

THE UNIVERSITY OF
WESTERN ONTARIO
DEPARTMENT OF
COMPUTER SCIENCE

CS4472A Software Specification, Testing and Quality Assurance

Course Outline --- Fall 2019

1. General Course Information

Course Information

Course Number and Title: CS4472A – Software Specification, Testing and Quality Assurance

Lectures: Thursday 19:00 – 22:00 MC-105B

Instructor's Office Hours:

Kostas Kontogiannis Office Hours: Thursday 15:00 – 18:00 MC 375

TAs Office Hours:

Konstantinos Tsiounis Office Hours: TBA

Prerequisite Requirements

- Prerequisite(s): Computer Science 3307A/B/Y
- Students are assumed to be familiar with the Java programming language

Note: Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

Our classes will combine instruction on current technologies, and software engineering methods with collaborative note development and discussion of course topics.

Copies of lecture notes will be available on the course web site. They are not a substitute for attending lectures.

2. Instructor's Information

Prof. Kostas Kontogiannis, P.Eng.

Email: kostas@csd.uwo.ca

Office MC-375

Tel. (ext. 84244)

Students must use their Western (@uwo.ca) email addresses when contacting their instructors.

Course discussion through the course's OWL Forum

Please do not send emails to the personal accounts of the instructor or the TAs unless it is an absolutely urgent or personal matter.

3. Course Description/Syllabus

One of the most important phases of the software life-cycle is Testing. Software Testing does not occur in a vacuum. It aims to ensure that the system meets its functional and non-functional requirements. In this respect, it is driven by the system's specifications. Software Testing is applied at various levels. In the most granular level, Software Testing aims to verify that individual units (i.e. a class or a method) work properly. This is referred to as Unit Testing. Once individual units work, then the next level is to verify that the units work properly together. This is referred to as Integration Testing. Once all units work together, the system has to be tested that works properly end-to-end, and its does not enter an illegal or non-specified state. This is referred to as Functional Testing. In addition to these testing levels, there are testing approaches that are based on models (i.e. model-driven testing), and approaches that relate to object-oriented systems (Object-Oriented testing). But Software Testing is only one part of Quality Assurance. Assuming that testing is conducted properly, we have to evaluate the overall reliability of the software system, and measure some key metrics as to estimate within a certain degree of confidence, the quality level of the end system.

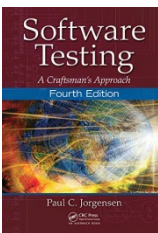
In this course, we will examine some key UML2 specification elements, namely sequence diagrams and state (activity) diagrams, and then we will discuss techniques for Unit, Integration, and Functional Testing. In the course we will use the JUnit5 framework for hands-on training on Software Testing. In this course, we will also discuss reliability growth models, and software metrics that predict quality, effort, and cost.

The following list of topics may be covered, depending on time and the dynamics of the semester.

Basic principles of software testing	Life-Cycle based testing
UML2 sequence and activity diagrams	Object-Oriented testing
Unit testing	Software metrics
Integration testing	Software reliability growth models
Functional and acceptance testing	Effort and cost estimation
JUnit	Software technical reviews
Model-driven testing	Build test automation

4. Course Materials

The textbook is titled *Beginning Software Engineering*, by Rob Stephens



Software Testing: A Craftsman's Approach, Fourth Edition Hardcover – Oct 18 2013
by Paul C. Jorgensen (Author)
ISBN-10: 1466560681

We will be using OWL to host the course content. *Eclipse* will be used for software development, *JUnit5* as a software testing framework, *Slack* will be used for group collaboration, and *BitBucket* for source code version control.

Students should check the course's OWL (<http://owl.uwo.ca>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

Students are responsible for checking OWL on a regular basis. Most announcements and material related updates will trigger e-mail notifications

5. Methods of Evaluation

Individual

-- Midterm (Thursday October 31, 2019)	25% Scheduled by the instructor
-- Final Exam (date TBD)	35% Scheduled by the Registrar

Team Assignments

-- Unit Testing 1	10%	(Sept. 30)
-- Unit Testing 2	10%	(Oct. 21)
-- Integration and Functional Testing	10%	(Nov. 15)
-- Reliability and Effort Estimation	10%	(Dec. 2)

All deliverables are due by 23:59:59 on their specified due dates. Due dates are subject to change.

