

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI

WORK INTEGRATED LEARNING PROGRAMMES

COURSE HANDOUT

Part A: Content Design

| | |
|----------------------|--------------------------------|
| Course Title | SOFTWARE TESTING METHODOLOGIES |
| Course No(s) | SS ZG552/SE ZG552 |
| Credit Units | 4 |
| Course Author | |
| Version No | |
| Date | |

Course Objectives

| No | Objective |
|------------|--|
| CO1 | The course aims at providing a sound conceptual foundation in the area of Software Testing Methodologies with emphasis on concepts and techniques for testing and analysis of software |
| CO2 | The testing of software, at a unit, subsystem and system level. Various test techniques: specification based testing and code based testing. Techniques and methods for software test generation and validation. |
| CO3 | The Software Analysis: Static and Dynamic. Test adequacy. Testing Object Oriented Software. The types of software testing: Regression and interoperability. The software test processes and management |

Text Book(s)

| | |
|----|--|
| T1 | Software Testing – A Craftsman’s Approach, Fourth Edition, Paul C Jorgenson, CRC Press |
| T2 | Foundations of Software Testing, Second Edition, Aditya P Mathur, Pearson |

Reference Book(s) & other resources

| | |
|----|---|
| R1 | The Art of Software Testing, Third Edition, Glenford J. Myers, Tom Badget, Corey Sandler, |
| R2 | Software Testing and Quality Assurance – Theory and Practice, Kshirasagar Naik, Priyadarshi Tripathy, Wiley, 2013 |
| R3 | Testing Object Oriented Systems: Models, Patterns and Tools, Robert V Binder, Addison Wesley |
| R4 | Guide to Software Engineering Body of Knowledge, Version 3, IEEE |

Content Structure

Module 1: Introduction to Software Testing & Techniques

| Topic No. | Topic Title | Reference |
|-----------|----------------------------------|---------------|
| 1.1 | Introduction to Software Testing | Lecture Notes |

| | | |
|-----|---|-----------------------------|
| 1.2 | Overview of the Course | Lecture Notes |
| 1.3 | Software Testing Techniques | T1 Chapter 1 & T2 Chapter 1 |
| 1.4 | Software Testing – Quality Attributes, Types and Levels | T1 Chapter 1 & T2 Chapter 1 |

Module 2: Mathematics & Formal Methods

| Topic No. | Topic Title | Reference |
|-----------|-------------------------------|------------------------|
| 2.1 | Permutations and Combinations | Lecture Notes & Slides |
| 2.2 | Propositional Logic | T1 3.4 |
| 2.3 | Discrete Math | T1 Chapter 3 |
| 2.4 | Graph Theory | T1 Chapter 4 |

Module 3: Specification Based Testing

| Topic No. | Topic Title | Reference |
|-----------|--|---------------------------------|
| 3.1 | Specification Based Testing – Overview | Lecture Notes |
| 3.2 | Equivalence Class | T1 Chapter 6 |
| 3.3 | Boundary Value Analysis | T1 Chapter 5 |
| 3.4 | Example & Case Study | Lecture Notes, T1 Chapter 6 & 5 |

Module 4: Specification Based Testing

| Topic No. | Topic Title | Reference |
|-----------|------------------------------|------------------------------|
| 4.1 | Domain Testing | T2 Chapter 3 |
| 4.2 | Combinatorial | Lecture Notes |
| 4.3 | Decision Table Based Testing | T1 Chapter 7 |
| 4.4 | Example & Case Study | T1 Chapter 7 & Lecture Notes |

Module 5: Code Based Testing

| Topic No. | Topic Title | Reference |
|-----------|-------------------------------|---------------|
| 5.1 | Code Based Testing – Overview | Lecture Notes |
| 5.2 | Path Testing | T1 Chapter 8 |
| 5.3 | Examples | T1 Chapter 8 |

