SENG426: Software Quality Engineering

Course Dates

CRN(s):	Section A01 CRN: 30776
	Section A02 CRN: 30777
Term:	Summer 2022
Course Start:	2022-05-04
Course End:	2022-08-17
Withdrawal with 100% reduction of tuition fees:	2022-05-16
Withdrawal with 50% reduction of tuition fees:	2022-06-05
Last day for withdrawal (no fees returned):	2022-06-29

Scheduled Meeting Times (M=Mon, T=Tue, W=Wed, R=Thu, F=Fri)

Section:	Location:	Classes Start:	Classes End:	Days of week:	Hours of day:	Instructor:
A01	ECS 125	2022-05-04	2022-07-29	MR	10:00-11:20	Issa Traore
A02	ECS 125	2022-05-04	2022-07-29	MR	10:00-11:20	Issa Traore
B01	ELW B238	2022-05-09	2022-07-29	T	16:30-18:20	
B02	ELW B238	2022-05-09	2022-07-29	W	09:30-11:20	

Instructor(s)

Name: **Issa Traore**
Office: EOW 415
Phone: (250) 721-8697
Email: itraore at ece dot uvic dot ca

Office Hours:		Comments
Mon	12:00pm-01:00pm	Zoom Links for Online lectures and Office hours are available on Brightspace.
Thu	12:00pm-01:00pm	

TA Information

1. Ms. Hadeer Saad Ahmed, hadeer dot sma at gmail dot com
2. Mr. Sanjay Dutt, sanjaydutt dot india at yahoo dot com

Course Objectives

- Introduce fundamental notions of software quality and the techniques used to build and check quality in software systems.
- Introduce the notion of enterprise computing and industrial software, and their quality constraints
- Quantitative assessment of software quality through quality attributes and metrics
- Advanced quality control techniques through in-depth coverage of critical software attributes, including functional testing, reliability testing, security testing, and performance testing
- Apply the principles of modern software engineering practices, such as DevOps and Site Reliability Engineering (SRE)

Learning Outcomes

Learning Outcomes

By the end of this course, students should have a good grasp of:

- software quality metrics and models
- functional software testing techniques
- software reliability analysis models and techniques
- software performance testing techniques
- software security testing techniques
- DevOps and SRE practices, with an emphasis on automation, continuous delivery and deployment

Syllabus

Syllabus details

The following syllabus is subject to the time available and may change during the term. Some of the topics may not be covered.

Chapter 1. Introduction to Software Quality Engineering
Discuss the characteristics of industrial and mission-critical software systems. Define the notion of software quality, and emphasize the importance of building quality software systems. Give an overview of quality attributes and related quality control techniques.

Chapter 2: DevOps Practice
Discussion of the limits of the traditional approach to service management. Definition and rationale for DevOps. Overview of practice and tools for DevOps. Core tenets and practices of DevOps.

Chapter 3. Automated Acceptance Testing
Discuss DevOPs deployment pipeline and test stages. Introduce user stories, user acceptance testing (UAT) based on user stories, and acceptance test automation process and tools. Present common functional test case generation strategies.

Chapter 4: Software Quality Metrics
Presentation of quality management models. Use of quality models and data for in-process quality management and to guide software testing. Service level definition and measurement. Availability metrics.

Chapter 5. Software Performance Testing
Present software performance criteria and metrics. Performance test planning and targets. Software performance testing process, approach, and tools.

Chapter 6. Software Security Bugs
Review of top software security weaknesses and vulnerabilities through concrete examples. Understanding and use of software security defect repositories: common weakness enumeration (CWE) and common vulnerability enumeration (CVE).

Chapter 7. Software Security Testing
Notions and practice of threat modeling. Notions of security verification. Security code review. Software security testing processes, methods and tools.

Chapter 8: Software Reliability Engineering
Notions of software reliability and reliability growth. Overview of software reliability growth models (SGRM). Software Reliability modeling and metrics. Application of reliability & availability concepts and models in the context of large scale enterprise software systems. Present Reliability block diagrams; concurrent systems (series/parallel) reliability.

Chapter 9: Software Quality Standards and Maturity
Present established standards for software quality measurement (e.g. ISO 25010) and quality process improvement and maturity.

