COURSE TITLE	**SOFTWARE ENGINEERING**
COURSE CODE	**01CE0607**
COURSE CREDITS	**4**

Objective:

1 To understand and apply various software project management techniques based on software engineering guidelines and principles

Course Outcomes: After completion of this course, student will be able to:

1 Apply appropriate software engineering principles and agile methodologies to address software development problems.

2 Apply the basic project management concepts in real life projects.

3 Analyse software requirement specifications and apply various modelling techniques for designing the system requirements.

4 Distinguish different testing strategies and create test cases.

5 Analyze various software quality assurance processes and maintenance approaches for enhancing reliability and efficiency of software systems.

Pre-requisite of course: Object oriented programming fundamental

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Introduction and Software process models** Software engineering, Dual role of software,Software Crisis history, Various Myths Associated with Software,Different Software Process Models,, The Linear Sequential Model,The Prototyping Model, The RAD Model, Evolutionary Process Models, Component-Based Development, Process, Product and Process,Agile Method, Manifesto,, Various Agile Modelling Techniques: XP, Scrum, Crystal.	8
2	**Project Management Concepts** The Management Spectrum,4P's(The People, The Project,, The Product), The W5HH Principle,, Software Process and Project Metrics, Measures, Metrics, and Indicators, , Metrics in the Process and Project Domains, Software Measurement,, Metrics for Software Quality Project planning: Empirical Estimation Models, Scheduling, Reactive versus Proactive Risk Strategies, Risk Management Process, , Risk Identification, Risk Projection,, Risk Refinement, RMMM Plans, Safety Risks and Hazards.	8

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Contents : Unit	Topics	Contact Hours
3	**Requirement Analysis and Design Concepts** Software Requirements, Types of Requirements,, Requirement Engineering Cycle, Requirements Specification document, , Characteristics of Requirements, Requirement verification and validation, Design Concepts and Design Principal, Architectural Design,, Component Level Design (Function Oriented Design,Object Oriented Design), User Interface Design, Web Application Design,, Effective Modular Design(Functional Independence,, Cohesion, Coupling), Design Documentation	9
4	**Coding and Testing** Coding standards & Coding Guidelines, , Code Review, Abstraction, Refinement, Modularity,, Software Architecture, Control Hierarchy,, Software Testing Techniques, Software Testing Fundamentals,, White Box Testing Techniques, Black Box Testing Techniques,, Object oriented Testing.	7
5	**Software Quality Assurance and Maintenance** Quality Concepts and Software Quality Assurance,, Quality principles and Attributes, Quality Audits. Software Reviews, , Formal Technical Reviews, The SQA Plan, , Software Reliability, The Quality Standards: ISO 9000,, CMM, Six Sigma for SE. Types of Software Maintenance,, Re-Engineering, Reverse Engineering, , Forward Engineering., The Software Configuration Management Process, Version Control and Change Control	8
Total Hours		**40**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Practical 1** Write down the problem statement for a system, identify its purpose, scope and literature review. Choose any one project and do the following exercises for that project. The problem statement is intended for a broad audience and should be written in non-technical terms. i) Online Auction System ii) Text to audio converter bot iii) Online Voting System iv) Real estate management v) Farmer's Friend vi) Mental health management vii) Online counselling booking service viii) Internship Website ix) Surprise template x) Pharmacy Management System xi) Online Delivery tracking	2
2	**practical 2** Do Project Planning, scheduling and Risk Management for selected system. i) Project planning - Choosing and designing effective policies and methodologies to attain project objectives. ii) Project scheduling - Procedure of assigning tasks to get them completed by allocating appropriate resources within an estimated budget and time-frame. iii) Project risk management - Identifying, analyzing and responding to any risk that arises over the life cycle of a project.	4

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
3	**practical 3** To perform Cost and Effort Estimation for the selected system. a) Understand the scope of the software to be built. b) Generate an estimate of the software size. c) Generate an estimate of the effort and cost. d) Reconcile estimates e) Determine the cause of divergence and then reconcile the estimates	4
4	**practical 4** Do requirement analysis and develop Software Requirement Specification Sheet (SRS) for selected system. a) Functionality (What is the software supposed to do) b) External interfaces (How does the software interact with people, the system ‘s hardware, other hardware, and other software) c) Performance (What is the speed, availability, response time, recovery time of various software functions, etc.) d) Attributes (What are the portability, correctness, maintainability, security, etc. considerations?) e) Design constraints imposed on an implementation. (Are there any required standards in effect, implementation language, policies for database integrity, resource limits, operating environment(s) etc.)	4
5	**practical 5** Perform system analysis on selected system and prepare Data Dictionary for selected system. i) Systems analysis (what the system should do) ii) Systems design (how to accomplish the objective of the system.) iii) Documentation of your data (metadata)	2
6	**practical 6** To perform the user's view analysis for the suggested system. - Draw use case diagram	2
7	**practical 7** Design structural view diagram for the selected system. i) Draw class Diagram ii) Object Diagram iii) Component Diagram	2
8	**practical 8** Design function-oriented diagram for the selected system. i) E-R Diagrams ii) Decision Tree iii) Decision Table iv) Data Flow Diagrams v) Data Dictionary	2
9	**practical 9** Design the behavioural view diagram for the selected system. i) Interaction Diagrams a) Sequence Diagrams b) Collaboration Diagram ii) State–Chart Diagrams iii) Activity Diagrams	2
10	**practical 10** Demonstration of Testing Tools i) Testing Whiz ii) IBM Rational Functional Tester	2
Total Hours		**26**

Textbook :

1 Software engineering- A practitioner’s Approach, .Roger S.Pressman,, McGraw-Hill International Editions, 2023

References:

1 Software engineering, Software engineering, Ian Sommerville, Pearson education Asia, 2017

2 Software Engineering – A Precise Approach, Software Engineering – A Precise Approach, Pankaj Jalote, Wiley, 2010

3 Software Engineering Fundamentals, Software Engineering Fundamentals, Ali Behhforoz & Frederick Hudson, OXFORD, 1996

4 Fundamentals of software Engineering, Fundamentals of software Engineering, Rajib Mall, Prentice Hall of India, 2004

5 Engineering Software as a Service and Agile Software Approach,, Engineering Software as a Service and Agile Software Approach,, Armando Fox and David Patterson, Strawberry Canyon LLC, 2016

6 Project Management for Business, Engineering and Technology, Elsevier., Project Management for Business, Engineering and Technology, Elsevier., John M Nicolas, Taylor & Francis, 2020

7 Software Testing Concepts and Tools,, Software Testing Concepts and Tools,, Nageswara Rao Pusuluri,, DreamTech, 2006

8 Software Project Management,, Software Project Management,, Sanjay Mohapatra,, Cengage Learning India Private Limited, 2011

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
10.00	20.00	10.00	30.00	20.00	10.00

Instructional Method:

1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

1 . http://nptel.ac.in/courses/106101061/

2 . https://www.joelonsoftware.com/

3 . http://www.codesimplicity.com/

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Supplementary Resources:

4 http://www.sparxsystems.com/products/ea/index.html
5 . URL:http://www.smartdraw.com
6 . URL:http://viu.eng.rpi.edu
7 www.en.wikipedia.org/wiki/Software_engineering
8 www.win.tue.nl
9 www.rspa.com/spi
10 www.onesmartclick.com/engsineering/software-engineering.html
11 www.sei.cmu.edus
12 https://www.edx.org/school/uc-berkeleyx