Course Details

Program(s)	Subject Name	Academic Session, Semester	Subject Code & Credit	
B.Tech.	Software Engineering	Autumn, 2025 (5th Semester)	CS-31001	Cr-4, L – T – P 3 –1 – 0

Note: 4Credits = 15x4= 60Hours (as per National Credit Framework, 1credit = 15Hours)

Course Faculty:

Prof. (Dr.) Arghya Kundu
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Syllabus

UNIT I Introduction: (10Hrs)

Role of Software Engineer, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Quality Attributes.

Assessment: How Software Engineering Changes? Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models, Choosing a social relevant problem, Summary Team Report.

UNIT II Requirement Engineering Process: (16Hrs)

Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Designing the architecture.

Assessment: Impact of Requirement Engineering in their problem, Decision Tables, SRS Document, IEEE Standards for SRS, Architectural design, component level design, user interface design, WebApp Design, Submission of SRS Document for Team Project.

UNIT III Quality concepts, Review techniques, Software Quality Assurance (SQA): (8Hrs)

Verification and Validation, SQA Plans, Software Quality Frameworks.

Assessment: Framing SQA Plan, ISO 9000 Models, SEI-CMM Model and their relevance to project Management, Other emerging models like People CMM.

UNIT IV Testing: (12Hrs)

Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing, Software Testing Strategies, Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Testing conventional applications, object oriented applications, Web applications, Formal modeling and verification, Software configuration management, Product metrics.

Assessment: Team Analysis in Metrics Calculation.

UNIT V: Project Management (12Hrs)

Project Management Concepts, Process and Project Metrics, Estimation for Software projects, Project Scheduling, Risk Management, Maintenance and Re-engineering.

Assessment: Preparation of Risk mitigation plan.

Text Books

Textbooks:

1. R. S. Pressman, Bruce R Maxim "Software Engineering: A Practitioners Approach", 9th Edition, McGraw Hill Edition (India) Reprint 2023.

2. Rajib Mall, "Fundamentals of Software Engineering", Fifth Edition, PHI Learning, Reprint 2023.
3. Pankaj Jalote, "Software Project Management in Practice", Pearson Education, New Delhi, 2002.

Course Objectives

To acquire knowledge and skills for Analysis, Design , Implementation and Management of large and complex Software Systems, fulfilling requirements of quality, budget and schedule software projects.

Number of Working Days as per Academic Calendar:

Academic Calendar	Start Date	End Date	Number of Holidays	Number of Working Days (Excluding Saturdays & Holidays)
Pre-Mid Semester Classes	11-July-2025	6-Sept-2025	4 Days (15 Aug, 27 Aug, 28 Aug, 5 Sept 2025)	37 Days
Mid Semester Examination	8-Sept-2025	13-Sept-2025	0	6 Days
Post Mid Semester Classes	15-Sept-2025	8-Nov-2025	12 Days (29 Sept to 7 Oct) + (20 Oct, 21 Oct, 5 Nov 2025)	30 Days
End Semester Examination	10-Nov-2025	19-Nov-2025	0	9 Days

LESSON PLAN

Module, Hrs	Topics/Coverage	Maximum Hours (Including Tutorials & ABL)	Suggested Reference Book(s) Chapters

