

MIT 4.1 Project Management and Software Testing

Course Objective:

Software Project management

Project Management is generally seen as a key component of successful software projects. Together with software techniques it can produce software of high quality.

This course aims to cover the basics

- Deliver successful software projects that support organization's strategic goals
- Match organizational needs to the most effective software development model
- Plan and manage projects at each stage of the software development life cycle (SDLC)
- Create project plans that address real-world management challenges
- Develop the skills for tracking and controlling software deliverables

This **software testing course** will enable you to:

- Explain the importance, objectives, principles, and limitations of software testing.
- Explain the need for test case design, two broad approaches for it, and the commonly used white-box and black-box techniques for designing test cases.
- Explain the aspects involved in planning for software testing and in selecting the test strategy for a software project.

Instructional Objective:

After completing this course students will be able to:

1. Select an appropriate project team
2. Gather the requirements of the project
3. Plan the project
4. Know how a project is to be divided in the team
5. Assign Resources
6. Schedule the work
7. A framework for Test and Analysis
8. Test Case Analysis
9. Functional Analysis
10. Structural Analysis

Module I

Creating the Work Breakdown Structure: Work Breakdown Structure, Approaches to Building a WBS, Defining Project Milestones

Identifying the Tasks and Activities: Characteristics of Tasks and Activities, The Activity ID Process

Software Size and Reuse Estimating: Problems and Risks with Estimating Software Size, Getting Started with Software sizing: Estimating Begins with Planning, The Effects of Reuse on Software Size

Module II

Estimating Duration and Cost: Effort Measures, The Steps in Estimating, COCOMO: A Regression Model, COCOMO II, SLIM: A Mathematical Model

Assigning Resources: Organizational Planning, Identifying and Documenting the Project Roles and Skills Needed, Assigning Responsibilities to Individuals, Establishing Reporting Relationships, Project Management Resource Activities During Execution

Scheduling the work: Why Schedule, The uncertainty of Scheduling the Future, Scheduling Fundamentals, PERT and CPM scheduling, Leveling Resource Assignments, Map the Schedule to a Real Calendar, Critical Chain Scheduling

Eliciting Requirements: What is Software Requirement, What makes a “Good” Software Requirement, Requirement Elicitation Methods, Guidelines for writing Quality Requirements, Challenges in Eliciting Requirements

Developing the Software Requirement Specification: Questions the SRS Answers for a Project, Benefits of an SRS, Building the SRS, Evaluating the Project SRS

Module III

A framework for Test and Analysis: Validation and Verification, Degree of Freedom, Varieties of Software

Basic Principles: Sensitivity, Redundancy, Restriction, Partition, Visibility, Feedback.

Finite Models, Overview, Finite Abstraction of Behavior, Control Flow Graph, Call Graph, Finite State Machines

Dependence and Data Flow Models: Definition – Use Pairs, Data Flow Analysis, Class Analysis : Live and Avail, From Execution to Conservative Flow Analysis, Data Flow Analysis with arrays and pointers, Interprocedural Analysis

Module IV

Finite State Verification: State Space Exploration, The State Space Explosion Problem, The Model correspondence Problem, Granularity of Modeling

Test Case Selection and Adequacy: Overview, Test Specification and Cases, Adequacy Criteria, Comparing Criteria

Functional Testing: Overview, Random versus Partition Testing Strategies, A systematic Approach, Choosing a suitable Approach

Structural Testing: Overview, Statement Testing, Branch Testing, Conduction Testing, Path Testing, Procedure Call Testing, Comparing structural Testing Criteria

Text Books:

1. Quality Software Project Management by Robert T. Futrell, Donald F. Shafer, Linda I. Shafer, Pearson Education, ISBN:81-7808-767-7
2. Software Testing and Analysis : Process , Principles and Techniques- By Michal Young University of Oregon ISBN 978-0-471 45593-6