



E.G.S. PILLAY ENGINEERING COLLEGE (AUTONOMOUS)

NAGAPATTINAM – 611 002. TAMILNADU, INDIA

Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai
(Accredited by NAAC with 'A' Grade and NBA)

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CP7022

SOFTWARE DESIGN

L T P c

3 0 0 3

OBJECTIVES:

- Analyze specifications
- Describe approaches to design
- Develop design documentation
- Evaluate the design

UNIT I SOFTWARE DESIGN PRINCIPLES 9

Introduction – Design process – Managing complexity – Software modeling and notations – Abstraction – Modularity – Hierarchy – Coupling - Cohesion – Design guidelines and checklists – Refactoring

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Introduction – Design process – Managing complexity – Software modeling and notations – Abstraction – Modularity – Hierarchy – Coupling - Cohesion – Design guidelines and checklists – Refactoring

UNIT II OO DESIGN 9

Object model – Classes and objects – Object oriented analysis – Key abstractions and mechanisms – Object oriented design – Identifying design elements – Detailed design – Case studies.

UNIT III DESIGN PATTERNS 9

Introduction to patterns – Design context – Reusable solutions – Documenting reusable solutions
– Standard patterns from GOF book.

UNIT IV FUNCTION AND SERVICE ORIENTED DESIGNS 9

Structural decomposition – Detailed Design – Function oriented design Case study – Services – Service identification – Service design – Service composition – choreography and orchestration –Service oriented design Case study

UNIT V USER CENTERED DESIGN AND DESIGN REVIEW 9

Introduction to user centered design – Use in context – Interface and interaction – User centered design principles – Task analysis – Evaluation – Introduction to design review– Testing the design
– Walk throughs – Review against check lists.

TOTAL : 45
PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

- Describe different approaches to designing a software application
- Analyze specifications and identify appropriate design strategies.



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- Develop an appropriate design for a given set of requirements
- Identify applicable design patterns for the solution
- Abstract and document reusable design patterns
- Evaluate a given design against the specifications

REFERENCES:

1. Grady Booch et al., "Object Oriented Analysis and Design with Applications", 3rd Edition, Pearson, 2010.
2. Carlos Otero, "Software Engineering Design: Theory and Practice", CRC Press, 2012
3. David Budgen, "Software Design", 2nd Edition, Addison Wesley, 2003
4. Alan Shalloway and James R Trott, "Design Patterns Explained: A New Perspective on Object-Oriented Design", 2nd Edition, Addison-Wesley Professional, 2004
5. Hassan Gomaa, "Software Modeling and Design", Cambridge University Press, 2011
6. Eric Gamma et al., "Design Patterns: Elements of Reusable Object-Oriented Software", Addison-Wesley Professional, 1994
7. Ian Sommerville, "Software Engineering", 9th Edition, Addison-Wesley, 2010
8. M B Rosson and J M Carroll, "Usability Engineering: Scenario-Based Development of Human-Computer Interaction", Morgan Kaufmann, 2002



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CP7026

SOFTWARE QUALITY ASSURANCE

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OBJECTIVES:

- Describe approaches to quality assurance
- Understand quality models
- Evaluate the system based on the chosen quality model

UNIT I INTRODUCTION 9

Introduction – Views on quality – Cost of quality – Quality models – Quality frameworks – Verification and Validation – Defect taxonomy – Defect management – Statistics and measurements – IEEE standards – Quality assurance and control processes

UNIT II VERIFICATION 6

Introduction – Verification techniques – Inspections, reviews, walk-throughs – Case studies

UNIT III TEST GENERATION 12

Software testing- Validation – Test plan – Test cases – Test Generation – Equivalence partitioning
– Boundary value analysis – Category partition method – **Combinatorial generation** – Decision tables – Examples and Case studies