Module 6: Code Based Testing

| Topic No. | Topic Title | Reference |
|-----------|-----------------------------|------------------------------|
| 6.1 | Data Flow Testing | T1 Chapter 9 |
| 6.2 | Path Based Testing – Metric | T1 Chapter 8 & Lecture Notes |
| 6.3 | Examples | T1 Chapter 9 & T1 Chapter 8 |

Module 7: Model Based Testing

| Topic No. | Topic Title | Reference |
|-----------|---|---------------|
| 7.1 | Model Based Testing – Introduction & Overview | T1 Chapter 12 |
| 7.2 | Finite State Machines & Fault Model | T2 Chapter 5 |

| | | |
|-----|------------|--------------------------------|
| 7.3 | Examples | T1 Chapter 17 |
| 7.4 | Case Study | Lectures Notes & T1 Chapter 17 |

Module 8: Model Based Testing

| Topic No. | Topic Title | Reference |
|-----------|---|-------------------------------|
| 8.1 | Model Based Testing – Systems | T1 Chapter 17 |
| 8.2 | Model Based Testing – System of Systems | T1 Chapter 17 & T2 Chapter 5 |
| 8.3 | Example | T1 Chapter 17 & Lecture Notes |
| 8.4 | Cases Study | T1 Chapter 17 & Lecture Notes |

Module 9: Object Oriented Testing

| Topic No. | Topic Title | Reference |
|-----------|--|-------------------------------|
| 9.1 | OO Software & OO Software test – Introduction & Overview | Lecture Notes & T1 Chapter 15 |
| 9.2 | Issues in Testing OO Software | T1 Chapter 15 |
| 9.3 | OO Unit Testing | T1 Chapter 15 |
| 9.4 | Examples | T1 Chapter 15 & Lecture Notes |

Module 10: Object Oriented Testing

| Topic No. | Topic Title | Reference |
|-----------|------------------------|-------------------------------|
| 10.1 | OO Integration Testing | T1 Chapter 15 |
| 10.2 | OO System Testing | T1 Chapter 15 |
| 10.3 | OO – GUI Testing | T1 Chapter 15 & Lecture Notes |
| 10.4 | Examples & Cases | T1 Chapter 15 & Lecture Notes |

Module 11: Integration Testing

| Topic No. | Topic Title | Reference |
|-----------|---|-------------------------------|
| 11.1 | Integration Testing – Introduction, Overview & Issues | T1 Chapter 13 |
| 11.2 | Integration Testing – Types & Strategies | T1 Chapter 13 |
| 11.3 | Examples | T1 Chapter 13 |
| 11.4 | Cases | T1 Chapter 13 & Lecture Notes |

Module 12: System Testing

| Topic No. | Topic Title | Reference |
|-----------|--|-------------------------------|
| 12.1 | System Testing – Introduction, Overview & Issues | T1 Chapter 14 |
| 12.2 | Systems Testing – Types, Techniques & Strategies | T1 Chapter 14 |
| 12.3 | Examples | T1 Chapter 14 & Lecture Notes |

Module 13: Life-Cycle Based Testing

| Topic No. | Topic Title | Reference |
|-----------|---|---------------|
| 13.1 | Life-Cycle Based Testing – Overview and Perspective | T1 Chapter 11 |
| 13.2 | Life-Cycles – Water fall, Iterative, and Agile | T1 Chapter 11 |

| | | |
|------|--|---------------|
| 13.3 | Implications and issues, Strategies & Models | T1 Chapter 11 |
| 13.4 | Example and Case | Lecture Notes |

Module 14: Test Adequacy and Enhancement

| Topic No. | Topic Title | Reference |
|-----------|---|------------------------------|
| 14.1 | Test Adequacy – Need & Overview | T2 Chapter 7 |
| 14.2 | Test Adequacy Assessment – Data Flow | T2 Chapter 7 |
| 14.3 | Test Adequacy Assessment – Control Flow | T2 Chapter 7 |
| 14.4 | Examples & Cases | T2 Chapter 7 & Lecture Notes |