Textbooks

Required Text	Optional Text	
Title: Course pack (available on Brightspace)	Title:	
Author:	Author:	
Publisher/Year:	Publisher/Year:	

Required Text	Optional Text
Reference Materials	
Title: Software Quality Engineering	Title: Software Testing and Quality Assurance
Author: Jeff Tian	Author: Kshirasagar Naik and Priyadarshi Tripathy
Publisher/Year: Wiley, 2005	Publisher/Year: Wiley, 2008
Title: Software Reliability Engineering: More Reliable Software Faster and Cheaper	Title: Foundations of Software and System Performance Engineering: Process, Performance Modeling, Requirements, Testing, Scalability, and Practice
Author: John D. Musa	Author: André B. Bondi
Publisher/Year: McGraw-Hill 199	Publisher/Year: Addison-Wesley, 2014
Title: Secure Programming with Static Analysis	Title: Continuous Delivery: Reliable Software Releases through build, test, and deployment automation
Author: Brian Chess, Jacob West	Author: Jez umble, David farley
Publisher/Year: Addison-Wesley, 2007	Publisher/Year: Addison Wesley Longman

Online Course Delivery

This course will be taught in person, making use primarily of Brightspace.

Labs will be conducted live.

Online office hours will use Zoom. You can also contact me through e-mail for appointments.

Assessment

Assessment Tool	Weight	Date
Mid-term Exam #1	35%	June 23, 2022
Mid-term Exam #2	15%	July 25, 2022
Lab Project	50%	(Part I: 5% - 30-05-2022; Part II: 5% - 13-06-2022; Part III: 14% - 27-06-2022; Part IV: 14% - 18-07-2022; Part V: 12% - 01-08-2022)
Final Exam	%	N/A

Notes

The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar.
https://www.uvic.ca/calendar/archives/202205/undergrad/index.php#/policy/S1AAgoGuV?bc=true&bcCurrent=14%20-%20Grading&bcItemType=policies

There will be no supplemental examination for this course.

General Information

Note to students:
Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Assistant to set up an appointment.

Accommodation of Religious Observance:
https://www.uvic.ca/calendar/archives/202205/undergrad/index.php#/policy/r1q0gofdN

Policy on Inclusivity and Diversity:
Engineering: https://www.uvic.ca/engineering/about/equity/index.php
Academic Calendar: https://www.uvic.ca/calendar/archives/202205/undergrad/index.php#/policy/HkQ0pzdAN

Standards of Professional Behaviour:
You are advised to read the Faculty of Engineering document Standards for Professional Behaviour, which contains important information regarding conduct in courses, labs, and in the general use of facilities.
https://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf

Academic Integrity
Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the entry in the current Undergraduate Calendar for the UVic policy on academic integrity.
https://www.uvic.ca/calendar/archives/202205/undergrad/index.php#/policy/Sk_0xsM_V

Equality:
This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum, and to meet the syllabus requirements. Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging an appropriate accommodation. Alternatively, you may want to contact the Centre for Accessible Learning located in the Campus Services Building.
https://www.uvic.ca/services/cal/. The University of Victoria is committed to promoting, providing, and protecting a positive, supportive, and safe learning and working environment for all its members.

Course Lecture Notes:
Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.

Sexualized Violence Prevention and Response at UVic:
UVic takes sexualized violence seriously, and has raised the bar for what is considered acceptable behaviour. We encourage students to learn more about how the university defines sexualized violence and its overall approach by visiting www.uvic.ca/svp. If you or someone you know has been impacted by sexualized violence and needs information, advice, and/or support please contact the sexualized violence resource office in Equity and Human Rights (EQHR). Whether or not you have been directly impacted, if you want to take part in the important prevention work taking place on campus, you can also reach out:
Where: Sexualized violence resource office in EQHR; Sedgewick C119
Phone: 250.721.8021
Email: svpcoordinator@uvic.ca
Web: www.uvic.ca/svp

Office of the Ombudsperson:
The Office of the Ombudsperson is an independent and impartial resource to assist with the fair resolution of student issues. A confidential consultation can help you understand your rights and responsibilities. The Ombudsperson can also clarify information, help navigate procedures, assist with problem-solving, facilitate communication, provide feedback on an appeal, investigate and make recommendations. Phone: 250-721-8357; Email: ombuddy@uvic.ca; Web:
https://uvicombudsperson.ca/

Grading System

The University of Victoria follows a percentage grading system in which the instructor will submit grades in percentages. The University will use the following Senate approved standardized grading scale to assign letter grades. Both the percentage mark and the letter grade will be recorded on the academic record and transcripts.