UNIT-I Introduction:	Role of Software Engineer, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Quality Attributes. ***Additional: Software and its characteristics, application. Software engineering, Emergence of Software Engineering***	10 Hrs	Chapter-1, 2
	Assessment: How Software Engineering Changes? Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models, Choosing a social relevant problem, Summary Team Report. ***Additional: Iterative Waterfall Model, RAD Model, Essential Idea behind Agile Models, Agile models: Extreme programming and Scrum, Agile versus Other Models***		T1-2.5.1, 2.5.2,2.5.3 T2-1.1.3, 1.4, 2.2.5,
Activity-1 (CO-1)	*Do the Assessment satisfying the CO-1* ***CO-1: Student will be able to distinguish different software process models and use a suitable model for solving a socially relevant problem.***		
UNIT II Requirement Engineering Process:	Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Designing the Architecture. ***Additional: Information Modeling: Scenario Based Modeling, Class Based Modeling, Functional Modeling, Behavioral Modeling (Pressman Ch-8)*** ***DFD, Structure Chart (Software Architecture) (Rajib Mall, Ch-6, 7)***	16 Hrs	T1-Ch.7, 8, 9 T2-Ch. 6, 7
	Assessment: Impact of Requirement Engineering in their problem, Decision Tables, SRS Document, IEEE Standards for SRS, Architectural Design, Component Level Design, User Interface Design, WebApp Design, Submission of SRS Document for Team Project.		T1- Ch.10, 11, 12, 13(13.5) T2- Ch. 4 (4.2.11)
Activity-2 & 3 (CO-2&CO-3)	*Do the Assessment satisfying the CO-2 & C0-3* ***CO-2: Student will be able create SRS document from a given problem description.*** ***CO-3: Student will be able to do software design from problem description.***		
UNIT III Quality concepts, Review technique, Software Quality Assurance (SQA)	Verification and Validation, SQA Plans, Software Quality Frameworks.	8 Hrs	T1- 17.4.1, 17.9 T2- Pg: 435,
	Assessment: Framing SQA Plan, ISO 9000 Models, SEI-CMM Model and their relevance to project Management, Other emerging models like People CMM.		T2: 11.3,11.4, 1.5, 11.6
Activity-4 (CO-4)	***CO-4 Student will be able to understand the relevance of quality models and metrics in software development process.***		
	MID SEMESTER EXAMINATION (8-13September2025)		
UNIT IV Testing	Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing, Software Testing Strategies, Strategies:	12 Hrs	T1- Ch-19,20,21, 22, 23 (23.3)

	Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Testing conventional applications, object oriented applications, Web applications, Formal modeling and verification, Software configuration management, Product metrics. **Additional: Coding & Code Review**		T2- Ch-10, 3.14
	Assessment: Team Analysis in Metrics Calculation.		
Activity-5 (CO-5)	***CO-5: Student will be able to distinguish and apply different testing methodologies and metrics.***		
UNIT V Project Management	Project Management Concepts, Process and Project Metrics, Estimation for Software projects, Project Scheduling, Risk Management, Maintenance and Re-Engineering.	12 Hrs	T1 – Ch. 24,25,26 T2 – Ch.3 (except 3.11.3.12, 3.14), Ch.13
	Assessment: Preparation of Risk Mitigation Plan.		
Activity-6 (CO-6)	***CO-6: Student will be able to apply basic project management practices in real life project.***		
		58 Hrs	
	END SEMESTER EXAMINATION (10-19 November 2025)		

Evaluation Scheme:

Evaluations		Marks
End Semester Examination		50
Internal	Mid Semester Examination	20
	Activity (Continuous Evaluation)	30
	Total	100

ACTIVITY

There will be 6 Activity Components mapping with 6 Outcomes with 5 marks to each activity component. The activity evaluation will be based on the following 6 different types of evaluations pattern (minimum 3 types):

1. Problem Solving (Individual)

2. Critical Thinking (Individual/Group)
3. Creation (Info-graphic, Written summary, Physical model/ mathematical model, soft model)
4. Interactivity Focus (Group based evaluation)
5. Quiz
6. Reflection (Self-Assessment, Reflection on learning)

LMS

The Moodle/ Google ClassRoom will be used for uploading class materials, different activities and the evaluation results for 30 Marks Component of Activities.

Course Outcomes

At the end of the course, the students will be able to:

	Course Outcomes	Module	Expected Cognitive Level of Learning
CO-1	Distinguish different Software Process Models and Use a suitable model for solving a Social Relevant Problem.	Software Process Models	3. Apply, 4. Analyse
CO-2	Create SRS document from a given problem description.	Requirement Engineering Process	6. Create
CO-3	Create software design from problem description.	Requirement Engineering Process	6. Create
CO-4	Analyse the Relevance of Quality Models and Metrics in Software Development Process.	Quality concepts, Review techniques, Software Quality Assurance (SQA)	4. Analyse
CO-5	Distinguish and Apply Different Testing Methodologies and Metrics.	Testing	4. Analyse
CO-6	Apply Basic Project Management Practices in Real Life Project.	Project Management	5. Evaluate