Module 15: Regression Testing

| Topic No. | Topic Title | Reference |
|-----------|---|--------------|
| 15.1 | Need, Motivation & Techniques | T2 Chapter 9 |
| 15.2 | Regression Testing – Test Selection (Execution Trace) | T2 Chapter 9 |
| 15.3 | Regression Testing – Test Selection (Dynamic Slicing) | T2 Chapter 9 |

Module 16: Test Case Minimization, Prioritization & Optimization

| Topic No. | Topic Title | Reference |
|-----------|--|--------------|
| 16.1 | Minimization, Prioritization & Optimization Techniques | T2 Chapter 9 |
| 16.2 | Test Selection Algorithms | T2 Chapter 9 |
| 16.3 | Examples | T2 Chapter 9 |

Module 17: Testing Non-functional Requirements

| Topic No. | Topic Title | Reference |
|-----------|----------------------|------------------|
| 17.1 | Reliability Analysis | T2 Chapter 9, R1 |
| 17.2 | Fault Tolerance | T2 Chapter 9, R1 |
| 17.3 | Examples | T2 Chapter 9, R1 |

Learning Outcomes:

| No | Learning Outcomes |
|-----|--|
| LO1 | Introduce the course and course handout. Bring a perspective of need and motivation for this course. Provide an overview of the course, quality attributes, levels and types of Testing |
| LO2 | Provide a base to the software testing techniques in form of mathematics and formal methods. Review topics of permutation/combination, discrete mathematics and graph theory. Focus is on the relevance to software testing. |
| LO3 | Bring an approach to look at the system from specification perspective. Learn the relevant techniques for testing specifications – Equivalence Class, Boundary Value Analysis, Combinatorial, Decision Tables and Domain Testing |
| LO4 | Take a code level approach to testing and assuring quality. Learn the relevant techniques for testing code – Path Based Testing and Data Flow Testing |

| | |
|------|--|
| LO5 | Introduce Model Based Testing. Various Model for Software testing, their choice and techniques. Learn Finite State Machine, Petri Nets and State Charts. Learn to use these to derive testing cases |
| LO6 | Understand the issues in OO Software Testing. Learn techniques and sublets of Unit, Integration and Systems Testing of OO Software. GUI Testing for OO Software |
| LO7 | Overview and need for Integration and Systems Testing of Software. Learn the techniques of Integration and Systems Testing |
| LO8 | Provide an overview from a life-cycle perspective of Software and Software Products. Agile Testing and Agile Model-Driven Development. Role of Test engineers in life-cycle-based testing |
| LO9 | Learn the need for test adequacy and need for enhancement of test cases. Various techniques and criteria for measuring of test adequacy (data and control flow). Using the criteria to enhance test cases. |
| LO10 | Explore and understand the need for minimization and prioritization. Review the regression test problem. Selection of test cases for regression. |

Part B: Contact Session Plan

| | |
|------------------------|--------------------------------|
| Academic Term | Second Semester 2022-2023 |
| Course Title | Software Testing Methodologies |
| Course No | SS ZG552/SE ZG552 |
| Lead Instructor | Harsh Tarneja |

Glossary of Terms

- Contact Hour (CH) stands for a hour long live session with students conducted either in a physical classroom or enabled through technology. In this model of instruction, instructor led sessions will be for 22 CH.
 - Pre CH = Self Learning done prior to a given contact hour
 - During CH = Content to be discussed during the contact hour by the course instructor
 - Post CH = Self Learning done post the contact hour
- Contact Hour (CS) stands for a two-hour long live session with students conducted either in a physical classroom or enabled through technology. In this model of instruction, instructor led sessions will be for 11 CS.
 - Pre CS = Self Learning done prior to a given contact session
 - During CS = Content to be discussed during the contact session by the course instructor
 - Post CS = Self Learning done post the contact session
- RL stands for Recorded Lecture or Recorded Lesson. It is presented to the student through an online portal. A given RL unfolds as a sequences of video segments interleaved with exercises
- SS stands for Self-Study to be done as a study of relevant sections from textbooks and reference books. It could also include study of external resources.
- LE stands for Lab Exercises
- HW stands for Home Work.
- M stands for module. Module is a standalone quantum of designed content. A typical course is delivered using a string of modules. M2 means module 2.

