Course Outline

School:	Eng. Tech. & Applied Science
Department:	Information and Communication Engineering Technology (ICET)
Course Title:	Software Testing and Quality Assurance
Course Code:	COMP 311
Course Hours/Credits:	56
Prerequisites:	COMP 123, COMP 225, COMP 228
Co-requisites:	COMP 228
Eligible for Prior Learning, Assessment and Recognition:	Yes
Originated by:	Ilia Nika
Creation Date:	Fall 2008
Revised by:	Peter Volder, Paula McMIllan
Revision Date:	Winter 2014
Current Semester:	Winter 2017
Approved by:	*ppesikan c/o*

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Chairperson/Dean

Students are expected to review and understand all areas of the course outline.

Retain this course outline for future transfer credit applications. A fee may be charged for additional copies.

This course outline is available in alternative formats upon request.

Course Description

This course explores the goals of quality assurance and quality control activities performed during the life cycle of a software product. It focuses on integrating test processes with agile software development methodologies. Practical exercises give experience of design, specification, execution of tests plus test automation using tools through a mixture of instructor-directed exercises and student research leading to knowledge sharing.

Program Outcomes

Successful completion of this and other courses in the program culminates in the achievement of the Vocational Learning Outcomes (program outcomes) set by the Ministry of Advanced Education and Skills Development in the Program Standard. The VLOs express the learning a student must reliably demonstrate before graduation. To ensure a meaningful learning experience and to better understand how this course and program prepare graduates for success, students are encouraged to review the Program Standard by visiting http://www.tcu.gov.on.ca/pepg/audiences/colleges/progstan/. For apprenticeship-based programs, visit http://www.collegeoftrades.ca/training-standards.

Course Learning Outcomes

The student will reliably demonstrate the ability to:

1. Discuss different meanings of quality. Discuss the benefits quality assurance brings to organizations that produce software products and to users of software products.
2. Explain the difference between Quality Assurance and Quality Control. Describe how each relates to testing.
3. Articulate the principles of the Agile Manifesto and explain how various development methodologies can improve quality of software products.
4. Describe key stages in the testing process and name activities performed at each stage.
5. Classify artifacts involved in the software development life cycle and explain the importance of version control for code files and other types of documents.
6. Select types of tests and reviews (white/black box, static/dynamic, functional/non-functional...) appropriately to evaluate how well a software product meets the quality characteristics as identified by ISO/IEEE standards.
7. Formulate pass-fail criteria from product objectives and apply black-box test-design techniques to design tests to check whether software meets criteria.
8. Explore a variety of test and project management tools. State the goals and dangers of test automation.
9. Compare and contrast CMMI and ISO 9001 in terms of motivation and the process involved.

Essential Employability Skills (EES)

The student will reliably demonstrate the ability to*:

1. Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.
2. Respond to written, spoken, or visual messages in a manner that ensures effective communication.
4. Apply a systematic approach to solve problems.
5. Use a variety of thinking skills to anticipate and solve problems.

6. Locate, select, organize, and document information using appropriate technology and information systems.
7. Analyze, evaluate, and apply relevant information from a variety of sources.
8. Show respect for diverse opinions, values belief systems, and contributions of others.
9. Interact with others in groups or teams in ways that contribute to effective working relationships and the achievement of goals.
10. Manage the use of time and other resources to complete projects.
11. Take responsibility for one's own actions, decisions, and consequences.

There are 11 Essential Employability Skills outcomes as per the Ministry Program Standard. Of these 11 outcomes, the following will be assessed in this course.

Global Citizenship and Equity (GC&E) Outcomes

The student will reliably demonstrate the ability to*:

1. Identify one's roles and responsibilities as a global citizen in personal and professional life.
2. Identify beliefs, values and behaviours that form individual and community identities and the basis for respectful relationships.
6. Support personal and social responsibility initiatives at the local, national or global level.

There are 6 institutional Global Citizenship & Equity outcomes. Of these 6 outcomes, the following will be assessed in this course.

Text and other Instructional/Learning Materials

Text Book(s):

Foundations of Software Testing, Third Edition   (ITSQB Certification)

By: Rex Black, Erik Van Veenendaal, Dorothy Graham

Published by: Cengage, 2012

ISBN: 978-1-4080-44-5-6

Online Resource(s):

Additional readings from handouts, Web sites such as www.sqa.net and online research be assigned or recommended.

Material(s) required for completing this course:

Access to personal computers in lab sessions.

Custom Courseware:

Extensive lecture slides serve as course notes.

Evaluation Scheme

⇨ Test 1: Exam delivered during week 5 of course.