F	D	C	C+	B-	B	B+	A-	A	A+
0-49	50-59	60-64	65-69	70-72	73-76	77-79	80-84	85-89	90-100

Grades	Description
A+, A, A-	**Exceptional**, **outstanding** or **excellent** performance. Normally achieved by a minority of students. These grades indicate a student who is *self-initiating*, *exceeds expectation* and has an *insightful* grasp of the subject matter.

Grades	Description
B+, B, B-	**Very good**, **good** or **solid** performance. Normally achieved by the largest number of students. These grades indicate a *good* grasp of the subject matter or *excellent grasp in one area balanced with satisfactory grasp in the other areas*.
C+, C	**Satisfactory**, or **minimally satisfactory**. These grades indicate a *satisfactory performance and knowledge* of the subject matter.
D	**Marginal Performance**. A student receiving this grade demonstrated a *superficial grasp* of the subject matter.
F	**Unsatisfactory performance**. Wrote final examination and completed course requirements; no supplemental.

Posting of Grades

Typically marks for assignments, examinations, and provisional final grades, are made available through a Learning Management System (LMS) like Brightspace, where each student will be able to view only their own grades. Sometimes numerical marks/grades may be posted publicly to the entire class. In that case, full student numbers or names will not be included with the posted information.

Course Experience Survey (CES)

I value your feedback on this course. Towards the end of term you will have the opportunity to complete a confidential course experience survey (CES) regarding your learning experience. The survey is vital to providing feedback to me regarding the course and my teaching, as well as to help the department improve the overall program for students in the future. When it is time for you to complete the survey, you will receive an email inviting you to do so. If you do not receive an email invitation, you can go directly to the CES site

You will need to use your UVic NetLink ID to access the survey, which can be done on your laptop, tablet or mobile device. I will remind you closer to the time, but please be thinking about this important activity, especially the following three questions, during the course.

- What strengths did your instructor demonstrate that helped you learn in this course?
- Please provide specific suggestions as to how the instructor could have helped you learn more effectively.
- Please provide specific suggestions as to how this course could be improved.

Csc Student Groups

The Computer Science Course Union (https://onlineacademiccommunity.uvic.ca/cscu/) serves all students who are either in a computer science program or taking a class in computer science. Please sign yourself up on their mailing list if you would like to be informed about their social events and services.

The Engineering Students' Society (ESS) serves all students registered in an Engineering degree program, including Software Engineering (BSEng). For information on ESS activities, events and services navigate to http://www.engr.uvic.ca/~ess .

Course Policies And Guidelines

Late Assignments: No late assignments will be accepted unless prior arrangements have been made with the instructor **at least 48 hours before** the assignment due date.
Coursework Mark Appeals: All marks must be appealed **within 7 days** of the mark being posted.
Attendance: We expect students attend all lectures and labs. It is entirely the students' responsibility to recover any information or announcements presented in lectures from which they were absent.
Electronic devices in labs and lectures: No unauthorized *audio* or *video* recording of lectures is permitted.
Electronic devices in midterms and exams: Calculators are only permitted for examinations and tests if explicitly authorized and the type of calculator permitted may be restricted. No other electronic devices (e.g. cell phones, pagers, PDA, etc.) may be used during examinations or tests *unless explicitly authorized*.
Plagiarism: Submitted work may be checked using plagiarism detection software. Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the link given below for the UVic policy on academic integrity. Note that the university policy includes the statement that "A largely or fully plagiarized assignment should result in a grade of F for the course."

The Faculty of Engineering and Computer Science Standards for Professional Behaviour are at
https://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf
U.Vic guidelines and policy concerning fraud and academic integrity are at
http://web.uvic.ca/calendar/undergrad/info/regulations/academic-integrity.html

U. Vic Privacy Policy: If any student has concerns about their private information being stored or accessed outside of Canada, they are required to inform the course instructor about their concerns before the end of second week of classes.

Equality

This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum and to meet the syllabus requirements. Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging for appropriate accommodation. Alternatively, you may want to contact the Centre for Accessible Learning located in the Campus Services Building.

The University of Victoria is committed to promoting, providing, and protecting a positive, and supportive and safe learning and working environment for all its members.

Copyright Statement

All course content and materials are made available by instructors for educational purposes and for the exclusive use of students registered in their class. The material is protected under copyright law, even if not marked with a ©. Any further use or distribution of materials to others requires the written permission of the instructor, except under fair dealing or another exception in the Copyright Act. Violations may result in disciplinary action under the Resolution of Non-Academic Misconduct Allegations policy (AC1300).