



## ARSD College, University of Delhi

### Model Course Handout/Lesson Plan

| Course Name: Software Engineering |             |   | B.Sc. (Hons.) Computer Science |              |               |            |
|-----------------------------------|-------------|---|--------------------------------|--------------|---------------|------------|
| Semester                          | Course Code | Course Title -                                    | Lecture (L)                    | Tutorial (T) | Practical (P) | Credit (C) |
| IV                                | 32341402    | Core Course- DSCIX (BHCS11)- Software Engineering | 4<br>Credit-4                  | 0            | 4<br>Credit-2 | 6          |
| Teacher/Instructor(s)             |             | Uma Ojha  |                                |              |               |            |
| Session                           |             | 2023  |                                |              |               |            |

#### Course Objective:

The course introduces fundamental Software Engineering approaches and techniques for software development. The students also develop a case study using appropriate software model.

#### Course Learning Outcomes:

On successful completion of the course, students will be able to:

1. Analyse and model customer's requirements and model its software design.
2. Use suitable software model for the problem at hand.
3. Estimate cost and efforts required in building software.
4. Analyse and compute impact of various risks involved in software development.
5. Design and build test cases, and to perform software testing.

## Lesson Plan

| <b>Unit No.</b> | <b>Learning Objective</b>             | <b>Week No.</b> | <b>Topics to be covered</b>  |
|-----------------|---------------------------------------|-----------------|--|
| I               | Introduction                          | 1               | Software - Nature of Software, Software Application Domains, Legacy Software; Software Engineering - A Layered Approach; Software Process – Process Framework, Framework and Umbrella Activities |
|                 | Process Models                        | 2               | Process Models – Waterfall Model, Incremental Model, and Evolutionary process Model (Prototyping, Spiral Model);   |
|                 | Introduction to Agile and Agile Model | 3               | Introduction to Agile – Agility, Cost of Change, Agility Principles. Agile Model - Scrum; Software Process Assessment and Improvement - Capability Maturity Model Integration (CMMI).            |
| II              | Requirement Modeling                  | 4               | Requirements Modeling - Requirements Modeling Approaches, Flow oriented Modeling, Data Flow Modeling,  |
|                 |                                       | 5               | Control Flow Model, Control Specification, Process Specification, Behavioral Model, State Diagram, Sequence Diagrams;  |
| III             | Design Modeling                       | 6               | Design Concepts, Translating requirements model into design model, Design Process, Abstraction, Architecture, Separation of concerns, Modularity, Information hiding, Functional Independence,   |
|                 |                                       | 7               | Refinement, Refactoring; Architectural Mapping using Data Flow.  |
| IV              | Software Metrics                      | 8-9             | Function based Product Metrics, Software Quality Metrics;  |
|                 | Estimation for Software Project       | 10              | Estimation for Software Project, Project Scheduling, Quality - Software Quality, McCall’s Quality Factors, ISO 9126 Quality Factors, Achieving Software Quality;                                 |

|    |                  |       |  |
|----|------------------|-------|--|
| V  | Risk Management  | 11    | Risk Management- Software Risks, Risk Identification, Risk Projection and Risk Refinement, Risk Mitigation, Monitoring and Management. |
|    | Quality Control  | 12    | Cost Impact of Software Defects, Defect Amplification and Removal, Formal Technical Reviews; Software Quality Assurance – SQA Tasks.   |
| VI | Software Testing | 13-14 | Software Testing - Strategic Approach to Software Testing, Unit Testing, Integration Testing, Validation Testing, System Testing;      |
|    |                  | 15    | Black-Box and White Box Testing, Basis Path Testing  |

#### Evaluation Scheme:

| No. | Component                | Duration | Marks |
|-----|--------------------------|----------|-------|
| 1.  | Internal Assessment      |          | 25    |
|     | • Quiz                   |          |       |
|     | • Class Test             |          |       |
|     | • Attendance             |          |       |
|     | • Assignment             |          |       |
| 2.  | End Semester Examination | 3 hrs.   | 75    |

| Details of the Course |   |               |
|-----------------------|---|---------------|
| Unit                  | Contents  | Contact Hours |
| I                     | Introduction: Software Engineering - A Layered Approach; Software Process – Process Framework, Umbrella Activities; Process Models – Waterfall Model, Incremental Model, and Evolutionary process Model (Prototyping, Spiral Model); Introduction to Agile – Agility Principles, Agile Model – Scrum. | 10            |
| II                    | Software Requirements Analysis and Specifications: Use Case Approach, Software Requirement Specification Document, Flow oriented Modeling,  | 8             |

|                            |   |                                     |
|----------------------------|---|-------------------------------------|
|                            | Data Flow Modeling, Sequence Diagrams   |                                     |
| III                        | Design Modeling: Translating the Requirements model into the Design Model, The Design Process, Design Concepts - Abstraction, Modularity and Functional Independence; Architectural Mapping using Data Flow.  | 10                                  |
| IV                         | Software Metrics and Project Estimations: Function based Metrics, Software Measurement, Metrics for Software Quality; Software Project Estimation (FP based estimations, COCOMO II Model); Project Scheduling (Timeline charts, tracking the schedule).                                     | 10                                  |
| V                          | Quality Control and Risk Management: Quality Control and Quality Assurance, Software Process Assessment and Improvement Capability Maturity Model Integration (CMMI); Software Risks, Risk Identification, Risk Projection and Risk Refinement, Risk Mitigation, Monitoring and Management. | 8                                   |
| VI                         | Software Testing: Strategic Approach to Software Testing, Unit Testing, Integration Testing, Validation Testing, System Testing; Black-Box and White Box Testing, Basis Path Testing.   | 12                                  |
|                            | <b>Total</b>  | <b>58</b>                           |
| <b>S. No.</b>              | <b>Name of Authors/Books/Publishers</b>   | <b>Year of Publication /Reprint</b> |
| 1.                         | Aggarwal, K. K., & Singh, Y. (2007). <i>Software Engineering</i> . 3rd edition. New Age International Publishers.   | 2007                                |
| 2.                         | Pressman, R. S., & Maxim, B. R. (2015). <i>Software Engineering: A Practitioner's Approach</i> . 8th edition. McGraw-Hill.  | 2015                                |
| <b>Mode of Evaluation:</b> | Internal Assessment / End Semester Exam   |                                     |