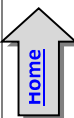


Savitribai Phule Pune University Second Year of Artificial Intelligence and Data Science (2020 Course) 210253: Software Engineering		
Teaching Scheme	Credit Scheme	Examination Scheme and Marks
Lecture: 03 Hours/Week	03	Mid_Semester(TH): 30 Marks End_Semester(TH): 70 Marks
Prerequisite Courses : 110005: Programming and Problem Solving		
Companion Course : ---		
Course Objectives: The main objective of this course is to introduce the students to software engineering- the fundamentals of software engineering principles and practices, including project management, configurations management, requirements definition, system analysis, design, testing, and deployment with hands-on experience in a group software development project. <ul style="list-style-type: none"> To learn and understand the principles of Software Engineering. To be acquainted with methods of capturing, specifying, visualizing and analyzing software requirements. To apply design and testing principles to software project development. To understand project management through life cycle of the project. 		
Course Outcomes: On completion of the course, learner will be able to- CO1: Analyze software requirements and formulate design solution for a software. CO2: Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns. CO3: Apply new software models, techniques and technologies to bring out innovative and novelistic solutions for the growth of the society in all aspects and evolving into their continuous professional development. CO4: Model and design User interface and component-level. CO5: Identify and handle risk management and software configuration management. CO6: Utilize knowledge of software testing approaches, approaches to verification and validation. CO7: Construct software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain efficient, reliable, robust and cost-effective software solutions.		
Course Contents		
Unit I	Introduction to Software Engineering and Software Process Models	(06Hours)
Software Engineering Fundamentals: Introduction to software engineering, The Nature of Software, Defining Software, Software Engineering Practice. Software Process: A Generic Process Model, defining a Framework Activity, Identifying a Task Set, Process Patterns, Process Assessment and Improvement, Prescriptive Process Models, The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models, A Final Word on Evolutionary Processes. Unified Process, Agile software development: Agile methods, plan driven and agile development.		
#Exemplar/Case Studies	Agile Tools- JIRA	
*Mapping of Course Outcomes for Unit I	CO1, CO3, CO7	
Unit II	Software Requirements Engineering and Analysis	(07 Hours)



Modeling: Requirements Engineering, Establishing the Groundwork, Identifying Stakeholders, Recognizing Multiple Viewpoints, working toward Collaboration, Asking the First Questions, Eliciting Requirements, Collaborative Requirements Gathering, Usage Scenarios, Elicitation Work Products, Developing Use Cases, Building the Requirements Model, Elements of the Requirements Model, Negotiating Requirements, Validating Requirements.

Suggested Free Open Source tools: StarUML, Modelio, SmartDraw.

#Exemplar/Case Studies Write SRS in IEEE format for selected Project Statement/ case study Study SRS of Online Voting system (http://dos.iitm.ac.in/OOSD_Material/CaseStudies/CaseStudy2/eVote-srs.pdf), Library management System, Develop use case model for any software applications.

***Mapping of Course Outcomes for Unit II** CO1, CO3, CO7

Unit III

Estimation and Scheduling

(07 Hours)

Estimation for Software Projects: The Project Planning Process, Defining Software Scope and Checking Feasibility, Resources management, Reusable Software Resources, Environmental Resources, Software Project Estimation, Decomposition Techniques, Software Sizing, Problem-Based Estimation, LOC-Based Estimation, FP-Based Estimation, Object Point (OP)-based estimation, Process-Based Estimation, Process-Based Estimation, Estimation with Use Cases, Use-Case-Based Estimation, Reconciling Estimates, Empirical Estimation Models, The Structure of Estimation Models, The COCOMO II Mode, Preparing Requirement Traceability Matrix

Project Scheduling: Project Scheduling, Defining a Task for the Software Project, Scheduling.

Suggested Free Open Source Tools: Gantt Project, Agantty, Project Libre.