UNIT IV STRUCTURAL TESTING 12

Introduction – Test adequacy criteria – Control flow graph – Coverages: block, conditions, multipleconditions, MC/DC, path – Data flow graph – Definition and use coverages – C-use, P-use, Def- clear, Def-use – Finite state machines – Transition coverage – **Fault based testing** – Mutation analysis – Case studies

UNIT V FUNCTIONAL TESTING 6

Introduction – Test adequacy criteria – Test cases from use cases – Exploratory testing – Integration, system, acceptance, regression testing – Testing for specific attributes: Performance, load and stress testing – Usability testing – Security testing – Test automation – Test oracles

TOTAL : 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to

- Describe different approaches to testing software applications
- Analyze specifications and identify appropriate test generation strategies
- Develop an appropriate test design for a given test object
- Identify applicable measurements for the verification and validation effort
- Execute the test design
- **Evaluate the testing effort based on adequate measures**

REFERENCES:

1. Boriz Beizer, "Software Testing Techniques", 2nd Edition, DreamTech, 2009.
2. Aditya P. Mathur, "Foundations of Software Testing", Pearson, 2008



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3. Mauro Pezze and Michal Young, "Software Testing and Analysis. Process, Principles, and Techniques", John Wiley 2008
4. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", 2nd Edition, Pearson, 2003
5. Kshirasagar Naik and Priyadarshi Tripathy (Eds), "Software Testing and Quality Assurance: Theory and Practice", John Wiley, 2008
6. "Combinatorial Methods in Software Testing", <http://csrc.nist.gov/groups/SNS/acts/index.html>



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CP7028 ENTERPRISE APPLICATION INTEGRATION LT P C

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OBJECTIVES:

- Describe approaches to enterprise application integration
- Understand the integration middleware
- Evaluate the integration approaches suitable for a given problem

UNIT I INTRODUCTION 6

Requirements for EAI - Challenges in EAI – Integration with legacy systems – Integration with partners - Heterogeneous environment – Implementation approaches – Web services, messaging, ETL, direct data integration – Middleware requirements – Approaches to integration – services oriented and messaging.

UNIT II INTEGRATION PATTERNS 6

Introduction to integration patterns – Architecture for application integration – **Integration patterns** – Point to point, broker, message bus, publish/subscribe, Challenges in performance, security, reliability - Case studies

UNIT III SERVICE ORIENTED INTEGRATION 12

Business process integration - Composite applications-services – Web services – Service choreography and orchestration - Business process modeling - BPMN, Business process execution - **BPEL** – Middleware infrastructure - Case studies

UNIT IV MESSAGING BASED INTEGRATION 9

Messaging – Synchronous and asynchronous – Message structure – Message oriented middleware – Reliability mechanisms – Challenges – Messaging infrastructure – Java Messaging Services – Case studies

UNIT V ENTERPRISE SERVICE BUS 12

Enterprise Service Bus – routing, scalable connectivity, protocol and message transformations, data enrichment, distribution, correlation, monitoring – Deployment configurations – Global ESB, Directly connected, Federated, brokered ESBs – Application server based – Messaging system based – **Hardware based ESBs** – Support to SOA, message based and event based integrations -Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to

- Describe different approaches to integration enterprise applications
- Analyze specifications and identify appropriate integration approaches
- Develop a suitable integration design for a given problem
- Identify appropriate integration middleware for a given problem
- Evaluate the integration approaches against specified requirements



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REFERENCES:

1. George Mentzas and Andreas Frezen (Eds), "Semantic Enterprise Application Integration for Business Processes: Service-oriented Frameworks", Business Science Reference, 2009
2. Waseem Roshen, "SOA Based Enterprise Integration", Tata McGrawHill, 2009.
3. G Hohpe and B Woolf, "Enterprise Integration Patterns: Designing, Building, and Deploying Messaging Solutions", Addison Wesley Professional, 2003
4. D Linthicum, "Next Generation Application Integration: From Simple Information to Web Services", Addison Wesley, 2003
5. Martin Fowler, "Patterns of Enterprise Application Architecture", Addison- Wesley, 2003
6. Kapil Pant and Matiaz Juric, "Business Process Driven SOA using BPMN and BPEL: From Business Process Modeling to Orchestration and Service Oriented Architecture", Packt Publishing, 2008