Teaching Methodology (Flipped Learning Model)

The pedagogy for this course is centered around flipped learning model in which the traditional class-room instruction is replaced with recorded lectures to be watched at home as per the student's convenience and the erstwhile home-working or tutorials become the focus of classroom contact sessions. Students are expected to finish the home works on time.

Contact Session Plan

- Each Module (M#) covers an independent topic and module may encompass more than one Recorded Lecture (RL).
- **Contact Sessions (2hrs each week)** are scheduled alternate weeks after the student watches all Recorded Lectures (RLs) of the specified Modules (listed below) during the previous week
- In the flipped learning model, Contact Sessions are meant for in-classroom discussions on cases, tutorials/exercises or responding to student's questions/clarification--- may encompass more than one Module/RLs/CS topic.
- Contact Session topics listed in course structure (numbered CSx.y) may cover several RLs; and as per the pace of instructor/students' learning, the instructor may take up more than one CS topic during each of the below sessions.

Detailed Structure

Introductory Video/Document: << *Introducing the faculty, overview of the course, structure and organization of topics, guidance for navigating the content, and expectations from students*>>

- Each of the sub-modules of **Recorded Lectures** (RLx.y) shall delivered via **30 – 60mins videos** followed by:
- **Contact session** (CSx.y) of 2Hr each for illustrating the concepts discussed in the videos with exercises, tutorials and discussion on case-problems (wherever appropriate); contact sessions (CS) may cover more than one recorded-lecture (RL) videos.

Course Contents

Contact Hour 1

| Time | Type | Description | Content Reference |
|---------------|-------|---|--|
| Pre CH | RL1.1 | Introduction to Software Testing | Lecture Notes & Slides |
| | RL1.2 | Overview of the Course | Lecture Notes & Slides |
| | RL1.3 | Software Testing Techniques | T1 Chapter 1 & T2 Chapter 1 |
| | RL1.4 | Software Testing – Quality Attributes, Types and Levels | T1 Chapter 1 & T2 Chapter 1 |
| During CH | CH1 | CH1.1 = Specification-Based Versus Code Based Testing debate CH1.2 = Fault Taxonomies CH1.3 = Requirements, Behaviour & Correctness CH1.4 = Correctness Versus Reliability CH1.5=Test Metrics | T1 1.4.3 T1 1.5 T2 1.3 T2 1.4 T2 1.6 |
| Post CH | SS1 | SS1.1 Quality Attributes SS1.2 Test Techniques | |
| | HW1 | None | |
| | LE1 | None | |
| | QZ1 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 2

| Time | Type | Description | Content Reference |
|---------------|-------|--|---|
| Pre CH | RL2.1 | Permutations and Combinations | Lecture notes & Slides |
| | RL2.2 | Propositional Logic | T1 3.4 |
| | RL2.3 | Discrete Math | T1 Chapter 3 |
| During CH | CH2 | CH2.1 = Examples for Permutations & Combinations CH2.2 = Examples for Propositional Logic CH2.3 = Examples on Set Theory CH2.4 = Probability Theory | T1 Chapter 3 (Develop examples to understand the theory and its application from Software Testing Perspective) |
| Post CH | SS2 | SS2.1 Map Test Technique and Math Concepts SS2.2 Study of Chapter 3 | |
| | HW2 | None | |
| | LE2 | None | |
| | QZ2 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 3