⇨ Test 2: Final exam delivered during the final week of class

⇨ Tools Quiz: Quiz on tools presented by all students as the deliverable of the team research project

⇨ Assignments: Eight assignments completed as course work.

Evaluation Name	CLO(s)	EES Outcome(s)	GCE Outcome(s)	Weight/100
Test 1	1, 2, 3, 4	1, 2	1, 2, 6	25
Test 2	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 2, 4, 5, 6	1, 2, 6	20
Team Research Project and Presentation	8	1, 6, 7, 8, 9, 10, 11		10
Tools Quiz	8	7, 8	1	8
Assignments	4, 6, 7, 8	1, 2, 4, 5, 6, 7, 8, 9	1	37
Total				100%

If students are unable to write a test they should immediately contact their professor or program Chair for advice. In exceptional and well documented circumstances (e.g. unforeseen family problems, serious illness, or death of a close family member), students may be able to write a make-up test.

All submitted work may be reviewed for authenticity and originality utilizing Turnitin®. Students who do not wish to have their work submitted to Turnitin® must, by the end of the second week of class, communicate this in writing to the instructor and make mutually agreeable alternate arrangements.

When writing tests, students must be able to produce official College photo identification or they may be refused the right to take the test or test results will be void.

Student Accommodation

Students with permanent or temporary accommodations who require academic accommodations are encouraged to register with the Centre for Students with Disabilities (CSD) located at Ashtonbee (L1-04), Progress (C1-03), Morningside (Rm 190), and Story Arts Campus (Rm 284). Documentation outlining the functional limitations of a disability is required; however, interim accommodations pending receipt of documentation may be possible. This service is free and confidential. For more information, please email csd@centennialcollege.ca.

Use of Dictionaries

- Any dictionary (hard copy or electronic) may be used in regular class work.
- English-Additional Language (e.g. English-Chinese) or Additional Language-English (e.g. Russian-English) dictionaries may be used in regular class work.
- Dictionaries may be used in tests and examinations, or in portions of tests and examinations, as long as they are non-electronic (not capable of storing information) and hard copy (reviewed by the invigilator to ensure notes are not incorporated that would affect test or examination integrity).

Program or School Policies
N/A

Course Policies
N/A

College Policies

Students should familiarize themselves with all College Policies that cover academic matters and student conduct.

All students and employees have the right to study and work in an environment that is free from discrimination and harassment and promotes respect and equity. Centennial policies ensure all incidents of harassment, discrimination, bullying and violence will be addressed and responded to accordingly.

Academic honesty is integral to the learning process and a necessary ingredient of academic integrity. Academic dishonesty includes cheating, plagiarism, and impersonation. All of these occur when the work of others is presented by a student as their own and/or without citing sources of information. Breaches of academic honesty may result in a failing grade on the assignment/course, suspension or expulsion from the college.

For more information on these and other policies, please visit www.centennialcollege.ca/about-centennial/college-overview/college-policies.

Students enrolled in a joint or collaborative program are subject to the partner institution's academic policies.

PLAR Process

This course is eligible for Prior Learning Assessment and Recognition (PLAR). PLAR is a process by which course credit may be granted for past learning acquired through work or other life experiences. The PLAR process involves completing an assessment (portfolio, test, assignment, etc.) that reliably demonstrates achievement of the course learning outcomes. Contact the academic school to obtain information on the PLAR process and the required assessment.

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Semester:	Winter 2017	Professor Name:	Bindu Goel
Section Code:	001 to 014	Contact Information:	bgoel@my.centennialcollege.ca
Meeting Time & Location:	Sec.001-002:	Office Hours:	By appt.

Sec.001-002:
Wed.2:30-4:20PM,L2-18(+Sec.003-4-5) LEC
Fri.2:30-4:20PM, A3-15 LAB

Sec.003-004:
Fri.10:30-12:20PM, A3-15 LAB

Sec.005-006:
Sat.8:30-10:20AM, A3-17 LAB

Sec.007-008:
Tue.12:30-2:20PM,D1-24(+Sec.006-9-10)LEC
Wed.10:30-12:20PM, A3-15 LAB

Sec.009-0010:
Sat.10:30-12:20AM, A3-11 LAB

Sec.011-012:
Fri.4:30-6:20PM,D3-03(+Sec.013-014)LEC
Tue.2:30-4:20PM, A3-15 LAB

Sec.013-014:
Sat.1:00-2:50PM, A3-11 LAB

Topical Outline (subject to change):

