



School of Computer Science & IT Devi Ahilya Vishwavidyalaya

SYLLABUS

M. Tech (Information Architecture & Software Engineering) 2 years

Program Educational Objectives (PEOs)

- PEO 1:** Develop software engineering skills for architecting quality products and carve out successful careers in IT industry and academia.
- PEO 2:** Demonstrate ability to manage software projects and participate effectively in group tasks and initiate entrepreneurship activities.
- PEO 3:** Deliver quality software products and perform research in the domain of software engineering.

Program Specific Outcomes (PSOs)

- PSO 1:** Acquire expertise to build real-life software applications using agile approach.
- PSO 2:** Design, implement and integrate software with maintainability, reusability, refactoring and design pattern issues in mind.

I - SEMESTER

CS-7314: Information Architecture

Aim:

This course is designed to help students acquire an understanding of information architecture, principles and concepts of designing effective architecture.

Course Outcomes:

- CO 1: Develop conceptual understanding of UX/UI design and information architecture
 - CO 2: Build theoretical foundation on principles and concepts of designing effective information architecture.
 - CO 3: Study existing portals on aspects of organizing, classification, navigation, searching & labelling information and prepare comprehensive reports on strength/weakness
 - CO 4: Understand TOGAF(The Open Group Architecture Framework) for building information architecture documents
 - CO 5: Supplement the fundamentals learnt with case studies of modern web infrastructure like Cloud, Security and Mobile.
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Unit-I

Introduction to UX/UI: Design Issues, tools & processes, Design Principles of good UX/UI design

Unit-II

Introduction to Information Architecture: Principles of information architecture, role of information architect, areas of information architecture, types of architecture, system architecture, enterprise architecture, application architecture, internet architecture, research and practice in information architecture.

Unit-III

Organizing information: Organizing information, organizational challenges, organizing websites and intranets, creating cohesive organization system, organizing WWW, browser navigation features, building context, improving flexibility, types of navigation systems, integrated navigation elements, remote navigation elements, designing elegant navigation systems

Unit-IV

Labeling Systems: Labelingsystems, not labels,types of labeling systems,creatingeffective labeling systems, fine-tuning the labeling system, non-representational labeling systems,double challenge,searching website,website understanding how users search,designing the search interface, reference interview, indexing the right stuff,search or not to search.

Unit-V

The Open Group Architecture Framework: Introduction to TOGAF 9, TOGAF 9 management overview, TOGAF 9 components, introduction to ADM, ADM phases, ADM deliverables, enterprise continuum, architecture repository, architecture governance, views and view points, architecture building blocks.

Text Books:

1. Information Architecture on the World Wide Web, First Edition, Peter Morville.

Reference Book(s):

1. TOGAFVersion9–The Open Group Architecture Framework.Publisher–The Open Group.
2. TOGAF–Quickstart guide for Enterprise Architect, Wolfgang Keller.

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CS-6220: Internet Programming Using Java

Aim:

To make students learn fundamental concept of coding and perform them practically and to develop problem-solving skills

Course Outcomes:

- CO 1: Understanding of OOPs concepts clearly
 - CO 2: Understanding of client server architecture and their working
 - CO 3: Understanding database creating and server technologies
 - CO 4: providing knowledge of advance java concepts like servlet, JSP, etc.
 - CO 5: Understanding of MVC Architecture
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Unit-I

Review of java concepts: Features of Java, Object-oriented programming overview, Introduction of Java Technologies, How to write simple Java programs, Data Types, Variables, Memory concepts, control statements, looping, Method CallStack and Activation Record, Argument Promotion and Casting, Scope of declaration and Method Overloading, String Handling: The String constructors, String operators, Character Extraction, String comparison, String Buffer. Arrays: Declaring and Creating Arrays, Enhanced for Statement, Passing Arrays to Method, Multidimensional Arrays, Variable-Length Argument lists, Using Command-line Arguments

Unit-II

Inheritance: Extending classes & related things, Packages and Interfaces: Defining a Package, Understanding CLASSPATH, Access Protection, Importing packages, creating own packages Exception Handling: Introduction, over view of doing it and keywords used, when to use it, Multithreading: What are threads, The java Thread model, Thread priorities, Thread life cycle, Thread Synchronization, Applets: Applet basics, Applet Architecture, Applet life cycle methods, Database connectivity: JDBC, The design of JDBC, Typical uses of JDBC

Unit-III

Introduction to HTTP, webServer and application Servers, Installation of Application servers, Config files, Web.xml. JavaServlet, Servlet Development Process, Deployment Descriptors, Generic Servlet, Lifecycle of Servlet. Servlet Packages, Classes, Interfaces, and Methods, Handling Forms with Servlet, Various methods of Session Handling, various elements of deployment descriptors.