| Time | Type | Description | Content Reference |
|---------------|-------|--|--|
| Pre CH | RL2.4 | Graph Theory | T1 Chapter 4 |
| During CH | CH3 | CH3.1 = Graphs for testing – FSM CH3.2 = Graphs for testing – Petri Nets CH3.3 = Graphs for testing – EDPN CH3.4 = Graphs for testing – StateCharts | T1 4.3.2 T1 4.3.3 T1 4.3.4 T1 4.3.5 |
| Post CH | SS3 | SS2.2 Study of Chapter 4 | |
| | HW3 | None | |
| | LE3 | None | |
| | QZ3 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 4

| Time | Type | Description | Content Reference |
|--------|-------|--|--------------------------|
| Pre CH | RL3.1 | Specification Based Testing – Overview | Lecture Notes & T1 1.4.3 |
| | RL3.2 | Equivalence Class | T1 Chapter 6 |

| | | | |
|---------------|-------|---|---------------------------------|
| | RL3.3 | Boundary Value Analysis | T1 Chapter 5 |
| | RL3.4 | Example & Case Study | Lecture Notes, T1 Chapter 6 & 5 |
| During CH | CH4 | CH4.1 = Discuss examples from the text CH4.2 = Discuss and solve two examples from day to day software | T1 Chapter 5 & 6 |
| Post CH | SS4 | SS3.1 EC & BVA for a program SS3.2 Analyse, Compare & Contrast the techniques | |
| | HW4 | None | |
| | LE4 | None | |
| | QZ4 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 5

| Time | Type | Description | Content Reference |
|---------------|-------|---|------------------------------|
| Pre CH | RL4.1 | Domain Testing | T2 Chapter 3 |
| | RL4.2 | Combinatorial | Lecture Notes |
| | RL4.3 | Decision Table Based Testing | T1 Chapter 7 |
| | RL4.4 | Example & Case Study | T1 Chapter 7 & Lecture Notes |
| During CH | CH5 | CH5.1 = Discuss examples from the text CH5.2 = Discuss and solve two examples from day to day software | |
| Post CH | SS4 | SS4.1 = Elements of being systematic SS4.2 = Compare & Contrast the test techniques | |
| | HW5 | None | |
| | LE5 | None | |
| | QZ5 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 6

| Time | Type | Description | Content Reference |
|--------|-------|-------------------------------|-------------------|
| Pre CH | RL5.1 | Code Based Testing – Overview | Lecture Notes |
| | RL5.2 | Path Testing | T1 Chapter 8 |

| | | | |
|---------------|-------|--|--|
| | RL5.3 | Examples | T1 Chapter 8 |
| During CH | CH6 | CH6.1 = Compound conditions CH6.2 = Discussion on examples | T1 8.3.3 T1 8.3.4 or faculty discretion |
| Post CH | SS5 | SS5.1 Design of unit test cases SS5.2 Explore the tools for testing and metrics | |
| | HW6 | None | |
| | LE6 | None | |
| | QZ6 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 7

| Time | Type | Description | Content Reference |
|---------------|-------|---|------------------------------|
| Pre CH | RL6.1 | Data Flow Testing | T1 Chapter 9 |
| | RL6.2 | Path Based Testing – Metric | T1 Chapter 8 & Lecture Notes |
| | RL6.3 | Examples | T1 Chapter 9 & T1 Chapter 8 |
| During CH | CH7 | CH7.1 = Discuss Coverage Metrics with examples CH7.2 = Slice based testing | T1 9.1.7 T1 9.2 |
| Post CH | SS6 | At faculty discretion | |
| | HW7 | None | |
| | LE7 | None | |
| | QZ7 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 8

| Time | Type | Description | Content Reference |
|-----------|-------|---|--------------------------------|
| Pre CH | RL7.1 | Model Based Testing – Introduction & Overview | T1 Chapter 12 |
| | RL7.2 | Finite State Machines & Fault Model | T2 Chapter 5 |
| | RL7.3 | Examples | T1 Chapter 17 |
| | RL7.4 | Case Study | Lectures Notes & T1 Chapter 17 |
| During CH | CH8 | CH8.1 = Discuss Patterson Lattice CH8.2 = Discuss an Example for FSM | T1 12.2 Faculty discretion |

