

SOFTWARE ENGINEERING

1. Introduction

Objective: Intends to introduce software engineering principles and techniques required for automation and quality production of software systems

Credits: 3-0-0

2. Course Outline

UNIT - I: Introduction

Software Development - an engineering process, Short History of Software Engineering, Software Development Life Cycle, Engineers in Software Development Cycle, Systems Engineering, Software Engineering and other branches of study, Identifying Issues in Software Engineering.

Defining Software: Its Nature and Qualities: Representative Qualities, Types of Systems and Quality Requirements, Software Engineering and maintenance of qualities.

Software Engineering Principles: Rigor and Formality, Separation of Concerns, Modularity, Abstraction, Change Management, Incrementality, Generality

UNIT - II: Requirement Engineering

Software requirements, Requirement Engineering Process, Software Requirements Specification (SRS), Techniques for Requirements Elicitation, Specifying Software Requirements, Formal and Rigour based Specification: Use cases, Activity Diagrams, FSM, Petri Nets, Algebraic And Logic Based Specifications.

UNIT - III: UML-based Design

UML Based Object-Oriented Design: Class, Sequence, State, Architectural and Deployment Diagrams.

Design with Reuse: Introducing Design Patterns

User-Interface Design: Aesthetic and Technical Issues.

Concerns Real-Time System Design

Modularization

Software Architectural Design, Software Design Document

UNIT - IV: Verification

Requirement Verification: Completeness and Correctness of Software Requirements. Introducing Model Checking and Symbolic Execution, Software Test Planning

Software Testing: Static and Dynamic Testing Techniques, Levels of Testing.

Testing a Process: Introducing Tools to Automate Testing

UNIT - V: Project Management

Software Production Process, Overview of Software Process Models,

Cost Estimation, Project Management, Risk Management, Quality Management:

CMM: Capability Maturity Model, Agile Method. Software Project Management Plan (SPMP)

UNIT - VI: Tools

Introducing Software Engineering Tools, Diagramming Tool, Analysis Tool, Code Generation Tool, Testing Tool, Management Tool, Process Support Tool, General Idea on Tool Development Technique

UNIT - VII: Evolution

Legacy Systems, Software Reverse Engineering, Re-engineering, Configuration Management

3. Reading Material

Text Books

1. Fundamentals of Software Engineering; Carlo Ghezzi, Mehdi Jazayeri, Dine Madrioli, Pearson Education Asia, Low Priced Edition.

Reference Books

1. Software Engineering, Ian Sommerville; Pearson Education Asia, Low Priced Edition.
2. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson; Pearson Education Asia, Low Priced Edition.
3. Fundamentals of Software Testing, Aditya P Mathur; Pearson.

Suggested Assignments

1. List the qualities software should have and explain the usefulness of each clearly.
2. Discuss on requirement Engineering Process
3. List the techniques for requirement elicitation.
4. Define Module, relations. And show use of relations uses, isComposedOf in giving modular architecture of a software system. (use TDN and graphic design notations)
5. Justify use of models: FSM and PetriNet With examples illustrate your view point.
6. Write the steps to be followed for writing algebraic formal specification.
7. Write the steps to be followed for writing logic-based formal specification.
8. Present a system architecture for a tool to automate Usecase based requirement engineering.
9. “Traceability is a quality maintainable by engineering principle.” Justify the statement.
10. Derive test cases from a state diagram.