



RAMRAO ADIK INSTITUTE OF TECHNOLOGY NERUL, NAVI MUMBAI

Department of Computer Engineering

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| Program: B. Tech. in Computer Engineering | |
| Course Name: Software Engineering Subject Code: CEC501 Theory Credits : 3 | Year &Sem: TE- SEM -V Lecture : 03 hours/week Total Contact Hours : TH-39hrs |
| Faculty : Mrs. Smita Bharne Mrs. Sheetal Ahir Dr. Vaibhav Narawade Ms. Dhanshri Bhosale Mr. Ganesh Ingle | Academic Year: 2022-23 |

CourseObjectives:

1. To introduce fundamentals of software engineering including requirement specifications, software design, testing and maintenance
2. Present software engineering methodologies for the development of Quality, cost effective, schedule- meeting software.

Course Outcomes: At the end of the course learner will able to

- CO1. Comprehend software development life cycle.
- CO2. Construct/Compose SRS document for a SEP (software engineering project).
- CO3 Plan, Schedule and Track SEP
- CO4 Apply design and development techniques to the SEP
- CO5 Use SCM, SQA and RMMM plan for SEP
- CO6 Understand ethical and professional issues related to Software Project Delivery

Signature of Head of Department

Signature of Faculty

Program Outcomes:

- PO1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Mapping of Course outcomes with Program outcomes:

| Subject Weight | Course Outcomes | | Contribution to Program outcomes | | | | | | | | | | | |
|------------------------|-----------------|---|----------------------------------|------|------|------|------|------|------|------|------|-------|-------|-------|
| | | | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 |
| THEORY 100% | CO1 | Comprehend software development life cycle. | 1 | 1 | 1 | 1 | 1 | 1 | | | 1 | 1 | 1 | 1 |
| | CO2 | Construct/Compose SRS document for a SEP (software engineering project). | 1 | 1 | 1 | 2 | 1 | 1 | | | 1 | 1 | | 1 |
| | CO3 | Plan, Schedule and Track SEP | 1 | | 2 | 1 | 1 | | | | 2 | 1 | 1 | 1 |
| | CO4 | Apply design and development techniques to the SEP | 1 | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | | 1 | 1 |
| | CO5 | SCM, SQA and RMMM plan for SEP | 1 | 1 | 1 | | 2 | 1 | 1 | 1 | | 1 | | 1 |
| | CO6 | Understand ethical and professional issues related to software project delivery | 1 | 1 | | | 1 | 1 | 1 | 2 | | 1 | 1 | 1 |

Program Specific Outcomes:

PSO1: To build competencies towards problem solving with an ability to understand, identify, analyze and design the problem, implement and validate the solution including both hardware and software.

PSO2: To build appreciation and knowledge acquiring of current computer techniques with an ability to use skills and tools necessary for computing practice.

PSO3: To be able to match the industry requirements in the area of computer science and engineering. To equip skills to adopt and imbibe new technologies.

Mapping of Course outcomes with Program Specific Outcomes:

| Course Outcomes | | Contribution to Program Specific outcomes | | |
|-----------------|---|---|------|------|
| | | PSO1 | PSO2 | PSO3 |
| CO1 | Comprehend software development life cycle. | 2 | 1 | 1 |
| CO2 | Construct/Compose SRS document for a SEP (software engineering project). | 2 | 1 | 1 |
| CO3 | Plan, Schedule and Track SEP | 2 | 2 | 1 |
| CO4 | Apply design and development techniques to the SEP | 2 | 1 | 1 |
| CO5 | SCM, SQA and RMMM plan for SEP | | 1 | 1 |
| CO6 | Understand ethical and professional issues related to Software Project Delivery | 1 | 1 | 1 |

Chapter Plan

| Chapter | Topic | Duration | CO Meet | Weightage (in %) |
|----------------|--|-----------------|----------------|-------------------------|
| 1. | Software Process Models | 6 | CO1 | 16 |
| 2. | Industry Requirements: Analysis and Specification | 8 | CO2 | 20 |
| 3. | Software Project planning and management | 5 | CO3 | 12 |
| 4. | Software Design | 8 | CO4 | 20 |
| 5. | Software Configuration Management, Quality Assurance and Risk management | 6 | CO5 | 16 |
| 6. | Software testing and maintenance | 6 | CO6 | 16 |