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|---------------|-----|--|--|
| | | CH8.3 = CH8.4 = | |
| Post CH | SS7 | SS7.1 Compare & Contrast FSM, State Charts & Petri Nets SS7.2 Using the FSM Model | |
| | HW8 | None | |
| | LE8 | None | |
| | QZ8 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 9

| Time | Type | Description | Content Reference |
|---------------|-------|--|-------------------------------|
| Pre CH | RL8.1 | Model Based Testing – Systems | T1 Chapter 17 |
| | RL8.2 | Model Based Testing – System of Systems | T1 Chapter 17 & T2 Chapter 5 |
| | RL8.3 | Example | T1 Chapter 17 & Lecture Notes |
| | RL8.4 | Cases Study | T1 Chapter 17 & Lecture Notes |
| During CH | CH9 | CH9.1 = Explain and discuss Systems of systems Types CH9.2 = Examples of Systems of Systems | T1 17.2 |
| Post CH | SS8 | SS8.1 Explore Systems of Systems around us | |
| | HW9 | None | |
| | LE9 | None | |
| | QZ9 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 10 (Review Session)

| Time | Type | Description | Content Reference |
|-----------|---------------|---|-------------------------------------|
| Pre CH | All QR videos | QR1 to QR8 | These are all Quick Review Sessions |
| During CH | CH10 | CH10.1 = Review of Modules 1 to 8 CH10.2 = Problem solving and Q&A | |
| Post CH | SS10 | At the faculty discretion | |
| | HW10 | None | |

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|---------------|------|---------------------------|--|
| | LE10 | None | |
| | QZ10 | At the faculty discretion | |
| Lab Reference | | | |

Contact Hour 11

| Time | Type | Description | Content Reference |
|---------------|-------|--|---|
| Pre CH | RL9.1 | OO Software & OO Software test – Introduction & Overview | Lecture Notes & T1 Chapter 15 |
| | RL9.2 | Issues in Testing OO Software | T1 Chapter 15 |
| | RL9.3 | OO Unit Testing | T1 Chapter 15 |
| | RL9.4 | Examples | T1 Chapter 15 & Lecture Notes |
| During CH | CH11 | CH11.1 = Discuss implications of Composition & Encapsulation on from Test Perspective CH11.2 = Discuss implications of Inheritance & Polymorphism from Test Perspective | T1 15.1.2 T1 15.3.4 Addition info at Faculty discretion |
| Post CH | SS9 | SS9.1 OO Test methods for a program SS9.2 Review of a OO Framework (Qt/GTK) and OO Testing | |
| | HW11 | None | |
| | LE11 | None | |
| | QZ11 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 12

| Time | Type | Description | Content Reference |
|-----------|--------|---|-------------------------------|
| Pre CH | RL10.1 | OO Integration Testing | T1 Chapter 15 |
| | RL10.2 | OO System Testing | T1 Chapter 15 |
| | RL10.3 | OO – GUI Testing | T1 Chapter 15 & Lecture Notes |
| | RL10.4 | Examples & Cases | T1 Chapter 15 & Lecture Notes |
| During CH | CH12 | CH12.1 = Discuss Framework for OO integration testing CH12.2 = Discuss Use Case based System Testing for OO software (Currency converter | T1 15.4.3 T1 15.5.1 |

| | | | |
|---------------|------|--|--|
| | | program) | |
| Post CH | SS10 | At Faculty discretion | |
| | HW12 | None | |
| | LE12 | None | |
| | QZ12 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 13

