Faculty of Engineering

COURSE OUTLINE

SENG 426 – Software Quality Engineering

Term – Spring 2018 (201801)

Instructor

Dr. Issa Traore
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Office Hours

Days: Monday, Thursday
Time: 11:30am-12:30pm
Location: EOW 415

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

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

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. Outline of 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: Introduction to DevOps

Discussion of the limits of the traditional approach to service management. Definition and rationale for DevOps. Overview of practice and tools for DevOps.

Chapter 3: DevOps and Software Telemetry

Core tenets an practices of DevOps. Service level definition and measurement. Availability metrics.

Chapter 4. System Testing Techniques and Metrics

Introduce application system testing and general functional testing strategy. Testing based on extended use case model. Presentation of quality management models; Use of quality models and data for in-process quality management and to guide software testing. Introduction of a number of techniques to quantify, classify and analyze discovered defects.

Chapter 5. Software Performance Testing

Introduction of 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.

A-Section(s): A01 / CRN 30701
A02 / CRN 30702

Days: Monday, Thursday

Time: 10:00-11:20am
Location: DSB C118

B01 Mon 4:30-6:20 pm
B02 Thu 11:30am – 1:20 pm
Location: ELW B220
TA: Mr. Paulo Quinan (quinan@uvic.ca)

Required Text

Title: Course Pack SENG 426
(available Uvic Bookstore)
Author:

Publisher:

Optional Text

Title:

Author:

Publisher:

Year: Year:

References:

1. Software Quality Engineering, Jeff Tian, Wiley, 2005
2. "Software Reliability Engineering: More Reliable Software Faster and Cheaper", John D. Musa, 2nd Edition, McGraw-Hill 1998, ISBN: 0-70-913271-5
3. Secure Programming with Static Analysis, by Brian Chess, Jacob West, Addison-Wesley, 2007
4. Foundations of Software and System Performance Engineering: Process, Performance Modeling, Requirements, Testing, Scalability, and Practice, by André B. Bondi, Addison-Wesley, 2014
5. Testing Object-Oriented Systems: Models, Patterns, and Tools, by Robert V. Binder, ISBN-13: 978-0321700674
6. Software Testing and Quality Assurance, Kshirasagar Naik and Priyadarshi Tripathy, Wiley, 2008
7. **Lectures Notes/Slides: on Course Space**

Assessment:

Attendance/Class participation: 4%
Project: 40% (Part I: 5%; Part II: 10%; Part III: 10%; Part IV: 15%)
Mid-term Exam: 20% Date: July 5, 2018
Final: 36%

Note:

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://web.uvic.ca/calendar2018-05/undergrad/info/regulations/grading.html

Assignment of E grade and supplemental examination for this course will be at the discretion of the Course Instructor. The rules for supplemental examinations can be found in the current Undergraduate Calendar.
https://web.uvic.ca/calendar2018-05/undergrad/info/regulations/exams.html#

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://web.uvic.ca/calendar2018-05/undergrad/info/regulations/religious-observanc.html

Policy on Inclusivity and Diversity:
https://web.uvic.ca/calendar2018-05/general/policies.html

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

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://web.uvic.ca/calendar2018-05/undergrad/info/regulations/academic-integrity.html

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 Resource Centre for Students with a Disability 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.

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.