Lesson Plan

| Week No. | Sr. No. | Mapping with CO's | Co mapped | Teaching Methodology | |
|----------|---------|--|-----------|----------------------|----------------------|
| | | Detailed contents | | Co weightage | |
| Week 1 | 1. | Module1: Software Process Models - Evolving role of software, Type of Software SW Components:4 Ps (Process, People, Project, Product) | CO1 | 2 | PPT, Quiz |
| | 2. | SDLC methods/models: Build & Fix, Waterfall, Prototype (Evolutionary & Throw-away) | | 2 | PPT |
| | 3. | V model, Incremental iterative, Spiral, RAD | | 2 | PPT |
| Week 2 | 4. | Introduction to agility, agile process models- Scrum, Kanban | | 2 | PPT |
| | 5. | Extreme Programming | | 1 | PPT |
| | 6. | Introduction to Devops | | 1 | PPT |
| Week 3 | 7. | Module 2: Industry Requirements: Analysis and Specification Requirement elicitation(analysis) | CO2 | 2 | PPT |
| | 8. | Software requirement specification (SRS) documentation | | 1 | PPT |
| | 9. | SRS documentation case study | | 2 | PPT, Case study |
| Week 4 | 10. | Dataflow Diagram (DFD), Types and Components of Data Flow Diagram | | | PPT |
| | 11. | Rules for DFD, Level-1 and level -2 DFD diagram | | 1 | PPT |
| | 12. | Examples of level-1 and level-2 DFD | | 1 | PPT, problem solving |

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|---------------|-----|---|-----|---|---------------------------------|
| Week 5 | 13. | Examples of level-1 and level-2 DFD | CO3 | 1 | PPT |
| | 14. | Data dictionaries | | 1 | PPT |
| | 15. | Module 3: Software Project planning and management -- Project planning and Project scheduling. | | 2 | PPT, Group discussion |
| Week 6 | 16. | Software Metrics: Size Metrics like LOC | | 2 | PPT |
| | 17. | Token Count, Function Count | | 2 | PPT |
| | 18. | Cost estimation using models like COCOMO | | 2 | PPT |
| Week 7 | 19. | The management spectrum | CO4 | 1 | PPT |
| | 20. | Module 4 :Software Design Design concepts and principles | | 1 | PPT |
| | 21. | Effective modular design Cohesion and Coupling | | 1 | PPT |
| Week 8 | 22. | UML diagrams- use case & class Diagram | | 2 | PPT, example case study |
| | 23. | Activity diagram | | 1 | PPT, example case study |
| | 24. | Sequence & collaboration diagram | | 1 | PPT,Example solving NPTEL video |
| Week 9 | 25. | Design model, Data designing, Architectural styles and design, | | 2 | PPT |
| | 26. | User interface design | | 1 | PPT |
| | 27. | Component level design | | 1 | PPT |

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| Week 10 | 28. | Module 5: Software Configuration Management, Quality Assurance and Risk management Reliability issues, Reliability metrics | CO5 | 2 | PPT |
| | 29. | Reliability models, SQA(software quality Assurance) | | 2 | PPT |
| | 30. | ISO 9000 certification for software industry | | 1 | |
| Week 11 | 31. | Software Risk identification, Risk projection | | 2 | PPT , Quiz |
| | 32. | Risk refinement, RMMM plans | | | PPT |
| | 33. | Software Configuration Management | | | |
| Week 12 | 34. | Module 6: Software testing and maintenance Software testing techniques | CO6 | 2 | PPT |
| | 35. | Types of Software testing techniques | | 2 | PPT |
| | 36. | Testing for specialized environment | | 2 | PPT, Video |
| Week 13 | 37. | Software maintenance and its types | | 2 | PPT |
| | 38. | Software Re-engineering | | 3 | PPT |
| | 39. | Reverse-engineering. | | 3 | PPT |

Assessment of Course Outcomes

| Assessment Method | Course Outcomes (Out of 20 marks) | | | | | |
|--------------------------|--|------------|------------|------------|------------|------------|
| | CO1 | CO2 | CO3 | CO4 | CO5 | CO6 |
| | | | | | | |
| IA-1 (20) | 05 | 15 | | | | |
| | | | | | | |
| Mid Sem (20) | 05 | 10 | 05 | | | |
| | | | | | | |
| IA-2 (20) | | | | 10 | 05 | 05 |
| | | | | | | |
| End Sem (60) | 10 | 15 | 05 | 15 | 10 | 05 |

Content beyond syllabus

Design Patterns for software designing

Signature of Head of Department

Signature of Faculty