that they conform to the University's and Information System Department's official guidelines. **This means that it is not appropriate to assume that a given numerical score corresponds to a particular letter grade**. Historical data suggests an "A" may be in the 90-100 range, a "B" may be from 80-89 and "C" grades range from 70-79.

It is also important to understand that final letter grades reflect academic achievement and not effort.

While I am more than happy to correct mistakes in the computation of grades and grade recording errors, in all other situations final letter grades are not negotiable.

A student's final course grade will be based on scores received on the homework assignments, project, exams, quizzes and class participation, as follows:

- **(26%) Homework assignments:** There will be several homework assignments given out throughout the semester (see schedule for updated due dates). Homework assignments are to be done **individually** by the student. All assignments will be made available on Blackboard and all students must submit via Blackboard. The assignments are **due at the beginning of class** on the day they are due. The **homework submission link on Blackboard will expire on the due date once the time they are due has passed**. Email submissions will not be accepted. Further details on the assignment submission process will be made available on the assignment sheet. **For graduate students, this portion will count to 21% of their final grade.**

- **(15%) In-class exercises**: There will be several in-class exercises throughout the semester that are given to reinforce the concepts taught in class. Each exercise will involve the application of some software testing technique or principle. Exercises could be cumulative. Each student's lowest exercise grade will be dropped from calculating the final grade for the semester. **For graduate students, this portion will count to 10% of their final grade.**

- **(10%) Research paper: This only applies to graduate students enrolled in IS740.** Graduate students will work on a semester-long research paper in groups of 2 on a software testing topic. Further details on the expected content of the research paper will be supplied separately. Due dates are given in the schedule.

- **(10%) Quizzes:** There will be **several** in-class quizzes throughout the semester. **Quizzes will be in-class, closed-book and unannounced**. Each quiz will be

given at the beginning of the class session, and the topic of the quiz will be limited to what was covered in the assigned reading for that day. The objective of the quizzes is to motivate students to attend class, arrive on time, be prepared for class, and keep up with the assigned reading. Each student's lowest exercise grade will be dropped from calculating the final grade for the semester.

- **(2 * 22% = 44%) Exams:** There will be two exams in this course. Please check the course schedule for the dates. **Exams are not cumulative**.

  In general, **make up exams will not be given**. If you know that you will have to miss an exam in advance, talk to me about it. If I am given sufficient notice, and if I agree that your absence cannot be avoided, then I can arrange a makeup exam. If you miss an exam due to an unforeseen emergency, then we can arrange a makeup exam if I agree that your absence was due to a bona fide emergency and you can document that emergency to my satisfaction.

- **(5%) Class participation:** This portion of the grade is a subjective assessment of a student's contribution to class discussions and exercises, **participation in class lab exercises**, punctuality, willingness to seek help from classmates and from me, and ability to conduct himself/herself appropriately.

  Activities that will push your class participation grade up
  - Coming prepared to class with readings
  - Participating actively and working on class lab exercises
  - Contributing intellectually to class discussions
  - Participating actively in discussions
  - Demonstrating good understanding of topics in readings by asking insightful questions
  - Treating other students' questions/comments with respect and responding to their questions respectfully and concisely when applicable

  Activities that will push your class participation grade down
  - Not prepared with readings for class
  - Not working on class lab exercises
  - Not participating actively in discussions—have to be repeatedly called upon by instructor to evoke participation
  - Leaving the class abruptly in the middle without letting the instructor know in advance
  - Excessive use of social networking websites, instant messaging, browsing the web, reading material for other courses, working on homework assignments from this course or other courses during class
  - Tardiness
  - Being rude to instructor and other students' questions/comments

Course Policies

Attendance and class participation

Students are strongly encouraged to ask questions and participate in class activities. While attendance is not required, you are strongly encouraged to attend. If you miss a class, you are responsible for getting the relevant notes and handouts to help you prepare for the quizzes and exams. Please come to class on time. Tardiness will affect your class participation grade. There will be in-class discussions and material covered in lectures that will not be available on the textbook and on the Web page. You will be responsible for that material in the quizzes and the exams. You are therefore strongly encouraged to attend all lectures.

