UNIVERSITY OF ZIMBABWE

FACULTY OF COMPUTER ENGINEERING INFORMATICS AND COMMUNICATIONS

COMPUTER ENGINEERING DEPARTMENT

BACHELOR OF SCIENCE HONOURS COMPUTER ENGINEERING

SOFTWARE TESTING AND QUALITY ASSURANCE PART 4-HCE 412

PERIOD: 2024/5

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Preamble

The course will cover topics such as testing levels (unit, integration, system, acceptance), testing types (functional, non-functional, regression, performance, etc.), test design techniques (black-box, white-box, use case-based), test execution and defect management, test automation, performance testing, security testing, quality assurance processes, test management and documentation, test metrics and reporting, emerging trends in software testing (Agile, DevOps, cloud-based testing, etc.), and case studies/practical applications.

Course Overview

This course provides an in-depth understanding of software testing principles, techniques, and best practices, as well as the fundamentals of quality assurance in software development. Students will learn how to plan, design, and execute effective software tests, identify and report defects, and implement quality assurance processes to ensure the delivery of high-quality software products.

Course Objectives

Upon completion of the course students should be able to:

- Apply the fundamentals of software testing.
- Apply various testing techniques.
- Master test planning, documentation, and defect tracking.
- Gain hands-on experience in software testing through practical exercises.
- Learn about test automation tools and frameworks.
- Understand common challenges and best practices in software testing.
- Develop critical thinking and problem-solving skills.
- Enhance collaboration and communication skills for effective testing.

Course Outline

Introduction to Software Testing and Quality Assurance

- Overview of software testing and quality assurance
- Importance of testing in the software development life cycle
- Role of quality assurance in software development

Software Testing Fundamentals

- Testing objectives and goals
- Testing levels (unit, integration, system, acceptance)
- Testing types (functional, non-functional, regression, performance, etc.)
- Test planning and strategy
- Test Design Techniques
- Black-box testing techniques (equivalence partitioning, boundary value analysis, decision table testing, etc.)
- White-box testing techniques (statement coverage, branch coverage, path coverage, etc.)
- Use case-based testing
- User interface testing

Test Execution and Defect Management

- Test case development and execution
- Test data management
- Defect tracking and reporting
- Test environment setup and management
- Test Automation

Test automation

- Benefits and challenges of test automation
- Test automation frameworks and tools
- Scripting and executing automated tests
- Performance Testing and Security Testing

Software performance testing

- Performance testing techniques and tools
- Introduction to security testing
- Common security vulnerabilities and testing approaches
- Quality Assurance Processes

Software quality assurance

- Quality standards and models (ISO, CMMI, etc.)
- Process improvement methodologies (Six Sigma, Lean, etc.)
- Metrics and measurements in quality assurance

Test Management and Documentation

- Test estimation and scheduling
- Test progress monitoring and reporting

- Test documentation (test plans, test cases, test scripts, etc.)
- Configuration management in testing

Test Metrics and Reporting

- Defining and measuring test metrics
- Test reporting techniques and tools
- Test summary reports and metrics analysis

Emerging Trends in Software Testing

- Agile and DevOps testing
- Cloud-based testing
- Mobile and IoT testing
- Continuous integration and continuous delivery (CI/CD) testing
- Case Studies and Practical Applications

Analysis of real-world testing scenarios

- Hands-on exercises and projects
- Best practices and lessons learned

Delivery Methodologies.

- Lectures,
- Lab – Sessions,
- Group Work,
- Presentations
- Research including Video Tutorials.

Course Assessment.

Final examination: 50%

Practical work 5%

- 1 Lab Assignments

Course work: 45%

- 1 Test,
- 2 Assignments

Books

- "Software Testing: Principles and Practices" by Srinivasan Desikan and Gopalaswamy Ramesh
- "Foundations of Software Testing" by Dorothy Graham, Erik Van Veenendaal, and Isabel Evans
- "The Art of Software Testing" by Glenford J. Myers, Corey Sandler, and Tom Badgett
- "How to Break Software: A Practical Guide to Testing" by James A. Whittaker

Testing Tools and Frameworks Documentation

- Selenium WebDriver: Official documentation for Selenium WebDriver, a popular automation testing tool
- JUnit: Documentation for JUnit, a widely used unit testing framework for Java
- TestNG: Documentation for TestNG, a testing framework for Java
- Cypress: Documentation for Cypress, a JavaScript-based end-to-end testing framework

Professional Testing Communities

- Software Testing Stack Exchange: A question and answer community for software testers
- Ministry of Testing Forum: A platform for testers to ask questions, share knowledge, and discuss testing-related topic