| Time | Type | Description | Content Reference |
|---------------|--------|--|-------------------------------|
| Pre CH | RL11.1 | Integration Testing – Introduction, Overview & Issues | T1 Chapter 13 |
| | RL11.2 | Integration Testing – Types & Strategies | T1 Chapter 13 |
| | RL11.3 | Examples | T1 Chapter 13 |
| | RL11.4 | Cases | T1 Chapter 13 & Lecture Notes |
| During CH | CH13 | CH13.1 = Examples of Call Graph Based Integration CH13.2 = Examples of Path Based Integration | T1 13.2 T1 13.3 |
| Post CH | SS13 | SS11.1 Integration strategies for a GUI program | |
| | HW13 | None | |
| | LE13 | None | |
| | QZ13 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 14

| Time | Type | Description | Content Reference |
|-----------|--------|--|-------------------------------|
| Pre CH | RL12.1 | System Testing – Introduction, Overview & Issues | T1 Chapter 14 |
| | RL12.2 | Systems Testing – Types, Techniques & Strategies | T1 Chapter 14 |
| | RL12.3 | Examples | T1 Chapter 14 & Lecture Notes |
| During CH | CH14 | CH14.1 = Coverage Metrics for System Testing | T1 14.7 T1 14.9 |

| | | | |
|---------------|------|--|--|
| | | CH14.2 = Non Functional System Testing CH14.3 = CH14.4 = | |
| Post CH | SS12 | At faculty discretion | |
| | HW14 | None | |
| | LE14 | None | |
| | QZ14 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 15

| Time | Type | Description | Content Reference |
|---------------|--------|--|--|
| Pre CH | RL13.1 | Life-Cycle Based Testing – Overview and Perspective | T1 Chapter 11 |
| | RL13.2 | Life-Cycles – Water fall, Iterative, and Agile | T1 Chapter 11 |
| | RL13.3 | Implications and issues, Strategies & Models | T1 Chapter 11 |
| | RL13.4 | Example and Case | Lecture Notes |
| During CH | CH15 | CH15.1 = Discuss Agile methods and processes for Test Engineers (TDD, XP, Scrum) CH15.2 = CH15.3 = CH15.4 = | Take up an exercise in class for team understanding with use of a sport or a team game |
| Post CH | SS13 | SS13.1 Agile Methodologies – Mechanisms and Tools | |
| | HW15 | None | |
| | LE15 | None | |
| | QZ15 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 16

| Time | Type | Description | Content Reference |
|-----------|--------|--|-------------------|
| Pre CH | RL14.1 | Test Adequacy – Need & Overview | T2 Chapter 7 |
| | RL14.2 | Test Adequacy Assessment – Data Flow | T2 Chapter 7 |
| During CH | CH16 | CH16.1 = Concepts, Adequacy criteria for data flow – focus on examples | T2 7.3/7.4 |
| Post CH | SS14 | At faculty discretion | |

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|---------------|------|--|--|
| | HW16 | None | |
| | LE16 | None | |
| | QZ16 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 17

| Time | Type | Description | Content Reference |
|---------------|--------|---|------------------------------|
| Pre CH | RL14.3 | Test Adequacy Assessment – Control Flow | T2 Chapter 7 |
| | RL14.4 | Examples & Cases | T2 Chapter 7 & Lecture Notes |
| During CH | CH17 | CH17.1 = Concepts, Adequacy criteria for control flow – focus on examples | T2 7.2 |
| Post CH | SS17 | At faculty discretion | |
| | HW17 | None | |
| | LE17 | None | |
| | QZ17 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 18