The Midterm will be a multiple choice exam covering the material up to the previous week the exam is held. We expect that we will have covered by that time Chapters 1-8 from the textbook plus Sequence and Activity Diagrams of UML. Other details of the material to be covered in the Midterm will also be announced in the class. The final exam will be scheduled by the Registrar's office, and it will be posted on the Web and announced in the class. The final exam will cover the whole material of the class (Week-1 to Week-12). The textbook and the lecture notes will be a valuable part of the material covered in the course. The attendance and study of the material and the active participation in conducting the assignments are the best strategies for succeeding in this course.

Make up dates for the Midterm will be November 12 and 13. Make up dates for the final exam will be announced. Please note that there must be a valid documented reason for missing the Midterm or the final exam, according to the policies outlined below in this document (see Absences section).

If, for any reason, the schedule given above cannot be adhered to, the marks will be prorated proportionally to the remaining components.

Each student will receive a mark for the project, which makes up 40% of their final grade in the course.

- Normally, the individual's combined project mark will be computed directly from the team marks for the team tasks. However, the instructors reserve the right to adjust an individual's mark – raising or lowering it – based on project participation, project presentation, meeting minutes, and the TAs' or instructor's knowledge of a student's attendance and participation in the course and/or mastery of the course material.
- Students are expected to complete a reasonable, fair, and equitable portion of their team project. Failing to do so may result in a significant deduction of the final mark allocated to the project at the discretion of the instructor.
- It is the student's responsibility to ensure that he/she is working to a satisfactory level. A student should consult with his/her TA or instructor if concerns or questions arise.

Exams

- There will be a midterm exam in this course.
- A 3-hour, closed-book final exam will be held at the end of the course, during the final exam period. No programmable calculators or other storage enabled device is permitted.

- Each student must achieve a grade of at least 45% on the final exam in order to be given a passing grade in the course.
- Students must bring their UWO identification to the exam.
- The exams are scheduled by the Office of the Registrar during the final exam period. Details will be provided when they are available. Students are advised not to make travel plans until they have consulted the final exam schedule.
- As an important note, computer---marked multiple---choice exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

Conduct

We will be working with several class-wide collaborative tools. The teaching staff reserve the right to deduct marks from the students course grade based on misuse or inappropriate conduct. The tools and the forums are for collaboration only. Personal or judgmental statements targeting individuals will not be acceptable. It is your responsibility to protect any private information of yours in these collaborative environments.

Team Project

- Students are required to work cooperatively in teams to design and implement their project.
- The instructors will decide on the composition of the teams. The instructors' decisions are final. The instructors will attempt to make sure that each team has 3 members.
- Students are required to keep in contact and collaborate closely with their teammates.
- The project must run on the specified environment for acceptance testing, but team members can develop it on their own systems. It must be programmed in the Java programming language.
- No late submissions will be accepted for project deliverables.

Meetings and Minutes

- During the course of the project, teams are required to have weekly meetings to discuss progress and plan for the future.
- Each team is required to write minutes of each meeting, listing the attendance, what the topics of discussion in the meeting were, any decisions that were made, and which team members were assigned which tasks. These minutes must be submitted via BitBucket.

6. Accommodation and Accessibility

Note that if documentation (medical or otherwise) is required, it can only be collected by the student's Dean's Office/Academic Counselling unit.

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or supporting documentation to the Academic Counselling Office of your home faculty as soon as possible. If you are a Science student, the Academic Counselling Office of the Faculty of Science is located in WSC 140, and can be contacted at scibmsac@uwo.ca.

For further information, please consult the university's medical illness policy at http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

Note that approval of accommodation for any course component worth 10% or more can *only* be made by the student's Dean's Office/Academic Counselling unit.