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CP7301 SOFTWARE PROCESS AND PROJECT MANAGEMENT L T P C
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OBJECTIVES:

1. To understand overall SDLC and adopt suitable processes
2. To elicit, analyze, prioritize, and manage both functional and quality requirements
3. To estimate efforts required, plan, and track the plans
4. To understand and apply configuration and quality management techniques
5. To evaluate, manage, and design processes

(A mini-project can be chosen by the instructor and use it as a context for the tutorials)

UNIT I DEVELOPMENT LIFE CYCLE PROCESSES 9

Overview of software development life cycle – introduction to processes – Personal Software Process (PSP) – Team software process (TSP) – Unified processes – agile processes – choosing the right process Tutorial: Software development using PSP

UNIT II REQUIREMENTS MANAGEMENT 9

Functional requirements and quality attributes – elicitation techniques – Quality Attribute Workshops (QAW) – analysis, prioritization, and trade-off – Architecture Centric Development Method (ACDM) – requirements documentation and specification – change management – traceability of requirements

Tutorial: Conduct QAW, elicit, analyze, prioritize, and document requirements using ACDM

UNIT III ESTIMATION, PLANNING, AND TRACKING 9

Identifying and prioritizing risks – risk mitigation plans – estimation techniques – use case points – function points – COCOMO II – top-down estimation – bottom-up estimation – work breakdown structure – macro and micro plans – planning poker – wideband delphi – documenting the plan – tracking the plan – earned value method (EVM)

Tutorial: Estimation planning, and tracking exercises

UNIT IV CONFIGURATION AND QUALITY MANAGEMENT 9

identifying artifacts to be configured – naming conventions and version control – configuration control – quality assurance techniques – peer reviews – Fegan inspection – unit, integration, system, and acceptance testing – test data and test cases – bug tracking – causal analysis Tutorial: version control exercises, development of test cases, causal analysis of defects

UNIT V SOFTWARE PROCESS DEFINITION AND MANAGEMENT 9

Process elements – process architecture – relationship between elements – process modeling – process definition techniques – ETVX (entry-task-validation-exit) – process baselining – process assessment and improvement – CMMI – Six Sigma

Tutorial: process measurement exercises, process definition using ETVX



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TOTAL 45+15=60 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to

1. Explain software development life cycle
2. Adopt a suitable process for software development
3. Elicit functional and quality requirements
4. Analyze, prioritize, and manage requirements
5. Perform trade-off among conflicting requirements
6. Identify and prioritize risks and create mitigation plans
7. Estimate the efforts required for software development
8. Perform planning and tracking activities
9. Control the artifacts during software development
10. Perform various tests to ensure quality
11. Define new processes based on the needs
12. Adopt best practices for process improvement

REFERENCES:

1. Pankaj Jalote, "Software Project Management in Practice", Pearson, 2002.
2. Chris F. Kemerer, "Software Project Management – Readings and Cases", McGraw Hill, 1997.
3. Watts S. Humphrey, "PSP: A self-improvement process for software engineers", Addison-Wesley, 2005.
4. Watts S. Humphrey, "Introduction to the Team Software Process", Addison-Wesley, 2000.
5. Orit Hazzan and Yael Dubinsky, "Agile software engineering", Springer, 2008.
6. James R. Persse, "Process Improvement Essentials", O'Reilly, 2006.
7. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Seventh Edition, McGraw Hill, 2010.



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CP7311 Project Work (Phase – I)

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GUIDELINES TO BE FOLLOWED:

A student should work under a project supervisor, a faculty member and prepare a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.



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CP7411 Project Work (Phase – I)

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00 24 12

GUIDELINES TO BE FOLLOWED:

A student should work under a project supervisor, a faculty member and prepare a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.