



# GUJARAT TECHNOLOGICAL UNIVERSITY

**Program Name: Diploma in Engineering**

**Level: Diploma**

**Branch: Computer Engineering / Computer Science & Engineering**

**Subject Code : DI0400011**

**Subject Name : Software Engineering**

<b>W.E. F. Academic Year:</b>	2025-26
<b>Semester:</b>	4 <sup>th</sup>
<b>Category of the Course:</b>	PCC

<b>Prerequisite:</b>	Computer fundamentals, Logical thinking, Programming knowledge and Object-oriented concepts
<b>Rationale:</b>	Software Engineering provides a structured approach for developing applications and software. Through this subject, students will learn how to analyze requirements and design solutions systematically. The course introduces the step-by-step process involved in system analysis, design, and project development. It emphasizes the importance of planning and documentation, enabling students to prepare and manage projects in an organized manner. By studying this subject, students will gain awareness of different aspects of software engineering and understand their roles and responsibilities in designing, developing, and implementing software systems.

## Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Compare various software development process models.	Understand
02	Develop software analysis and design using SRS, DFDs, and object-oriented UML diagrams	Apply
03	Develop a software development plan using appropriate project scheduling methods.	Apply
04	Design and apply test cases to evaluate software functionalities.	Apply

*\*Revised Bloom's Taxonomy (RBT)*

## Teaching and Examination Scheme:



# GUJARAT TECHNOLOGICAL UNIVERSITY

**Program Name: Diploma in Engineering**

**Level: Diploma**

**Branch: Computer Engineering / Computer Science & Engineering**

**Subject Code : DI0400011**

**Subject Name : Software Engineering**

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	Cr	Theory		Tutorial / Practical		
				ESE (E)	PA (M)	PA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

**Course Content:**

Unit No.	Content	No. of Hours	% of Weightage
1	Software Process Models Defining software, Software Application Domain- System Software, Application Software, Embedded Software, Web Application, Artificial Intelligence Software and Green Hydrogen Ecosystem Software – Role of software in hydrogen production & distribution. Software Engineering – A layered Approach, Generic Process Model, Generic Framework Activity, Umbrella activity. Software Development Models- a) Traditional models - Waterfall model, Incremental process model, Prototype model, Spiral model, V- model b) <b>Agile Approach</b> - Principles of Agile, <b>Agile Frameworks</b> - Scrum, Extreme Programming (XP)	11	26
2	<b>Software Requirement Analysis and Design</b> <b>Requirement Gathering and Analysis</b> - Types of Requirements (Functional and Non-functional), Techniques for Requirement Gathering <b>Software Requirement Specification (SRS)</b> - Characteristics of a Good SRS, Customer requirement, Functional Requirement <b>Software Design</b> - Characteristics of a Good software design, Analysis v/s Design, classification of cohesion, classification of coupling.	15	28
2	<b>Function Oriented Software Design</b> – Data flow diagram (DFD), Context level DFD and Level -1 DFD <b>Object-Oriented Modeling with UML</b> – Use case diagram,		



# GUJARAT TECHNOLOGICAL UNIVERSITY

**Program Name: Diploma in Engineering**

**Level: Diploma**

**Branch: Computer Engineering / Computer Science & Engineering**

**Subject Code : DI04000011**

**Subject Name : Software Engineering**

	Class Diagram, Component Diagram, Sequence Diagram and Activity Diagram		
3	<p><b>Software Project Estimation &amp; Scheduling</b>            Responsibility of software project Manager</p> <p><b>Metrics for Size Estimation</b> - Line of Code , Function Points</p> <p><b>Project Estimation Techniques</b> - COCOMO model</p> <p><b>Project Scheduling</b> - Gantt Chart, Flow Chart, Sprint burn down chart for agile model</p> <p><b>Risk Management</b> - Risk Identification, Risk Assessment, Risk mitigation and planning, Risk Monitoring &amp; Control</p>	11	26
4	<p><b>Software Coding and Testing</b></p> <p><b>Coding</b>            Coding standards and guidelines, Code review - Code Work through and Code Inspection, Software Documentation - Internal Documentation and External Documentation.</p> <p><b>Testing</b>            Testing Fundamentals, Functional Testing – Black box testing, Structural Testing – White box testing, Overview of Alpha &amp; Beta Testing, Overview of Unit testing &amp; Integration testing, Test Documentation – test case template</p>	08	20
<b>Total</b>		<b>45</b>	<b>100</b>