Readings

The readings posted on the syllabus are assigned to students as reading materials. **Students are expected to read the readings posted on the syllabus for a particular class day before the class meeting.**

Missing quizzes

If you miss a quiz, you can make it up with a 50% penalty. That is, you will only get credit for half of whatever score you get on the quiz. The quiz must be made up as soon as possible after the class on which it was originally given, ideally the same day or at the latest before the next class. If too much time (more than 1 week) passes after the quiz was given in class before you request a make-up, I will not allow you to take the make-up and you will get a 0 for the quiz. If you arrive late to class, and a quiz is already in progress when you arrive, you can begin the quiz when you arrive, but must turn it in at the same time as the rest of the class, or you can make it up after class for a 50% penalty, your choice.

Missing in-class exercises

Because of the nature of the in-class exercises, completing them outside of class is more difficult. Sometimes the exercises are group-based and if you miss the class, you will not be able to meaningfully complete the exercise individually. Generally, exercises will be due at the beginning of the following class period (because it's not always possible to complete them before the end of a class), and this is true for all students, whether they were in class for the exercise or not. Students absent from class will be responsible for downloading the relevant materials from Blackboard, figuring out how to complete the exercise on their own, and submitting it before the next class. This is more difficult than just coming to class and getting it done.

Late policy on assignments

The due dates are to be taken seriously and you should not expect them to be extended. However, there might be various circumstances because of which you may not be able to submit an assignment on time. Late assignments will always be penalized as it is not fair to the other students who sacrificed their sleep and spent time to submit the assignment on time. I also believe that a late assignment is better than no assignment.

With this in mind, the following late policy will be implemented in this course: **Late assignments will be penalized 10% off the total possible points if turned in within the first 24-hour period after the specified due date and time, and 5% per 24-hour period (or fraction of a day, including weekends) after that time, up to three days after the due date. Late assignments will be accepted with penalty up to three days after the due date.** Assignments submitted at any later time will not be accepted. It is up to you to determine the version of your assignment to be graded. You must weigh the late penalty against the completeness of your assignment.

When turning in an assignment late, you should email the homework material to me. Your homework submission time will be determined by the time stamp on the email with your homework material received by me. This is the only situation in which homework submissions will be accepted by email.

Re-grading Policy

If you are dissatisfied with a grade on an assignment/exam you should consult me directly **within one week of the day the graded assignment is returned to you**. No re-grade requests will be considered after this week period for both homework assignments and exams.

Cell Phones, Beepers, and Other Devices

All cell phones and beepers must be turned off during class ("vibrate" mode is okay). If you must make a call, please leave the classroom. If you disrupt the class you will be asked to leave the classroom. An occasional email check is unavoidable and I understand this, but make sure you avoid browsing the web, instant messaging, using Facebook and other social networking websites, and excessive email checking while in class. I will know when you are engaged in these activities, and if I find your behavior disrupting, I will ask you to leave the classroom.

Getting Help: Questions and Concerns

Email is the BEST way to get in touch with me. I will try to answer your email as soon as possible. When I send out emails to the class on the class list, make sure you are receiving them. You are encouraged to use your UMBC e-mail account for all e-mail correspondence.

You are strongly encouraged to make use of my office hours (listed above) to go over any issues you are having with the course or the course material. In addition to the listed office hours, I am also available by appointment, which means that you should email me before stopping by my office to make sure that I will be in.

Inclement weather policy

In case of inclement weather, check the main UMBC Webpage (http://www.umbc.edu) to see whether UMBC is closed and classes are canceled. In the event of such cancellation on an exam day, I will reschedule the exam and announce the same to the students. If there is a deliverable due on that day, there will be no extension for the deliverable. You should still submit the softcopy of your deliverable on time. If the assignment has a hard

copy deliverable, the due date for the hardcopy of your deliverable will automatically be before start of class on the day of the next class.

Student Disability Services (SDS)

UMBC is committed to eliminating discriminatory obstacles that may disadvantage students based on disability. Services for students with disabilities are provided for all students qualified under the Americans with Disabilities Act of 1990, the ADAA of 2009, and Section 504 of the Rehabilitation Act who request and are eligible for accommodations. The Office of Student Disability Services (SDS) is the UMBC department designated to coordinate accommodations that would allow for students to have equal access and inclusion in their courses.

