**DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE**
(AUTONOMOUS)
(Approved by AICTE & Affiliated to Anna University, Chennai)
Accredited with 'A' Grade by NAAC, Accredited by TCS
Accredited by NBA with BME, ECE & EEE
**PERAMBALUR - 621 212. Tamil Nadu.**
website : www.dsengg.ac.in

# COURSE PLAN (2024 – 2025 Odd Semester)

| | | | | |
|---|---|---|---|---|
| **Name of the Faculty** | | | | |
| **Designation/Department** | ASSISTANT PROFESSOR / IT | | | |
| **Course Code/Name** | U20IT502 / SOFTWARE ENGINEERING | | | |
| **Year/Section/Department** | III / B/IT | | | |
| **Credits Details** | L:3 | T:0 | P:0 | C:3 |
| **Total Contact Hours Required** | 45 | | | |

**Syllabus:**

| **UNIT I SOFTWARE PROCESS** | **No. of Periods 9** |
|---|---|
| Introduction –Software Engineering Paradigm – life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented and Agile software project management model) – system engineering – computer based system – verification – validation. | |
| **UNIT II SOFTWARE REQUIREMENTS** | **No. of Periods 9** |
| Functional and non-functional - user – system –requirement engineering process – feasibility studies – requirements – elicitation – validation and management – software prototyping – prototyping in the software process – rapid prototyping techniques – user interface prototyping -Software document. Analysis and modeling- data, functional and behavioral models – structured analysis and data dictionary. | |
| **UNIT III DESIGN CONCEPTS AND PRINCIPLES** | **No. of Periods 9** |
| Design process and concepts – modular design – design heuristic – design model and document. Architectural design – software architecture – data design – architectural design– user interface design – user interface design principles. Real time systems - Real time software design. Software Configuration Management (SCM) – Need for SCM – Version control – Introduction to SCM process – Software configuration items - software design with extreme programming – Risk Management. | |
| **UNIT IV TESTING** | **No. of Periods 9** |
| Taxonomy of software testing – levels – test activities – types of software test – black box testing – testing boundary conditions – structural testing – test coverage criteria based on data flow mechanisms – regression testing – testing in the large - software testing strategies - testing using extreme programming. | |

| UNIT V SOFTWARE PROJECT MANAGEMENT | No. of Periods 9 |
|---|---|
| Measures and measurements – S/W complexity and science measure – size measure – data and logic Structure measure – information flow measure. Software cost estimation – function point models COCOMO model- Delphi method.- Defining a Task Network – Scheduling – Earned Value Analysis Error Tracking – Software changes – program evolution dynamics – software maintenance Architectural evolution. | |

**Objective:**

- To understand the phases in a software project
- To understand fundamental concepts of requirements engineering and Analysis Modeling.
- To understand the various software design methodologies
- To learn various testing and maintenance measures

**Text Book:**

**T1:** Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Seventh Edition, McGraw-Hill International Edition, 2010.
**T2:** Ian Sommerville,"Software Engineering", 9th Edition, Pearson Education Asia, 2011.

**Reference Book:**

**R1.** Rajib Mall, Fundamentals of Software Engineering", Third Edition, PHI Learning PrivateLimited, 2009.
**R2.** Pankaj Jalote, ―Software Engineering, A Precise Approach‖, Wiley India, 2010.
**R3.** Kelkar S.A., ―Software Engineering‖, Prentice Hall of India Pvt Ltd, 2007.
**R4.** Stephen R.Schach, ―Software Engineering‖, Tata McGraw-Hill Publishing Company Limited, 2007.

**Website:**

**W1:** http://nptel.ac.in/.
**W2:** https://www2.cs.siu.edu/~mengxia/Courses%20PPT/435/Chapter_03.pdf
**W3:** http://www.cs.tau.ac.il/~nachumd/models/Nets.pdf

**Online Mode of Study (if Any):**

https://nptel.ac.in/courses/106/105/106105182/
https://onlinecourses.nptel.ac.in/noc20_cs68/preview

