



# Guru Nanak Dev Engineering College, Bidar

## Course File planning

### Software Engineering (18CS35)

**Credit: 03**

**Teaching Hours/Week (L: T: P) = (3:0:0)**

#### CONTENTS

#### Course Objectives:

- Outline software engineering principles and activities involved in building large software programs. Identify ethical and professional issues and explain why they are of concern to software engineers.
- Explain the fundamentals of object oriented concepts
- Describe the process of requirements gathering, requirements classification, requirements specification and requirements validation. Differentiate system models, use UML diagrams and apply design patterns.
- Discuss the distinctions between validation testing and defect testing.
- Recognize the importance of software maintenance and describe the intricacies involved in software evolution. Apply estimation techniques, schedule project activities and compute pricing.
- Identify software quality parameters and quantify software using measurements and metrics. List software quality standards and outline the practices involved.

#### Pre-requisites:

Students must have exposure to basics of software engineering , requirement analysis, verification and validation and project management.

#### Linkages with other Courses:

1. CAD
2. Basics of C++ programming.

#### Course Policies and Procedures:

(Expectations from students, Rules for Student Assignments, Assignment Grading System, CIE and Semester End Examinations.)

#### Expectations from student:

1. Students should have the knowledge of pre-requisite
2. Students should complete all assignments in a time bound manner

**Rules for assignments:** At the end of every module, assignments in the form of question answers will be given and students have submit the same before last date.

### Assignment Grading System

Each assignment will be evaluated for 10 marks and final score for assignment will be the average marks scored in all the assignments.( Similarly other assignments like seminar, model making has to be evaluated using suitable rubrics)

CIE and Semester End Examinations: As per the VTU regulations.

**Evaluation Policy ( It is only indicative, may vary from course to course):**

Level of Question	Approximate % of Question
Understanding	20
Apply	35
Analyze / Solve	35
Design	10

### Lesson Plan

Module wise distribution of Classes	Topics	Class Number	Teaching Methodology
8	Overview of course, Course Outcome its linkages with other courses and practical applications, expectations from students, Evaluation Policy etc.	1	Interactive Discussion
	<b>MODULE1: Introduction:</b> Software Crisis Engineering, Need for Software	2	Lecture/PPT
	Professional Software Development, Software Engineering Ethics. Case Studies.	3	Lecture/PPT
	<b>Software Processes:</b> Models: Waterfall Model, Incremental Model	4	Lecture/PPT
	Spiral Model.,Process activities, <b>Requirements Engineering:</b> Requirements Engineering Processes, Requirements Elicitation and Analysis.	5	Lecture/PPT
	Functional and non-functional requirements, Requirements Document. Requirements Specification	6	Lecture/PPT
	Requirements validation Requirements Management.	7	Lecture/PPT

	Requirements Management.	8	Lecture/PPT
8	<b>Module 2:</b> What is Object orientation? What is OO development? What is Object orientation? What is OO development?	9	Lecture/PPT
	OO Themes; Evidence for usefulness of OO development;	10	Lecture/PPT
	OO modelling history. Modelling as Design technique: Modelling; abstraction; The Three models.	11	Lecture/PPT
	<b>Introduction, Modelling Concepts and Class Modelling:</b> OO Themes	12	Lecture/PPT
	Evidence for usefulness of OO development; OO modelling history.	13	Lecture/PPT
	Modelling as Design technique: Modelling; abstraction; The Three models.	14	Lecture/PPT
	Class Modelling: Object and Class Concept;	15	Lecture/PPT
	Link and associations concepts; Generalization and Inheritance, A sample class model; Navigation of class models.	16	Lecture/PPT
8	<b>Module 3: System Models:</b> Context models, Interaction models .	17	Lecture/PPT
	Structural models	18	Lecture/PPT
	Behavioral models	19	Lecture/PPT
	Model-driven engineering	20	Lecture/PPT
	<b>Design and Implementation:</b> Introduction to RUP	21	Lecture/PPT
	Design patterns	22	Lecture/PPT
	Implementation issues	23	Lecture/PPT
	Open source development	24	Lecture/PPT
8	<b>Module 4:</b> Development testing	25	Lecture/PPT
	Test-driven development.	26	Lecture/PPT
	Release testing ,User testing	27	Lecture/PPT
	Test Automation.	28	Lecture/PPT

	<b>Software Evolution:</b> Evolution processes	29	Lecture/PPT
	Program evolution dynamics	30	Lecture/PPT
	Software maintenance	31	Lecture/PPT
	Legacy system management	32	Lecture/PPT
8	<b>MODULE 5: Project Planning:</b> Software pricing	33	Lecture/PPT
	Plan-driven development	34	Lecture/PPT
	Project scheduling .	35	Lecture/PPT
	Estimation techniques	36	Lecture/PPT
	<b>Quality management:</b> Software quality	37	Lecture/PPT
	Reviews and inspections	38	Lecture/PPT
	Software measurement and metrics	39	Lecture/PPT
	Software standards	40	Lecture/PPT