#Exemplar/Case Studies Write SRS in IEEE format for selected Project Statement/ case study, Study SRS of Online Voting system, Library management System (http://dos.iitm.ac.in/OOSD_Material/CaseStudies/CaseStudy2/eVote-srs.pdf),

***Mapping of Course Outcomes for Unit III** CO1, CO3, CO7

Unit IV

Design Engineering

(07 Hours)

Design Concepts: Design within the Context of Software Engineering, The Design Process, Software Quality Guidelines and Attributes, Design Concepts - Abstraction, Architecture, design Patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Refinement, Aspects, Refactoring, Object-Oriented Design Concept, Design Classes, The Design Model, Data Design Elements, Architectural Design Elements, Interface Design Elements, Component-Level Design Elements, Component Level Design for Web Apps, Content Design at the Component Level, Functional Design at the Component Level, Deployment-Level Design Elements.

Architectural Design: Software Architecture, What is Architecture, Why is Architecture Important, Architectural Styles, A brief Taxonomy of Architectural Styles.

Suggested Free Open Source Tool: Smart Draw

#Exemplar/Case Studies Study design of Biometric Authentication software

***Mapping of Course Outcomes for Unit IV** CO1, CO2 CO3, CO7

Unit V

Risks and Configuration Management

(07 Hours)

Risk Management: Software Risks, Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation, Monitoring, and Management, The RMMM Plan.

Software Configuration Management: Software Configuration Management, The SCM Repository The SCM Process, Configuration Management for any suitable software system.

Suggested Free Open Source Tools: CF Engine Configuration Tool, Puppet Configuration Tool.

#Exemplar/Case Studies Risk management in Food delivery software

***Mapping of Course Outcomes for Unit V** CO1, CO2 CO3, CO7



Unit VI	Software Testing	(07 Hours)
A Strategic Approach to Software Testing, Verification and Validation, Organizing for Software Testing, Software Testing Strategy—The Big Picture, Criteria for Completion of Testing, Strategic Issues, Test Strategies for Conventional Software, Unit Testing, Integration Testing, Test Strategies for Object-Oriented Software, Unit Testing in the OO Context, Integration Testing in the OO Context, Test Strategies for WebApps, Validation Testing, Validation-Test Criteria, Configuration Review. Suggested Free Open Source Tools: Selenium, JUnit.		
#Exemplar/Case Studies	Selenium Testing with any online application	
*Mapping of Course Outcomes for Unit VI	CO1, CO2 CO3, CO6	

Learning Resources

Text Books:

1. Roger Pressman, “Software Engineering: A Practitioner’s Approach”, McGraw Hill, ISBN 0–07–337597–7
2. Ian Sommerville, “Software Engineering”, Addison and Wesley, ISBN 0-13-703515-2

Reference Books:

1. Carlo Ghezzi, “Fundamentals of Software Engineering”, PHI, ISBN-10: 0133056996
2. Rajib Mall, “Fundamentals of Software Engineering”, PHI, ISBN-13: 978-8120348981
3. Pankaj Jalote, “An Integrated Approach to Software Engineering”, Springer, ISBN 13: 9788173192715.
4. S K Chang, “Handbook of Software Engineering and Knowledge Engineering”, World Scientific, Vol I, II, ISBN: 978-981-02-4973-1
5. Tom Halt, “Handbook of Software Engineering”, Clanye International, ISBN- 10: 1632402939

e-books:

- <https://ebookpdf.com/roger-s-pressman-software-engineering>

MOOC/ Video Lectures available at:

- https://swayam.gov.in/nd1_noc19_cs69/preview
- https://swayam.gov.in/nd2_ccc20_cs07/preview

@The CO-PO Mapping Matrix

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	2	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	2	2	2	-	-	-	-
CO3	-	-	2	-	-	2	-	-	-	-	-	-
CO4	-	2	2	-	-	-	-	-	-	-	-	-
CO5	-	2	2	-	-	-	-	-	-	-	-	-
CO6	-	2	2	-	-	-	-	-	-	-	-	-
CO7	1	-	1	1	-	-	-	-	-	-	-	-