**Course Plan:**

| Topic Number | Topic | Reference Detail | Page Number | Mode of teaching | Number of Periods Required | Cumulative Period |
|---|---|---|---|---|---|---|
| **UNIT I - SOFTWARE PROCESS** | | | | | | |
| 1 | Introduction to Software Engineering | T1 | 20 | BB | 1 | 1 |
| 2 | Software Engineering Paradigm | T1 | 23 | BB | 1 | 2 |
| 3 | Life cycle models - Waterfall, Incremental Process Models | T1 | 26 | BB | 1 | 3 |
| 4 | WINWIN spiral, evolutionary model | T1 | 34 | PPT & Video | 1 | 4 |
| 5 | Prototyping & object oriented model | T1 | 43 | BB | 1 | 5 |
| 6 | Agile software project management model | T1 | 56 | BB | 1 | 6 |
| 7 | System engineering | T1 | 65 | BB | 1 | 7 |
| 8 | Computer based system | W2 | --- | BB | 1 | 8 |
| 9 | Verification , validation | W2 | --- | BB | 1 | 9 |
| **Outcome of Unit I:** **CO1:** Identify the key activities in managing a software project and recognize different process model.(K2) | | | | | | |
| **UNIT II - SOFTWARE REQUIREMENTS** | | | | | | |
| 10 | Software Requirements: Functional and Non-Functional | T1 | 272 | BB | 1 | 10 |
| 11 | User requirements, System requirements | T1 | 273 | PPT | 1 | 11 |
| 12 | Requirement Engineering Process: Feasibility Studies | T1 | 274 | BB | 1 | 12 |

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|---|---|---|---|---|---|---|
| 13 | Requirements elicitation and analysis | T1 | 256 | BB | 1 | 13 |
| 14 | Requirement validation, requirements management | T1 | 258 | BB | 1 | 14 |
| 15 | Software prototyping, prototyping in the software process, rapid prototyping techniques | T1 | 260 | BB | 1 | 15 |
| 16 | User interface prototyping, Software document | T1 | 330 | BB | 1 | 16 |
| 17 | Analysis and modeling- data, functional and behavioral models | W3 | --- | BB | 1 | 17 |
| 18 | Structured analysis and Data Dictionary | R1 | 428 | BB | 1 | 18 |
| **Outcome of Unit II:** **CO2:** Explain the concepts of requirements engineering and Analysis Modeling.(K2) | | | | | | |
| **UNIT III - DESIGN CONCEPTS AND PRINCIPLES** | | | | | | |
| 19 | Design process – Design Concepts | T1 | 338 | BB | 1 | 19 |
| 20 | Design Model– Design Heuristic | T1 | 355 | BB | 1 | 20 |
| 21 | Architectural Design | T1 | 365 | BB | 1 | 21 |
| 22 | User interface design | T1 | 371 | BB | 1 | 22 |
| 23 | Real time systems | T1 | 378 | BB | 1 | 23 |
| 24 | Software Configuration Management (SCM) | R2 | 211 | BB | 1 | 24 |

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|---|---|---|---|---|---|---|
| 25 | Version control – Introduction to SCM process | R2 | 222 | BB | 1 | 25 |
| 26 | Software design with extreme programming | T1 | 415 | BB | 1 | 26 |
| 27 | Risk Management. | T1 | 416 | BB | 1 | 27 |

**Outcome of Unit III:**

**CO3:** Outline the systematic procedures for software design and deployment.(K2)

**UNIT IV - TESTING**

| | | | | | | |
|---|---|---|---|---|---|---|
| 28 | Taxonomy of software testing | T1 | 438 | BB | 1 | 28 |
| 29 | Levels – test activities | T1 | 439 | BB | 1 | 29 |
| 30 | Types of software test | T1 | 444 | BB | 1 | 30 |
| 31 | Black box testing | T1 | 459 | PPT | 1 | 31 |
| 32 | Testing boundary conditions – structural testing | T1 | 488 | BB | 1 | 32 |
| 33 | Test coverage criteria based on data flow mechanisms | W1 | --- | BB | 1 | 33 |
| 34 | Regression testing | T1 | 657 | BB | 1 | 34 |
| 35 | Software testing strategies | T1 | 802 | BB | 1 | 35 |
| 36 | Testing using extreme programming | T1 | 809 | BB | 1 | 36 |

**Outcome of Unit IV:**

**CO4:** Compare various testing and maintenance methods.(K2)

**UNIT V - SOFTWARE PROJECT MANAGEMENT**

| | | | | | | |
|---|---|---|---|---|---|---|
| 37 | Measures and measurements | W2 | --- | PPT | 1 | 37 |
| 38 | Size measure – data and logicStructure measure | W2 | --- | PPT | 1 | 38 |
| 39 | Information flow measure | T1 | 133 | BB | 1 | 39 |

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|---|---|---|---|---|---|---|
| 40 | Software cost estimation – function point models | T1 | 181 | BB | 1 | 40 |
| 41 | COCOMO model-Delphi method | T1 | 186 | BB | 1 | 41 |
| 42 | Defining a Task Network – Scheduling | T1 | 148 | BB | 1 | 42 |
| 43 | Earned Value Analysis | T1 | 151 | BB | 1 | 43 |
| 44 | Software changes – program evolution dynamics | T1 | 159 | BB | 1 | 44 |
| 45 | Software maintenance Architectural evolution. | T1 | 828 | BB | 1 | 45 |

