Adama Science and Technology University												
1	School: ***Electrical Engineering and Computing***							Department: ***Computer Science and Engineering***				
2	Course Category	***Core Module***										
	Course Name	***Software Testing and Quality Assurance***										
	Course Code:	***SEng4201***										
3	Synopsis:	This course gives fundamental concepts of software testing on a new software development through software quality assurance methods and principles in order to produce reliable , cost effective and scalable software product that meet users need and organizational standards										
4	Name(s) of Academic Staff:	Getinet Yilma										
5	Semester and Year offered:	Semester:	I			Year:	4	Major Mandatory				
6	Credit Hour:	3										
7	Prerequisite/ Co-requisite: (if any)	**SEng320**1 Software Requirements engineering **SEng320**4 - Software Design and Architecture										
8	Course Learning Outcome (CLO): At the end of the course the student will be able to do:											
	CLO1	Discuss basic concepts of software testing and quality assurance										
	CLO2	Elaborate software testing design and planning techniques										
	CLO3	Differentiate type testing and testing tools										
	CLO4	Describe testing process and Test report										
	CLO5	Identify software quality characteristics and metrics										
	CLO6	Discuss Professional ethics, current trends on testing										
	CLO7	Analyze the quality of the software based on software quality metrics										
9	Mapping of the course Learning Outcomes to the program Learning Outcomes, Teaching Methods and Assessment:											
	Course Learning Outcomes (CLO)	Program Learning Outcomes (PO)										
				PO3	PO4	PO5		PO7		PO9	Teaching Methods	Assessment
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	CLO1										√		√							
	CLO2									√	√		√			√				
	CLO3									√	√		√					√		
	CLO4									√	√		√		√					
	CLO5									√	√		√		√					
	CLO6				√						√		√			√				
	CLO7										√		√			√	√			
	Indicate the relevancy between the CLO and PO by ticking "√"on the appropriate relevant box																			

10	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	
	1	Automated Testing tools (Selenium, TestingWhiz, Telerik TestStudio, Tosca Testsuite,
	2	Real-Time and Embedded Systems Testing
	3…etc.	Open source test tools such as Watir

11	Distribution of Student Learning Time (SLT)								
	Course Content Outline	CLO	Teaching and Learning Activities						Total (SLT)
			Guided learning (F2F)				Guided Learning Total (F2F)	Independent Learning (NF2F)	
			L	T	P	O			
	Chapter 1: Introduction to Software Testing	CLO1	6					8	10

	1.0. Introduction 1.1. The Testing Process 1.2. What is Software Testing? 1.3. Why Should We Test? What is the Purpose? 1.4. Who Should do Testing? 1.5. How Much Should We Test? 1.6. Selection of Good Test Cases 1.7. Measurement of Testing 1.8. Incremental Testing Approach 1.9. Basic Terminology Related to Software Testing 1.10. Testing Life Cycle 1.11. When to Stop Testing? 1.12. Principles of Testing 1.13. Limitations of Testing								
	Chapter 2: Levels of Testing 2.1 UNIT TESTING 2.1.1 Concept of Unit Testing 2.1.2 Static Unit Testing 2.1.3 Defect Prevention 2.1.4 Dynamic Unit Testing 2.1.5 Debugging 2.2 CONTROL FLOW TESTING 2.2.1 Control Flow Graph 2.2.1 Paths in a Control Flow Graph 2.2.1 Path Selection Criteria 2.2.1.1 All-Path Coverage Criterion 2.2.1.1 Statement Coverage Criterion 2.2.1.1 Branch Coverage Criterion	CL O2	8					6	21

	2.2.1.1 Predicate Coverage Criterion 2.3 DATA FLOW TESTING 2.3.1 Data Flow Anomaly 2.3.2 Overview of Dynamic Data Flow Testing 2.3.3 Data Flow Graph, Terms and Testing Criteria 2.3.4 Comparison of Data Flow Test Selection Criteria 2.4 DOMAIN TESTING 2.4.1 Domain Error 2.4.2 Testing for Domain Errors 2.4.3 Sources of Domains 2.4.4 Types of Domain Errors 2.4.5 ON and OFF Points 2.4.6 Test Selection Criterion 2.4 SYSTEM INTEGRATION TESTING 2.4.1 Concept of Integration Testing 2.4.2 Different Types of Interfaces and Interface Errors 2.4.3 Granularity of System Integration Testing 2.4.4 System Integration Techniques 2.4.4.1 Incremental 2.4.4.2 Top Down 2.4.4.3 Bottom Up 2.4.5 Software and Hardware Integration testing 2.4.6 Test Plan for System Integration								