Unit-IV

JSP Basics: JSP lifecycle, Directives, scripting elements, standard actions, implicit objects. Connection of JSP and Servlet with different database viz. Oracle, MS-SQL Server, MySQL.java.sql Package. Querying database, adding records, deleting records, modifying records, types of Statement. Separating Business Logic and Presentation Logic, Building and using JavaBean. Session handling in JSP, Types of errors and exceptions handling.

Unit-V

MVC Architecture Introduction to Remote Method Invocation, Introduction to Enterprise Java Bean, Types of EJB, Creating and working with Session Bean

Text Books:

1. Java2: The Complete Reference by Herbert Schildt, Tata McGraw-Hill, 8th Edition, 2011.
2. K. Mukhar, "Beginning Java EE 5: From Novice to Professional", Wrox Press.

Reference Book(s):

1. The Java Programming Language, Ken Arnold, James Gosling, David Holmes, 3rd Edition, Person Education, 2000.
2. Head First Java, Kathy Sierra, Bert Bates, O'Reilly Publication, 2nd Edition, 2005

CS-6513: Advanced Software Engineering

Aim: The aim of this course is to help students learn the skills and practices to build modern software products and services.

Course Outcomes (COs)

CO1: Implement reusability mechanisms for producing application systems.

CO2: Explore maintenance and reengineering approaches for legacy systems.

CO3: Understand the properties and methods of designing reliable and safe system.

CO4: Analyze and apply CASE in SDLC phases.

CO5: Study of advanced concepts in various domains to produce an effective software system.

Unit-I:

No. of Hours: 8

Introduction to Software Reuse: What is Software Reuse?, Reuse types, Reuse Approaches, Reuse Technology, Reuse benefits & barriers, Reuse success & failure Factors, CBSE Process, Reuse Driven Software Engineering is a business.

Unit-II:

No. of Hours: 8

Architectural Concepts in Reuse: Application and component systems, Application families allow significant reuse, Developing Application Systems from Reusable Components: Reuse Variability, Facades for Component System Internals and Externals. Organizing a system in Layered Architecture.

Unit-III:

No. of Hours: 8

Software change, Software Evolution, Software maintenance: Models and Metrics, Reengineering: Reengineering Process and Activities: Program Comprehension, Reverse Engineering, Restructuring, Forward Engineering, Re-documentation. Software Aging.

Unit-IV :

No. of Hours: 8

Software Dependability, Software Safety, Software Availability, Software Reliability: Metrics, Approaches and Models. Software Quality: Quality Factors, Verification & Validation (V&V), SQA. Computer-Aided Software Engineering (CASE): Scope and Technology, CASE support in SDLC, Second Generation CASE Tools, Architecture of a CASE Environment.

Unit-V:

No. of Hours: 8

Usability Engineering: HCI, Types of UI, Component-Based GUI Development, Usability Engineering Process and Methods. Aspect-Oriented Software Engineering. Cleanroom Software Engineering and Crowdsourcing. Artificial Intelligence & Machine Learning in SDLC.

Text Books:

1. Software Engineering: Concepts & Practices- **Ugrasen Suman**, Cengage Learning Publications, Second Ed. 2022.
2. Software Engineering-A practitioner's approach- **R. S. Pressman**, Tata McGraw-Hill International Editions, New York.
3. Software Engineering- **Ian Sommerville**, Pearson Education Asia, 10th Edition, 2016.
4. Fundamentals of Software Engineering-**Rajib Mall**, PHI, New Delhi.
5. An Integrated Approach to Software Engineering- **Pankaj Jalote**, Narosa Publishing House.

CS-4407: Information System Design

Course Outcomes (COs)

CO1: Explain the concepts, importance and elements of designing an information system.

CO2: Comparative study of various process models used in information system design.

CO3: Demonstrate project planning and management activities in order to manage and estimate software projects.

CO4: Discuss structured and object-oriented analysis & design methodologies.

CO5: Practice object-oriented modeling using UML for the design of real life problems.

Unit-I:

No. of Hours: 8

Introduction to Information System, Challenges in ISD, Elements of ISD, Roles and responsibilities in IS Design, Case Study of Information System Design; Software processes, Information system design models, A comparative study of Information System design models (Traditional, CBD, Agile and RUP process).