If you miss the Final Exam, please contact your faculty's Academic Counselling Office as soon as you are able to do so. They will assess your eligibility to write the Special Exam (the name given by the university to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

7. Academic Policies

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy, <http://www.uwo.ca/its/identity/activatenonstudent.html>, the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at this website: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Absences

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to your Dean's office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with his or her instructor once the accommodation has been approved and the instructor has been informed. In the event of a missed final exam, a Recommendation of Special Examination form must be obtained from the Dean's Office immediately. For further information please see the following document: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf

A student requiring academic accommodation due to illness should use the Student Medical Certificate when visiting an off-campus medical facility or request a Records Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found at the following address: https://registrar.uwo.ca/services/release_of_information.html

The link to the policy on academic consideration for student absences can be found at https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf

If according to the aforementioned policy the absentee student is required to fill a Student Medical Certificate form, this can be found at <https://www.eng.uwo.ca/files/undergraduate/student-medical-certificate.pdf>

Email Contact

We occasionally need to send email messages to the class or to students individually. Email is sent to your UWO email address as assigned to you by ITS (Information Technology Services). It is your responsibility to read this email frequently and regularly. You may wish to have this email forwarded to an alternative email address. See the ITS web site for directions on forwarding email.

You should note that email at ITS and other email providers may have quotas or limits on the amount of space they dedicate to each account. Unchecked email may accumulate beyond those limits and you may be unable to retrieve important messages from your instructors.

Email contact to the instructor and/or teaching assistants is discouraged; instead, you should ask your questions by posting them on the forum section at OWL's course site. Email containing questions about course material and/or assignments will not be answered. However, if you have a special situation that you need to discuss with the teaching staff, please feel free to email from your UWO account the instructor.

Accessibility Statement

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661---2111 x82147 for any specific question regarding an accommodation.

Tutoring

The role of tutoring is to help students understand course material. Tutors should not write part or all of an assignment for the students who hire them. Having employed the same tutor as another student is not a legitimate defense against an accusation of collusion, should two students hand in assignments judged similar beyond the possibility of coincidence.

Ethical Conduct

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a scholastic offence, at the following address: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

All assignments must be completed individually or in groups, as specified. You can discuss approaches to problems with other students; however, the work handed in must be or include (in the case of group projects) your individual effort.

Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a serious and major academic offence (see Scholastic Offence Policy in the Western Academic Calendar). Assignments that are judged to be the result of academic dishonesty will, for the student's first offence, be given a mark of zero with an additional penalty equal to the weight of the assignment. Students are responsible for reading and respecting the Computer Science Department's policy on Scholastic Offences and Rules of Ethical Conduct.

The University of Western Ontario uses software for plagiarism checking. Students will be required to submit their programs in electronic form for plagiarism checking.

8. Support Services

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 ext. 82147 if you have questions regarding accommodation. Please visit http://sdc.uwo.ca/ssd/documentation_requirements.html for more information.

The policy on Accommodation for Religious Holidays can be found here:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

For your reference, here are the web sites for Registrarial Services

(<http://www.registrar.uwo.ca>), Student Support Services provided by Student Services

(<http://student.uwo.ca>).

Students who are in emotional/mental distress should refer to Mental Health@Western for a complete list of options about how to obtain help. Information for support can be found at https://www.uwo.ca/health/mental_wellbeing/

Finally, the University Students' Council provides a number of services and support.

Information can be found at <https://westernusc.ca/your-services/>

9. Acknowledgment of the Science Student Donation Fund

This course is supported by the Science Student Donation Fund. If you are a BSc or BMSc student registered in the Faculty of Science or Schulich School of Medicine and Dentistry, you pay the Science Student Donation Fee. This fee contributes to the Science Student Donation Fund, which is administered by the Science Students' Council (SSC). One or more grants from the Fund have allowed for the purchase of equipment integral to teaching this course. You may opt out of the Fee by the end of September of each academic year by completing the online form linked from the Faculty of Science's Academic Counselling site. For further information on the process of awarding grants from the Fund or how these grants have benefitted undergraduate education in this course, consult the Chair of the Department or email the Science Students' Council at ssc@uwo.ca.