| Time | Type | Description | Content Reference |
|---------------|--------|--|-------------------|
| Pre CH | RL15.1 | Need, Motivation & Techniques | T2 Chapter 9 |
| | RL15.2 | Regression Testing – Test Selection (Execution Trace) | T2 Chapter 9 |
| | RL15.3 | Regression Testing – Test Selection (Dynamic Slicing) | T2 Chapter 9 |
| During CH | CH19 | CH19.1 = Execution Trace Example CH19.2 = Dynamic Slicing example | T2 9.5 T2 9.6 |
| Post CH | SS15 | SS15.1 Compare and Contrast Execution Trace & Dynamic Slicing | |
| | HW19 | None | |
| | LE19 | None | |
| | QZ18 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 19

| Time | Type | Description | Content Reference |
|---------------|--------|--|------------------------|
| Pre CH | RL16.1 | Minimization, Prioritization & Optimization Techniques | T2 Chapter 9 |
| | RL16.2 | Test Selection Algorithms | T2 Chapter 9 |
| | RL16.3 | Examples | T2 Chapter 9 |
| During CH | CH19 | CH19.1 = Pairwise – OATS as a reduction technique CH19.2 = Latin Squares | T2 6.6 & 6.8 T2 6.4 |
| Post CH | SS16 | SS16.1 Compare and Contrast use of combinatorial techniques for test reduction | |
| | HW19 | None | |
| | LE19 | None | |
| | QZ19 | Suitable quiz may be designed for the topics covered | |
| Lab Reference | | | |

Contact Hour 20

| Time | Type | Description | Content Reference |
|---------------|---------------|--|-------------------------------------|
| Pre CH | All QR videos | QR9 to QR16 | These are all Quick Review Sessions |
| During CH | CH20 | CH20.1 = Review of Modules 9 to 16 CH20.2 = Problem solving and Q&A | |
| Post CH | SS20 | At the faculty discretion | |
| | HW20 | None | |
| | LE20 | None | |
| | QZ20 | At the faculty discretion | |
| Lab Reference | | | |

Contact Hour 21, 22: Review

Evaluation Scheme:

Legend: EC = Evaluation Component; AN = After Noon Session; FN = Fore Noon Session

| No | Name | Type | Duration | Weight | Day, Date, Session, Time |
|------|--------------------|-----------|-----------|--------|--------------------------|
| EC-1 | Quiz-1 | | * | 5% | February 13-23, 2023 |
| | Quiz-2 | | * | 5% | March 20-30, 2023 |
| | Quiz-3 | | * | 5% | April 20-30, 2023 |
| EC-2 | Mid-Semester Test | Open Book | 2 hours | 35% | Sunday, 12/03/2023 (FN) |
| EC-3 | Comprehensive Exam | Open Book | 2 ½ hours | 50% | Sunday, 21/05/2023 (FN) |

Note - Evaluation components can be tailored depending on the proposed model.

Important Information:

Syllabus for Mid-Semester Test (Open Book): Topics in CS 1-5.

Syllabus for Comprehensive Exam (Open Book): All topics given in plan of study

Evaluation Guidelines:

1. For Closed Book tests: No books or reference material of any kind will be permitted. Laptops/Mobiles of any kind are not allowed. Exchange of any material is not allowed.
2. For Open Book exams: Use of prescribed and reference text books, in original (not photocopies) is permitted. Class notes/slides as reference material in filed or bound form is permitted. However, loose sheets of paper will not be allowed. Use of calculators is permitted in all exams. Laptops/Mobiles of any kind are not allowed. Exchange of any material is not allowed.
3. If a student is unable to appear for the Regular Test/Exam due to genuine exigencies, the student should follow the procedure to apply for the Make-Up Test/Exam. The genuineness of the reason for absence in the Regular Exam shall be assessed prior to giving permission to appear for the Make-up Exam. Make-Up Test/Exam will be conducted only at selected exam centres on the dates to be announced later.

It shall be the responsibility of the individual student to be regular in maintaining the self-study schedule as given in the course handout, attend the lectures, and take all the prescribed evaluation components such as Assignment/Quiz, Mid-Semester Test and Comprehensive Exam according to the evaluation scheme provided in the handout.