	2.4.7 Off-the-Shelf Component Integration Testing 2.5 SYSTEM TEST 2.5.2 Basic Tests 2.5.2.1 Boot Tests 2.5.2.2 Upgrade/Downgrade Tests 2.5.2.3 Light Emitting Diode Tests 2.5.2.4 Diagnostic Tests 2.5.2.5 Command Line Interface Tests 2.5.3 Functionality Tests 2.5.3.1 Communication Systems Tests 2.5.3.2 Module Tests 2.5.3.3 Logging and Tracing Tests 2.5.3.4 Element Management Systems Tests 2.5.3.5 Management Information Base Tests 2.5.3.6 Graphical User Interface Tests 2.5.3.7 Security Tests 2.5.3.8 Feature Tests 2.5.4 Robustness Tests 2.5.4.1 Boundary Value Tests 2.5.4.2 Power Cycling Tests 2.5.4.3 On-Line Insertion and Removal Tests 2.5.4.4 High-Availability Tests 2.5.4.5 Degraded Node Tests 2.5.5 Interoperability Tests 2.5.6 Performance Tests 2.5.7 Scalability Tests 2.5.8 Stress Tests								

	2.5.9 Load and Stability Tests 2.5.10 Reliability Tests 2.5.11 Regression Tests 2.5.12 Documentation Tests 2.6 ACCEPTANCE TESTING 2.6.1 Types of Acceptance Testing 2.6.2 Acceptance Criteria 2.6.3 Selection of Acceptance Criteria 2.6.4 Acceptance Test Plan 2.6.5 Acceptance Test Execution 2.6.6 Acceptance Test Report								
	Chapter 3: Test Management 3.1 Risk and Testing 3.2 Test Organization and Independence 3.3Roles within the Test Team 3.4 Test Strategy 3.5 Test Approach 3.6Test Plan 3.7Test Planning Activities 3.8 Test Estimation 3.9Test Progress Monitoring and Control 4.10 Test Reporting 4.11Test Control	CL O3, CL O4, CL O7	6					5	14
	Chapter 4: Tool Support for Testing 4.1 What is a Test Tool? 4.2 Benefits and Risks of using a Test Tool 4.3 Types of Test Tool	CL O3	3					6	13

	• Tool Support for Management of Testing and Tests • Tool Support for Static Testing • Tool Support for Test Specification • Tool Support for Test Execution and Logging • Tool Support for Performance and Monitoring • Tool Support for Specific Application Areas • Tool Support using Other Tools 4.4 Test Tool Limitations 4.5 Tool Selection Advice 4.6 Key Factors in the Selection of a Tool								
	Chapter 5: Legal, Ethical, and Professional Aspects of Testing 5.1 The Ethical Software Tester 5.2 Professional Responsibility of Software Tester 5.3 ACM Code of Professional Conduct and Ethics	CLO6	6					4	8
	Chapter 6: Software Quality Assurance 6.1 Quality factors and criteria 6.2 Relationship between quality factors and quality criteria 6.3 Quality Metric 6.4 Quality characteristic 6.5 software Quality standard	CLO4	7					5	16
	Chapter 7: Current trends of Testing 7.1 Change-Driven Testing 7.2 Testing in DevOps 7.3 Testing Autonomous Systems	CLO6	6					4	16

	7.4 Testing Artificial Intelligence system 7.5 Testing as a service								
	Total		42					38	80hrs

Assessment				
Continuous Assessment	Percentage Total-60(%)	F2F	NF2F	SLT

1	Assignments	Assignment I & II (20%)	2	8:30	10:30
2	Quiz/Test	Quiz I & II (25%)	2	2	4
3	Project	Course Project (15%)	2	20	22
5	Choose an item.				
				Total	36:30hrs

Final Exam	Percentage 40 (%)	F2F	NF2F	SLT
Final Exam	40%	2:30	11	13:30hrs
			Grand Total SLT	120hrs

L = Lecture, T = Tutorial, P = Practical, O = Others, F2F = Face to Face, NF2F = Non Face to Face

Note: indicates the CLO based on the CLO's numbering in item 9.

12	Special requirements and resources to deliver the course (e.g. software, computer lab, simulation room …etc.)	1	
		2	
		3	Choose an item.
		4	Choose an item.
		5	Choose an item.
13	Text book and reference: (note: ensure the latest edition /publication)	1	**Ali Mil, Fairouz Tchier,** *Software Testing :Concepts and Operations,2015,* by John Wiley & Sons
		2	Kshirasagar Naik, Priyadarshi Tripathy, Software Testing And Quality Assurance : Theory and Practice, 2008
		3	Stephan Goericke, The Future of Software Quality Assurance,2020, Springer open
		4	RAJIV CHOPRA, PHD, Software Testing, 2018
			Web Reference:

			http://online.stanford.edu/	http://nptel.ac.in/	
			https://ocw.mit.edu/	http://groups.csail.mit.edu/pag/	
			http://groups.csail.mit.edu/pag/ http://www.testingeducation.org/BBST/	http://capone.mtsu.edu/storm/ https://www.stickyminds.com/	