**Suggested Specification Table with Marks (Theory):**

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
31	46	23	0	0	0

*Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)*

**References/Suggested Learning Resources:**



# GUJARAT TECHNOLOGICAL UNIVERSITY

**Program Name: Diploma in Engineering**

**Level: Diploma**

**Branch: Computer Engineering / Computer Science & Engineering**

**Subject Code : DI0400011**

**Subject Name : Software Engineering**

## **(a) Books:**

1. Roger S. Pressman “Software Engineering: A Practitioner's Approach” , Tata McGraw Hill, 2010, ISBN :978-007-126782-3
2. Rajib Mall “Fundamentals of Software Engineering”, PHI,2018, ISBN:978-93-88028-02-8
3. Michael R Blaha and James R Rumbaugh, “Object Oriented Modeling and design with UML”, Pearson Prentice Hall, 2009 ISBN:978-81-317-1106-4

## **(b) Open source software and website:**

1. <https://www.javatpoint.com/>
2. <https://www.geeksforgeeks.org/>
3. <https://www.w3schools.co>
4. <https://www.tutorialspoint.com/>
5. <https://nptel.ac.in>
6. <https://www.edx.org>
7. <https://www.coursera.org>
8. <https://www.udemy.com>
9. <https://www.techtarget.com/searchsoftwarequality/definition/agile-software-development>

## **Suggested Course Practical List:**

- 1) Describe various software development models with appropriate diagram Process Scheduling algorithm
- 2) Write problem statement to define the project title with bounded scope of the project.
- 3) Select relevant process model to define activities and related tasks set for assigned project
- 4) Gather application specific requirements- Requirement gathering
- 5) Prepare broad SRS (software requirement software) for the above selected project
- 6) Develop data designs using DFDs (data flow diagram) and E-R (entity-relationship) diagram.
- 7) Prepare use-cases and draw use case diagram
- 8) Develop a class diagram for selected project
- 9) Develop a component diagram for selected project
- 10) Develop Sequence diagram for selected project
- 11) Develop the activity diagram to represent flow from one activity to another for software development.
- 12) Evaluate size of the project using Function point metric for the assigned project.
- 13) Estimate cost of the project using COCOMO (Constructive Cost Model) / COCOMO II approach for the assigned project.
- 14) Use flow chart and Gantt charts to track progress of the assigned project. (Use Sprint burn down chart if agile model is selected).
- 15) Prepare various test case for selected project.



# GUJARAT TECHNOLOGICAL UNIVERSITY

**Program Name: Diploma in Engineering**

**Level: Diploma**

**Branch: Computer Engineering / Computer Science & Engineering**

**Subject Code : DI04000011**

**Subject Name : Software Engineering**

## List of Laboratory/Learning Resources Required:

1. Computer with basic configuration and Word Processing & Presentation tools
2. Internet connectivity for accessing online tools
3. Diagramming tools for UML and DFD diagrams

## Suggested Project List:

1. Case study on student management system
2. Case study on library management system
3. Case study on hospital management system
4. Case study on banking system
5. Case study on collage management system
6. Case study on movie ticket booking system
7. Case study on online food ordering application
8. Case study on online shopping
9. Case study on hotel management system
10. Case study on bus ticket reservation system
11. Case study on railway ticket reservation system
12. Case study on flight ticket reservation system
13. Case study on leave management system in large organization
14. Case study on stock management system in mall
15. Case study on attendance management system
16. Case study on vehicle rental system
17. Case study on hospital appointment booking
18. Case study on gym management system
19. Case study on Tours and Travel Management
20. Case study on hostel management system
21. Case study on employee management system

## Suggested Activities for Students:

- a) Students are encouraged to register themselves in various MOOCs such as: Swayam, edx, Coursera, Udemy etc to further enhance their learning.
- b) Prepare charts for various models, SDLC life cycles, UML notations etc..
- c) Prepare SRS documents based on case study.
- d) Discuss various case studies available on internet.
- e) An hour of problem solving for various case study topics may be organized and students are encouraged to participate



# GUJARAT TECHNOLOGICAL UNIVERSITY

**Program Name: Diploma in Engineering**

**Level: Diploma**

**Branch: Computer Engineering / Computer Science & Engineering**

**Subject Code : DI04000011**

**Subject Name : Software Engineering**

- f) Encourage students to interact with the industry person to discuss and gather information of current trends, models, documentation, testing methods and different tools used in industry.

\*\*\*\*\*