Unit-II:

No. of Hours: 8

Project Management and Planning: Project management essentials, Project success and failures, Project Life Cycle, Project team structure and organization. Project planning: Metrics and Measurements, Project Estimation: Effort Estimation Techniques, Staffing and Personnel Planning. Project Scheduling. Software Configuration Management, and Risk Management.

Unit-III:

No. of Hours: 8

Requirements engineering: Requirements Elicitation, Requirements analysis: Structured Vs. Object-oriented analysis, Prototyping analysis; Requirements specification, Requirements validation; Requirements management and its tools. Software Design: Design fundamentals, Design process, Modular design, and Component level design. Structured Vs. Object-oriented design, Refactoring.

Unit-IV :

No. of Hours: 8

Object-oriented analysis and design, UML modeling, Use case diagrams: Use Case scenario and Use Case relationships, Class and Object diagrams, Sequence diagrams, Collaboration diagrams, State-Chart diagrams, Activity diagrams, Component diagrams, Deployment diagrams, Generalizations Domain Model refinements, Architecture, Packaging model elements. Case Study of large scale systems

Unit-V:

No. of Hours: 8

Implementation: Traditional vs. TDD, Testing of information systems, Testing strategies, Levels of testing. Debugging, Automation Testing. Software testing tools.

Text Books:

1. Introduction to Information System, O'Brain, Printice Hall, 1997.
2. Software Engineering: Concepts & Practices- Ugrasen Suman, Cengage Learning Publications, Second Ed. 2022.
3. Object Oriented Analysis and Design Using UML- Ugrasen Suman et al, Cengage Learning, First Edition, 2018.
4. Object Oriented Modeling and Design Using UML-James Rambaugh, Pearson Education.

Reference Book(s):

1. Software Engineering-A practitioner's approach- R. S. Pressman, Tata McGraw-Hill International Editions, New York.

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2. Object Oriented Analysis and Design with Applications-Grady Booch, Addison Wesley.
3. Object-Oriented Software Engineering: A Use Case Driven Approach- Ivar Jacobson et al, Pearson Education.

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CS6418: Advanced Database Management System

Aim:

The aim of the course is to make students able to handle large database system (corporate database) and to be able to manipulate it efficiently.

Course Outcomes (COs)

CO1: Build strong foundation of query languages through relational algebra, calculus & QBE

CO2: Design conceptual, logical & physical database model through ER model and normalization.

CO3: Develop SQL proficiency on simple & advanced features with advanced functions like Concurrency, transaction on processing, and recovery in multi user environment

CO4: Acquire necessary skills for No SQL based database application development

CO5: Exposure to graph, spatial, and temporal databases

Unit-I:

No. of Hours: 8

Introduction: Advantages of DBMS approach, Various views of data, data independence, schema & sub-schema, primary concept of data models, database languages, transaction management, database administrator & user, data dictionary, database architectures. ER model: Basic concept, design issues, mapping constraint, keys, ER diagram, weak & strong entity-sets, specialization & generalization, aggregation, inheritance, design of ER schema, Reduction of ER Schema to tables. Domains, relation, kind of relation, Relational databases, Various types of keys: candidate, primary, alternate & foreign keys

Unit-II:

No. of Hours: 8

Relational Algebra and SQL: The structure, relational algebra with extended operations, modification of database, Idea of relational calculus, basic structure of SQL, Set operation, Aggregate functions, Null values, Nested Sub queries, derived relations, views, Modification of database, join relation, Domain, relation & keys, DDL in SQL.

Unit-III :

No. of Hours: 8

Functional dependencies & Normalization: basic definitions, Trivial & non trivial dependencies, closure set of dependencies & of attributes, Irreducible set of dependencies, introduction to normalization, non-loss decomposition, FD diagram, First, second and third normal forms, dependency preservation, BCNF, multivalve dependencies and fourth normal form, join dependencies and fifth normal form. Database Integrity: general idea, integrity rules, Domain rules, Attributes rules, assertion, triggers, integrity & SQL.

Unit-IV:

No. of Hours: 8

Transaction, Concurrency & Recovery: basic concept, ACID properties, transaction state, Implementation of atomicity & durability, Concurrent execution, Basic idea of serializability, Basic idea of concurrency control, basic idea of deadlock, Failure Classification, storage structure-types, stable storage implementation, data access, recovery & Atomicity: log based recovery, deferred database modification, immediate, Query-processing and optimization

Unit-V

No. of Hours: 8

Overview of Graph & Spatial Databases & NOSQL

Text Books:

1. DBMS by Sudarshan & Korth

Reference Book(s):

1. Internet material & eBooks for advanced topics Online Resources:

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