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name	Evaluation Date
1	Course Overview Defining quality and what makes a successful software product Seven principles of testing	Text Lecture slides Chapter 1 of "Software Testing" 2nd Edition by Ron Patton	(1) What quality means to different stakeholders (2) Implications of the seven principles of testing	Lecture In class discussion Team reading and discussion	Assignment 1: answer questions on reading Test 1	
2	Defining QA, QC, and SQS The 5 stages of a test process The difference	Text Lecture slides	Explain the difference between QA and QC and what an SQS is Discuss how test and development teams work together Name and state the purpose of the stages in	Lecture In-class discussion Hands-on exercise	Assignment 2: using an IDE's degugger to locate the source of	

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name	Evaluation Date
	between testers and developers Debugging		a test process Use a debugger to find defects in code		defects Test 1	
3	Reviewing the Software Development Life Cycle The evolution from waterfall to Agile through the V Model The Agile Manifesto	Lecture slides Agile Manifesto web site eBooks: "Agile for Dummies" and "Agile 101"	Explain the goal and impact of the V-Model Describe the 4 levels of testing defined by the V-Model Define incremental and iterative development	Lecture In-class discussion Hands-on exercise	Assignment 3: team exercise applying TDD (pseudo-code) to a system requirements Test 1	
4	Test-driven development and Feature-driven devlopment Overview of some implementations of Agile: DSDM, XP, Scrum, RUP...	Lecture slides Web sites and videos to be shown in class eBook: "Agile 101" and "Agile for Dummies"	Compare and contrast different implementations of Agile	Lecture In-class discussion Hands-on exercise	Assignment 4: team exercise writing a test case specification for same program specification as for assignment 3 Test 1	
5	Software quality characteristics (ISO/IEEE 9126) Categories of test Test metrics Testing end-to-end: from inception to maintenance	Text Lecture slides	Explain how tests of different types are appropriate for different quality characteristics and suggest strategy for designing tests Explain the additional challenges of testing during maintenance	Lecture In-class discussion	Test 1	
6	Static and white-box tests Types of reviews: peer/technical review; walkthrough; inspection Static code analysis	Text Lecture slides	Describe the goals, people involved and format typically taken by different forms of reviews Calculate cyclomatic complexity of code Perform static code analysis using code	Lecture In-class discussion Hands-on exercise	Assignment 5: perform static code analysis using a tool and answer questions about results Test 2	
7	Dynamic black-box tests Test case design using equivalence	Text Lecture slides	Analyze requirements to identify pass/fail criteria and select and appropriate test design technique to help create test case specifications	Lecture In-class discussion Hands-on exercise	Team assignment 6: given a program	

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name	Evaluation Date
	partitions, boundary value analysis and decision tables				specification, use equivalence partitions with boundary value analysis or decision table to identify test cases test 2	
8	Black box test design using state transition diagrams	Text Lecture slides	Analyze requirements to create state transition diagrams for objects in the required system. Then use the state transition diagram to identify test cases.	Lecture In-class discussion Hands-on exercise	Team assignment 7: given a program specification, identify objects with changing state, draw state transition diagrams and then identify test cases test 2	
9	Complete discussion of black-box test design with Exploratory testing and use-case testing Feedback on assignments 6 and 7 Test documentation	Text Lecture slides	Maximize effectiveness of dynamic testing and minimize number of test cases required to achieve confidence that a software system has been thoroughly tested. Maximize	Lecture In-class discussion Hand out description of team research project	Test 2	
10	Defect handling process including confirmation and regression testing Configuration management/SCM/Version control Unit test tool	Test Lecture slides	Describe the states of a defect report in a typical defect handling process Explain the importance of using an SCM throughout the life cycle of a software product Perform unit testing using a tool	Lecture In-class discussion Hands-on exercis	Assignment 8: Scripted tutorial on a tool for unit testing Test 2	
11-12	Test and project	Web sites: student	Exchange knowledge by researching a tool	Student presentations	Project	

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name	Evaluation Date
	management tools Test automation	research White papers and articles made available to students	and then teaching it to the rest of the class.	Recap lecture to include test automation	presentation for team work Tools quiz for learning from peers	
13	ISO 9001 certification CMMI Brief history of QA and QA gurus	Lecture slides ISO 9000 brochures Article from ASQ: "Short History of QA"	Explain why companies invest in ISO 9001 certification Describe the 5 CMMI levels Recognize the names of some QA pioneers and briefly discuss thier contribution to modern QA	Lecture in-class discussion	Test 2	
14	Review and final test	Review slides	Discuss the roles and goals of QA professionals and testers Apply the test process to real-world development situations From system objectives, identify test criteria and design test cases Discuss the hows and whys of verifcation and validation testing	In class discussion Practice for exam questions	Test 2	