

UNIVERSITY OF MADRAS

B.Sc. DEGREE PROGRAMME IN COMPUTER SCIENCE

SYLLABUS WITH EFFECT FROM 2023-2024

Year: III

Semester: V

Software Testing	325E5E
Credits 3	Lecture Hours:4 per week
<p>Learning Objectives: (for teachers: what they have to do in the class/lab/field)</p> <ul style="list-style-type: none"> • Adapt to various test processes, types of errors and fault models and methods of test generation from requirements for continuous quality improvement of the software system along with Software Quality best practices usage. • Apply software testing cycle in relation to software development and projectmanagement focusing incidents and risks management within a project towardsefficient delivery of software solutions and implement improvements in thesoftware development processes by making use of standards and baselines. 	
<p>Course Outcomes: (for students: To know what they are going to learn)</p> <p>CO1. Select and classify measurement scales and models, software metrics andmeasures addressing software quality and reliability.</p> <p>CO2. Conduct unit and integration tests by determining test design, test automation, testcoverage criteria using testing frameworks and test adequacy assessment usingcontrol flow, data flow, and program mutations.</p> <p>CO3. Apply suitable higher order testing techniques and methods in order to achieveverified and validated software by following testing best practices.</p> <p>CO4. Demonstrate the skillset as a tester to neutralize the consequences of wickedproblems by narrating effective test cases and test procedures.</p>	

Units	Contents
I	Principles of Testing: Testing Concepts: Purpose of Software Testing, Testing Principles, Goals of Testing, Testing aspects: Requirements, Test Scenarios, Test cases,Test scripts/procedures, Strategies for Software Testing, Testing Activities, Mistakes,Faults & Failures, Planning for Verification and Validation, Software Inspections,Automated Static Analysis, Verification and Formal Methods, Levels of Testing
II	White-Box Testing: Test Adequacy Criteria, Static Testing, Structural Testing, Code Complexity Testing, Mutation Testing, Data Flow Testing - Black-Box Testing: Test Case Design Criteria, Requirement Based Testing, Positive andNegative Testing, Boundary Value Analysis, Equivalence Partitioning State BasedTesting, Domain Testing - Functional Testing: Test Plan, Test Management, Test Execution and Reporting, TestSpecialist Skills, Tester’s Workbench and Tool Categories, Test Maturity Model and TestProcess Assessment,
III	Debugging & Root Cause Analysis, Software Items, Component &Units, Test Bed, Traceability and Testability, Attributes of Testable Requirements, TestMatrix, Types of Testing Documentation, Verification Testing, Validation Testing,Integration Testing, System and Acceptance Testing, GUI Testing,Regression Testing,Selection, Minimization and Prioritization of Test Cases for Regression Testing

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IV	Creating Test Cases from Requirements and Use cases, Software Defects: Origins of Defects, Defect Classes, Defect Repository / Test Design, Defect Repository Higher Order Testing: Object Oriented Testing, Specification Based Testing, Performance Testing, Ad-hoc Testing, Usability and Accessibility Testing, Risk-based Testing, Exploratory Testing, Scenario-based Testing, Random Testing Compatibility Testing,
V	User Documentation Testing, Client–Server System Testing, RAD Testing, Configuration Testing, Testing internal Controls, Multiplatform Environment Testing, Security Testing, Web-based System Testing, Reliability Testing, Efficiency Testing, Maintainability Testing, Portability Testing, Introduction to Performance Testing, Application Performance Testing, Process of Performance Testing, Effective Root-Cause analysis, Testing VS Test Automation, Tool evaluation and selection, Automation team roles, Architectures, Planning and implementing test automation process

Books for References

1. Kshirasagar Naik, Priyadarshi Tripathy, Software Testing and Quality Assurance-Theory and Practice, John Wiley & Sons, Inc., 2008, ISBN 978-0-471-78911-6
2. Fenton, Pfleeger, “Software Metrics: A Rigorous and practical Approach”, Thomson Brooks/Cole, ISBN 981-240-385-X.
3. Desikan, Ramesh, “Software Testing: principles and Practices”, Pearson Education, ISBN 81-7758-121-X.
4. Anne Mette Jonassen Hass, Guide to Advanced Software Testing, ARTECH HOUSE, INC., 2008, ISBN-13: 978-1-59693-285-2
5. Ian Molyneaux, The Art of Application Performance Testing, O’Reilly Media, Inc., 2009, ISBN: 978-0-596-52066-3
6. Jamie L. Mitchell, Rex Black, Advanced Software Testing—Vol. 3, 2nd Edition, Rocky Nook, 2015, ISBN: 978-1-937538-64-4
7. G. Gordon Schulmeyer, Handbook of Software Quality Assurance Fourth Edition, ARTECH HOUSE, INC., 2008, ISBN-13: 978-1-59693-186-2