If you have a documented disability and need to request academic accommodations, please refer to the SDS website at sds.umbc.edu for registration information or visit the SDS office in the Math/Psychology Building, Room 212. For questions or concerns, you may contact us at disAbility@umbc.edu or (410) 455-2459. If you require accommodations for this class, make an appointment to meet with me to discuss your SDS-approved accommodations.

Academic Integrity

By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabricating, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to suspension, or dismissal. To read the full Student Academic Conduct Policy, consult the UMBC Student Handbook, the Faculty Handbook, or the UMBC Policies section of the UMBC Directory.

In particular, for this course the following are examples of academic misconduct that will not be tolerated:

- Cheating: Using or attempting to use unauthorized material, information, study aids, or another person's work in any academic exercise.
- Fabrication: Falsification or invention of any information or citation in an academic exercise.
- Facilitating academic misconduct: Helping or attempting to help another student commit an act of academic misconduct.
- Plagiarism: Knowingly, or by carelessness or negligence, representing as one's own, in any academic exercise, the intellectual or creative work of someone else.
- Dishonesty: Lack of truthfulness or sincerity when interacting with the faculty member regarding an academic exercise

Academic dishonesty also includes interfering with another student's work or aiding another student to commit academic dishonesty.

The following are the academic integrity rules I expect you to abide by in my class.

Rule 1: You must indicate on your submission any assistance you received. If you make use of such assistance without giving proper credit, you may be guilty of plagiarism.
Rule 2: You must not share actual program code with other students.
Rule 3: You must not look at solution sets or program code from other years, nor should you make your own solutions publicly available even after the due date.
Rule 4: You must be prepared to explain any program code you submit.
Rule 5: You must not modify other's code or artifacts and submit as your own. Modifying code or other artifacts does not make it your own.

(Source for rules from University of Washington Computer Science and Engineering department)

Disclosures of Sexual Misconduct and Child Abuse or Neglect

Any student who has experienced sexual harassment or assault, relationship violence, and/or stalking is encouraged to seek support and resources. There are a number of resources available to you.

With that said, as an instructor, I am considered a Responsible Employee, per UMBC'S interim Policy on Prohibited Sexual Misconduct, Interpersonal Violence, and Other Related Misconduct. This means that while I am here to listen and support you, I am required to report disclosures of sexual assault, domestic violence, relationship violence, stalking, and/or gender—based harassment to the University's Title IX Coordinator. The purpose of these requirements is for the University to inform you of options, supports, and resources.

You can utilize support and resources even if you do not want to take any further action. You will not be forced to file a police report, but please be aware, depending on the nature of the offense, the University may take action.

If you need to speak with someone in confidence about an incident, UMBC has the following Confidential Resources available to support you:

The Counseling Center: 410-455-2742 (M-F 8:30-5)
University Health Services: 410-455-2542 (M-F 8:30—5)
For after-hours emergency consultation, call the police at 410-455-5555

Other on-campus supports and resources (quasi-confidential resources):
The Women's Center (available to students of all genders): 410-455-2714 (M-Th 9:306, F 9:30-4)
Title IX Coordinator: 410-455-1606 (9-5)

Child Abuse and Neglect
Please note that Maryland law requires that I report all disclosures or suspicions of child abuse or neglect to the Department of Social Service and/or the police.

Tentative Schedule (subject to change)

A Google doc will be maintained for the class with up-to-date due dates. Check the Blackboard course website for the link to the course calendar. It is a tentative schedule of lecture topics, exams, and deliverable due dates. I reserve the right to adjust this schedule for any reason, but I will make every effort to advise you of any changes well in advance. **It is the student's responsibility to check the schedule regularly and be aware of changes.**

Link to schedule (Do NOT try to click on the link. Copy and paste the link in browser. You must be logged in to myUMBC to view schedule. You can also access the link from Blackboard course website):
https://docs.google.com/spreadsheets/d/1s2HLWdasbDJwRqpT-qAi7Y8Fs84zui1A5k06E63CojA/edit?usp=sharing

The topics and chapters that will be covered are:
Model-driven test design
Automated testing (JUnit, Selenium, others)
Test-driven design
Black-box testing criteria
White-box testing criteria
Combinatorial testing
Mutation testing
Regression testing
Web testing
Testing in Continuous Integration/Continuous Development (CI/CD) environment