**Course Teaching Materials:** Teaching materials such as Notes, PPT, Videos, etc. to be attached

Module No.	Course Teaching Materials	Links
1	Notes	<a href="https://drive.google.com/drive/folders/1LDwxeEAemCzMT1M1DA3emCojWAgvt9M?usp=sharing">https://drive.google.com/drive/folders/1LDwxeEAemCzMT1M1DA3emCojWAgvt9M?usp=sharing</a>
	Videos	<a href="https://www.youtube.com/watch?v=WxkP5KR_Emk">https://www.youtube.com/watch?v=WxkP5KR_Emk</a>
2	Notes	<a href="https://drive.google.com/drive/folders/1qN0PU0JpOT3ELy8SHZqucpcwIkCADek0?usp=sharing">https://drive.google.com/drive/folders/1qN0PU0JpOT3ELy8SHZqucpcwIkCADek0?usp=sharing</a>
	Videos	<a href="https://www.youtube.com/watch?v=WxkP5KR_Emk">https://www.youtube.com/watch?v=WxkP5KR_Emk</a>
3	Notes	<a href="https://drive.google.com/drive/folders/1qN0PU0JpOT3ELy8SHZqucpcwIkCADek0?usp=sharing">https://drive.google.com/drive/folders/1qN0PU0JpOT3ELy8SHZqucpcwIkCADek0?usp=sharing</a>
	Videos	<a href="https://www.youtube.com/watch?v=WxkP5KR_Emk">https://www.youtube.com/watch?v=WxkP5KR_Emk</a>
4	Notes	<a href="https://drive.google.com/drive/folders/1qN0PU0JpOT3ELy8SHZqucpcwIkCADek0?usp=sharing">https://drive.google.com/drive/folders/1qN0PU0JpOT3ELy8SHZqucpcwIkCADek0?usp=sharing</a>
	Videos	<a href="https://www.youtube.com/watch?v=WxkP5KR_Emk">https://www.youtube.com/watch?v=WxkP5KR_Emk</a>

5	Notes	<a href="https://drive.google.com/drive/folders/1qN0PU0JpOT3ELy8SHZqucpcwIkCADek0?usp=sharing">https://drive.google.com/drive/folders/1qN0PU0JpOT3ELy8SHZqucpcwIkCADek0?usp=sharing</a>
	Videos	<a href="https://www.youtube.com/watch?v=WxkP5KR_Emk">https://www.youtube.com/watch?v=WxkP5KR_Emk</a>

**Web Resources:**

w3schools.com

geeksforgeeks.com

**Blogs:**

<https://gndcsemasrath.blogspot.com/>

**NPTEL/MOOCs:**

**Introduction to SE**

**Course Outcomes:**

After studying this course, students will be able to:

<b>CO1: Analyse software system, component, or process to meet desired needs within realistic constraints.</b>
<b>CO2: Recongnize various object oriented modeling techniques.</b>
<b>CO3: Describe the different system models.</b>
<b>CO4: Make use of the different techniques for software testing</b>
<b>CO5: Describe project planning and Quality management.</b>

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1										1	1	
CO2	3	1										1	1	
CO3	3											1	1	
CO4	3	1										1	1	

CO5	3	3										1	1	
<b>Avg.</b>	<b>3</b>	<b>2</b>										<b>1</b>	<b>1</b>	

### Question Bank:

#### MODULE1

1. What is software ? List the fundamental software engineering activities. Mention and explain the key challenges or the general issues facing software engineering.
2. What are the attributes of good software? Explain the Key challenges in software engineering.
3. Prepare a software solution for insulin pump control system.
4. List out Functional and Non-functional Requirements in software engineering.
5. How the requirement elicitation and analysis specified in requirements engineering process.
6. Explain briefly software engineering ethics?
7. With a suitable diagram explain Water fall model
8. Explain requirement engineering processes with suitable diagram
9. With a neat diagram explain Boehm's spiral model ?
10. Explain Ethnography in detail ?
11. What is requirement specification? Explain various ways of writing system requirements.
12. Explain the different checks to be carried out during requirement validation process
13. Write a block diagram for illustrating incremental developmental model . State at least two benefits and problems in incremental development .

#### MODULE2

1. Define object orientation.? List and explain the aspects of object oriented approach.?
2. List and explain the object oriented theories which support object oriented technology.?
3. Briefly explain Links, Association, Ordering,Bags and Sequences with an example for each.?

4. Explain Generalization and Inheritance with an example each.?
5. Explain the following
  - i) identity ii) Classification iii) inheritance iv) polymorphism v) object
6. Define the purpose of the following terms with suitable examples
  - i. Multiplicity      ii. Association class
7. Explain in brief class model, state model and interaction model.?
8. What is Object Oriented Development.? Explain different stages of Object Oriented Development.?

### MODULE3

1. Explain briefly the different types of system models that might be created during the system analysis phase.?
2. Explain context model with an example.?
3. Describe RUP in detail with a neat diagram.?
4. List out the practices followed in RUP.?
5. Describe high level architecture of weather station.?
6. Draw and explain state diagram for a typical weather information system.?
7. Illustrate with two examples for object and object class.?

### MODULE4

1. Explain two distinct goals of software testing.?
2. Differentiate between verification and validation process.?
3. Describe debugging process with a neat diagram.?
4. Explain in detail the software inspection process.?
5. Compare and contrast advantages of software inspection over testing.?
6. Define verification and validation and explain two complementary approaches to system checking and analysis.?

### Module 5

1. Explain Test Driven development with its process and list its benefits
2. illustrate Software Evolution Process with an example

3. Compare and contrast the following
  - Release Testing
  - Regression Testing
  - Unit Testing
4. Discuss Lehman's laws of program evolution dynamics.?
5. Elaborate the various activities involved in reengineering process with a neat block diagram.?
6. Explain six stages of Acceptance testing and Discuss the four strategic options of Legacy System Management.
7. Illustrate the various stages of project planning with an appropriate example.

Represent project Scheduling Process with appropriate block diagram and discuss the critical steps involved in it.

8. Discuss various software reviews and quality assurance inspection.
9. Analyze and classify the various factors affecting Software pricing.?