



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering Syllabus

Subject Code : 3164504

Subject Name : Software Engineering

WEF Academic Year :	2021 - 22
Semester :	6
Category of the Course :	Professional Elective

Prerequisite :	Object Oriented Programming fundamental, UML.
Rationale :	<ul style="list-style-type: none"> To study Software Development Life Cycle, Development models and Agile Software development. To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods. To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing. To learn the process of improving the quality of software work products. To gain the techniques and skills on how to use modern software testing tools to support software testing projects. To expose Software Process Improvement and Reengineering and DevOps

Course Scheme :

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

Course Content :

Sr. No.	Course Content	No. of Hours	% of Weightage
01	Introduction : Definition of Software Engineering, Software crisis, Evolution of technology- Hype curve, Exploratory style of Software development vs. Software Engineering, Human cognition mechanism, Software Engineering principle- abstraction and decomposition.	03	05
02	Software Development Life Cycle (SDLC) models : Water fall model, V-shape Model, Prototyping Model, Spiral Model, RAD Agile Model, Verification and Validation.	06	15



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03	Software Project Management : Responsibility of a project manager, Project planning, Metrics for project size estimation, Project estimation techniques, COCOMO model, Halstead's Software Science, Scheduling- CPM, PERT, Gantt chart, Risk management, Software configuration management, Staffing and team leader project and planning.	08	20
04	Requirement analysis and specification : SRS, Requirement gathering and specification, Functional requirement, Traceability.	04	10
05	Software Design : Characteristics of a good software, Cohesion and coupling, Function oriented design- DFD, Structure chart. Design phase in life cycle, System Design Definitions, Concept and methodologies, data flow oriented Design, Program Design and the requirements. Object oriented design-class and relationship, UML diagrams.	08	20
06	Coding and Testing : Coding Standard, software documentation, Testing- unit testing, black box testing- equivalence class partitioning, boundary value analysis, white box testing- McCabe's Cyclometric complexity, Mutation Testing, Debugging, Program analysis tool, Integration Testing, Grey box testing, System testing- Smoke and performance testing.	07	15
07	Software Reliability and Quality Management : Reliability, Hazard, MTTF, Repair and Availability, Software quality, Software reliability and fault tolerance, six-sigma.	02	05
08	DevOps : Overview, Problem Case Definition, Benefits of Fixing Application Development Challenges, DevOps Adoption Approach through Assessment, Solution Dimensions, What is DevOps?, DevOps Importance and Benefits, DevOps Principles and Practices, 7 C's of DevOps Lifecycle for Business Agility, DevOps and Continuous Testing, How to Choose Right DevOps Tools, Challenges with DevOps Implementation, Must Do Things for DevOps, Mapping My App to DevOps - Assessment, Definition, Implementation, Measure and Feedback.	04	10
Total		42	100

Reference Books :

1. Rajib Mall, Software Engineering, PHI
2. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Seventh Edition, Mc Graw-Hill International Edition
3. Ian Sommerville, "Software Engineering", 9th Edition, Pearson Education Asia, 2011.
4. Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 2010.
5. Deepak Gaikwad, Viral Thakkar, "DevOps Tools from Practitioner's ViewPoint" , Wiley



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Course Outcome :

After Completion of the Course, Student will able to :

No	Course Outcomes	RBT Level*
01	Identify the need for engineering approach to software development and various processes of requirements analysis for software engineering problems.	RM
02	Apply software engineering principles, techniques to develop and maintain, large scale software systems	AP
03	Analyze and design of complex systems and meet ethical standards, legal responsibilities	AN
04	Produce efficient, reliable, robust and cost-effective software solutions and perform independent research and analysis as an effective member or leader of software development team to achieve personal and team goals	AP

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Suggested Course Practical List :

(Pl. Note: List of Experiments and Tutorials should be as per theory covered in the class, below mentioned practical are just for the reference purpose).

Tutorial 1

Study the complete Software Development Life Cycle (SDLC) and analyze various activities conducted as a part of various phases. For each SDLC phase, identify the objectives and summaries outcomes.

Tutorial 2

Consider any project to be developed in any technology as a Software Architect or Project Manager. Construct Software Requirement Specification (SRS) document for the project.

Tutorial 3

Considering your immense expertise in software development, The Absolute Beginners Inc. has recently allotted you a mega project. The goal of the project is to create a database of all. The software would allow one to generate a list of top ten hit films, top ten flop films, best comedy films, and so on. Using your prior experience you have decided the approximate sizes of each module of the software as follow:

- Data entry (0.9 KDSI)
- Data update (0.7 KDSI)
- Query (0.9 KDSI)
- Report generation and display (2 KDSI)



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Also take into consideration the following cost drivers with their ratings :

- Storage constraints (Low)
- Experience in developing similar software (High)
- Programming capabilities of the developers (High)
- Application of software engineering methods (High)
- Use of software tools (High)

(All other cost drivers have nominal rating).

Now answer the following :

Solve the problem by Applying Basic and intermediate COCOMO

- Find Project Type?
- Find Project Size?
- Find Initial Effort Estimation?
- Find Adjusted Effort Estimation?
- Find schedule?
- Find minimum size of the team you would require to develop this system?
- Assuming that your client would pay Rs. 50,000/- per month of development, how much would be the likely billing?

Tutorial 4 :

Function Point: <http://conferences.embarcadero.com/article/32094#Bonus> .

Analyze the case study and identify the error and solve it. At the end, need to assess calculation part of effort using FP oriented estimation model

Tutorial 5 :

Subject Project: For below mentioned Systems and other systems assign a mini-project two a group of students to prepare Software documents mentioned as A to E

1. Library Information System
2. Villager Telephone System
3. Waste Management Inspection Tracking System (WMITS)
4. Flight Control System
5. Ambulance Dispatching System

- A. Development of Software Requirements Specification (SRS)
- B. Function oriented design using SA/SD
- C. Object-oriented design using UML
- D. Test case design
- E. Implementation using Java and testing



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Tutorial 6 :

Study of any two Open source tools in DevOps for Infrastructure Automation, Configuration Management ,Deployment Automation, Performance Management, Log Management. Monitoring. (Behat , Watir, Chef, Supergiant, SaltStack, Docker, Hudson etc.)

List of Laboratory/Learning Resources Required :

Various Web Based SE Tools

- Software:-Rational Rose, Microsoft Visio, Enterprise resource planning
- Project Management Tools
- SCM Tools
- SQA Tools
- Analysis and Design Tools
- User Interface Development Tools
- Object-Oriented Software Engineering Tools
- Testing Tool

- www.en.wikipedia.org/wiki/Software_engineering
- www.win.tue.nl
- www.rspa.com/spi
- www.onesmartclick.com/engsineering/software-engineering.html
- www.sei.cmu.edu
- <https://www.edx.org/school/uc-berkeleyx>
- <https://devops.com/most-popular-open-source-devops-tools/>
- <https://www.guru99.com/devops-tutorial.htm>

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