**Outcome of Unit V:**

**CO5**:Interpret the project schedule, estimate project cost and effort required.(K2)

**CO6:** Develop a software using the software engineering principles.(K2)

**Course Outcome:**

**At the end of course:**

**CO1:** Identify the key activities in managing a software project and recognize different process model.(K2)

**CO2:** Explain the concepts of requirements engineering and Analysis Modeling.(K2)

**CO3:** Outline the systematic procedures for software design and deployment.(K2)

**CO4:** Compare various testing and maintenance methods.(K2)

**CO5:** Interpret the project schedule, estimate project cost and effort required.(K2)

**C06:** Develop a software using the software engineering principles.(K2)

**Course Outcome Vs Program Outcome Mapping:**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | 2 | 1 | - | - | - | - | - | - | - | - | - | - |
| **CO 2** | 2 | 1 | - | - | - | - | - | - | - | - | - | - |
| **CO 3** | 2 | 1 | - | - | - | - | - | - | - | - | - | - |
| **CO 4** | 2 | 1 | - | - | - | - | - | - | - | - | - | - |
| **CO 5** | 2 | 1 | - | - | - | - | - | - | - | - | - | - |
| **CO 6** | 3 | 2 | 1 | 1 | - | | - | - | - | - | - | - |
| **AVG** | **2.17** | **1.17** | **1** | **1** | **-** | | **-** | **-** | **-** | **-** | **-** | **-** |

**Content Beyond Syllabus / Gap Identified**:

- Software Quality factors
- Capability Maturity Model
- Glass-Box Testing
- SPI models

**Assignment:**

| Web Portal | Assignment | Components | Topic Number with Topic/Unit Details | Relevance to CO |
|---|---|---|---|---|
| **Web Portal 1** | **--** | **Assessment – I (60)** | **Unit I and II** | **CO1 & CO2** |
| | **1** | **Assignment-Handwritten (20)** | 3.Waterfall model, Incremental model<br>4.Spiral model, Evolutionary model, | **CO 1** |
| | **2** | **Poster/PPT Presentation (20)** | 5.Prototyping model,<br>12.Requirement engineering process | **CO 2** |
| **Web Portal 2** | **--** | **Assessment – II (60)** | **Unit III and IV** | **CO3 & CO4** |
| | **3** | **Seminar (20)** | 17.functional and behavioral models<br>18.Structured analysis and Data Dictionary | **CO 3** |
| | **4** | **Case Study Report/ Mini** | 31. Black box testing<br>34. Regression testing | **CO 4** |

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|---|---|---|---|---|
| | | **Project/ Model Making (20)** | | |
| **Web Portal 3** | **--** | **Model Exam (75)** | **Unit V** | **CO1 to CO6** |
| | **5** | **Technical Aptitude (15)** | 41. COCOMO model<br>43. Earned Value Analysis | **CO 5 & CO 6** |
| | | **Attendance** (Course attendance-10) | | |

**Submission Details:**

| **Phase 1(Before AT 1)** | | **Phase 2 (Before AT 2)** | | **Phase 3 (Model)** |
|---|---|---|---|---|
| **Assignment 1** | **Assignment 2** | **Assignment 3** | **Assignment 4** | **Assignment 5** |
| | | | | |

**PLAN OF ASSESSMENT TEST –DISTRIBUTION OF MARKS:**

| **TEST** | **CO- MARK WISE DISTRIBUTION** | | | | | | **BLOOM'S LEVEL MARK WISE DISTRIBUTION** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AT-1** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** | **CO6** | **BTL1** | **BTL2** | **BTL3** | **BTL4** | **BTL5** | **BTL6** |
| | **39** | **21** | **-** | **-** | **-** | **-** | **20** | **40** | **-** | **-** | **-** | **-** |
| **AT-2** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** | **CO6** | **BTL1** | **BTL2** | **BTL3** | **BTL4** | **BTL5** | **BTL6** |
| | **-** | **-** | **39** | **21** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **MODEL** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** | **CO6** | **BTL1** | **BTL2** | **BTL3** | **BTL4** | **BTL5** | **BTL6** |
| | **20** | **20** | **20** | **20** | **10** | **10** | **-** | **-** | **-** | **-** | **-** | **-** |

**Google Class Code Details:**

Google Class Name: **U20IT502 SOFTWARE ENGINEERING**

Google Class Code: https://classroom.google.com/c/NzExMDEyNDIwMTcw?cjc=nmbulbg

**Prepared By**

**AP/IT**

**Verified By**

**HOD/IT**

**Approved By**
**Principal**