



Course Title: SOFTWARE TESTING AND RELIABILITY

Course Code: CSIT806

Course Level: PG

L	T	P/S	SW/F W	TOTAL CREDIT UNITS
3	-	-	-	3

Credit Units: 3

Course Objectives:

The course aims at

1. Training the students with hand-on experience of different approaches to Testing,
2. To give insight of Management of test and Software Reliability,
3. Describe various models and its verification.

Pre-requisites: Software Engineering-I

Course Contents/Syllabus:

	Weightage (%)
Module I: Fundamentals of Testing	10
Human and errors, Defects, Faults, Failures, Defect Rate and Reliability, Defect Prevention, Reduction and Containment, Testing and Debugging, Software Quality, Requirement Behavior and Correctness, Fundamentals of Test Process, Psychology of Testing, General Principles of Testing, Test Metrics, Agile Methodology and Its Impact on testing, Test Levels: Unit, Component, Module, Integration, System, Acceptance, Generic	
Module II: Approaches to Testing	15
Static Testing, Structured Group Examinations, Static Analysis, Control flow & Data flow, Determining Metrics, Dynamic Testing, Black Box Testing: Equivalence Class Partitioning, Boundary Value Analysis, State Transition Test, Cause Effect Graphing and Decision Table Technique and Used Case Testing and Advanced black box techniques, White Box Testing: Statement Coverage, Branch Coverage, Path Coverage, System integration, Deployment testing, Beta testing, Scalability testing, Reliability testing, Stress testing, Acceptance testing: Acceptance criteria, test cases selection and execution	
Module III : Test Management	15

Test Organization, Test teams, tasks and Qualifications, Test Planning, Quality Assurance Plan, Test Plan, Prioritization Plan, Test Exit Criteria, Cost and economy Aspects, Test Strategies, Preventive versus Reactive Approach, Analytical versus heuristic Approach, Test Activity Management, Incident Management, Configuration Management, Test Progress Monitoring and Control, Specialized Testing: Performance, Load, Stress & Security Testing	
Module IV : Software Reliability	15
Defining Software Reliability, Software Reliability Attributes and Specification, Concept of Introduction to Measurement and Inspection Process, Documents and Metrics, Basics of Reliability Theory, Software Reliability Problem, Modeling Process, Software Reliability Models (SRGM), preliminary Concepts of Reliability Engineering, Parameter Estimation, Model Validation	
Module V : Software Reliability Growth Models	15
Execution Time Models, Calendar Time Models, Erlang Model, Modeling Fault Dependency and Debugging Time Lag, Testing Effort Dependent Modeling, Distributed Environment, Imperfect Debugging, Testing-Domain Models, Change-Point, Unified Approach Concepts, Artificial Neural Networks based SRGM, Introduction to Discrete SRGM	
Module VI : Software Reliability Allocation Models	15
Software Reliability Allocation Models, Criteria for Model Evaluation, Optimal Reliability Allocation, Quality Planning and Control, Quality Improvement Process, Evolution of Software Quality Assurance (SQA), Major SQA Activities, Major SQA Issues, Zero Defect Software.	
Module VII : Software Verification, Validation & Testing	15
Verification and Validation, Evolutionary Nature of Verification and Validation, Impracticality of Testing all Data and Paths, Proof of Correctness, Software Testing, Functional, Structural and Error-Oriented Analysis & Testing, Static and Dynamic Testing Tools, Characteristics of Modern Testing Tools.	

Student Learning Outcomes:

The student will be able:

- To apply methods and techniques to analyze requirements, and design and code software artifacts to assess and model software reliability.
- To apply the principles and methods of software testing.
- To select and apply in autonomy appropriate technologies and techniques for different types of testing all over the software process development in different domains and contexts.

Pedagogy for Course Delivery:

The class will be taught using theory and tutorial based methods. In addition to assigning some of the models and frameworks under case based methods. Course instructor will demonstrate and explain about applications of software testing and reliability.

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	End Term Examination (%)
100	-	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	Mid-Term Exam	Assignment	Case Study	Attendance	
Weightage (%)	10%	5%	10%	5%	70%

Text Books:

1. Andreas Spillner, Tilo Linz and Hans Schaefer; “Software Testing Foundations”, Shroff Publishers and Distributors
2. D Srinivasan and R Gopalswamy; “Software Testing: Principles and Practices”, Pearson Education, 2006

References Books:

3. Aditya P. Mathur; "Foundations of Software Testing", Pearson Education Custom Edition, 2000
4. Robert V Binder; "Testing Object Oriented Systems: Models, Patterns and Tools", Addison Wesley, 1996
5. P K Kapur, H Pham, A Gupta and PC Jha; "Software Reliability Assessment with OR Applications", Springer-Verlag London Limited, 2011
6. P K Kapur, R B Garg & S Kumar; "Contributions to Hardware and Software Reliability" World Scientific, London, 1999
7. John Musa; "Software Reliability Engineering", McGraw-Hill
8. Roger S. Pressman; "Software Engineering – A practitioner's approach", 5th Edition, McGraw Hill
9. Deepak Kumar: "Software Reliability Engineering, A Brief Description LAMBERT – Academic Publishing