

## MINOR SPECIALIZATIONS

### C. INFORMATION TECHNOLOGY

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### CS223 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

#### **Course description and Objectives:**

*On Completion of this course, the student will be able to understand fundamentals of object- oriented programming in Java, including defining classes, invoking methods, using class libraries. Have the ability to write a computer program to solve specified problems. Be able to use the Java SDK environment to create, debug and run simple Java programs.*

#### **Course Outcomes:**

*The student is expected to have*

- *Understanding of OOP concepts and basics of java programming (Console and GUI based)*
- *The skills to apply OOP and Java programming in problem solving*
- *Should have the ability to extend his knowledge of Java programming further on his/her own.*

#### **UNIT I - Introduction, Classes and Objects**

Creation of Java, Importance of Java to Internet, Byte code, Java buzzwords, OOP Principles- Encapsulation, Inheritance and Polymorphism, Data types, Variables, Declaring variables, Dynamic initialization, Scope and life time of variables, Arrays, Operators, Control statements, Type conversion and casting, Compiling and running of simple Java program, Concepts of classes and objects Class fundamentals – Declaring objects, Assigning object reference variables, Introducing methods, Constructors, Usage of static with data and methods, Usage of final with data, Access control, this key word, Garbage collection, Overloading methods and constructors, Call by value, Recursion, Nested classes and Inner classes, Exploring the String class.

#### **UNIT II - Inheritance, Packages and Interfaces**

Basic concepts, Member access rules, Usage of super key word, Forms of inheritance, Method overriding, Abstract classes, Dynamic method dispatch, Using final with inheritance, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, Importing packages, Differences between classes and interfaces, Defining an interface,

Implementing interface, Applying interfaces, Variables in interface and Extending interfaces.

### **UNIT III - Exception Handling, Multithreading**

Concepts of Exception handling, Types of exceptions, Usage of try, Catch, Throw, Throws and Finally keywords, Built-in exceptions, Creating own exception Sub classes, Concepts of Multithreading, Differences between process and thread, Thread life cycle, Creating multiple threads using Thread class, Runnable interface, Synchronization, Thread priorities, Inter thread communication, Daemon threads, deadlocks, Thread groups.

### **UNIT IV -Applets & Event Handling & AWT Controls**

Applet Class, Applet Architecture, Applet Skeleton - Applet Initialization and Termination, Overriding update(), Simple Applet, Display Methods, Requesting Repainting - A simple banner Applet, Using The Status Window, The HTML APPLET Tag, Passing parameters to Applets, Applet Context and show Document.

Event sources, Event classes – ActionEvent, AdjustmentEvent, ComponentEvent, Container Event, Focus Event, InputEvent, ItemEvent, KeyEvent and MouseEvent, Delegation event model, Event Listeners, Handling mouse and Keyboard events, Adapter classes.

### **UNIT V - AWT & Swing**

Concepts of components, Container, Panel, Window, Frame, Canvas, Font class, Color class and Graphics. AWT Controls : Buttons, Labels, Text fields, Text area, Check boxes, Check box groups, Lists, Choice, Scrollbars, Menus, Layout Managers - Flow, Border, Grid, Card and Grid bag.

JApplet, JFrame and JComponent, Icons and Labels, Handling threading issues, Text fields, Buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

#### **TEXT BOOKS**

1. Herbert Schildt, "The Complete Reference Java J2SE", 7th ed., TMH Publishing Company Ltd, New Delhi, 2008.
2. Joe Wiggles worth and Paula McMillan, "Java Programming Advanced Topics", 3rd ed., TMH, 2009.

#### **REFERENCE BOOKS**

1. Cay Horstmann, "Big Java", 2nd ed., John Wiley and Sons, 2006.

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## IT201 INTERNET AND WEB TECHNOLOGIES

### **Course Description & Objectives:**

*This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web, and a general grounding introduction to more advanced topics such as programming and scripting. This will also expose students to the basic tools and applications used in Web publishing.*

### **Course Outcomes:**

- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Style Sheets.
- Build dynamic web pages using JavaScript (Client side programming).
- Create XML documents and Schemas.
- Build interactive web applications using AJAX.

### **UNIT I - Networking Concepts**

Introduction, Protocols in Computer Communications, the OSI Model, OSI Layer Functions.

Introduction, Why Internet Working?, Problems in Internet Working, Dealing with Incompatibility Issues, A Virtual Network, Internet Working Devices, Repeaters, Bridges, Routers, Gateways, A Brief History of the Internet, Growth of the Internet.

### **UNIT II - Network Protocols**

Introduction, Brief History of WWW, the Basics of WWW and Browsing, Hyper Text Markup Language, Common Gateway Interface, Remote Login.

### **UNIT III -JavaScript and AJAX**

Introduction, JavaScript, Basic Concepts, Controlling JavaScript Execution, Miscellaneous Features, JavaScript and Form Processing, Pop-up Boxes. AJAX:Introduction, How AJAX Works?, Life without AJAX, AJAX Coding, Life withAJAX.

**UNIT IV -Introduction to XML**

What is XML?, XML versus HTML, Electronic Data Interchange, XML Terminology, Introduction to DTD, Document-Type Declaration, Element-Type Declaration, Attribute Declaration, Limitations of DTDs, Introduction to Schema, Complex Types, Extensible Stylesheet Language Transformations, Basics of Parsing, JAXP

**UNIT V - Creating Good Web Pages**

Introduction, Top Level Navigation, Creating Sample Layouts, Metaphor, Theme, and Storyboard, Screen Resolution, 3-Column Layout, Using Frameworks, Using Graphics, Usability for the Handheld Devices, Creating Multilingual Web sites, XHTML and Web Browser Compatibility Issues, Designing the Basic Elements of a Home Page.

**TEXT BOOK:**

1. Achyut Godbole, Atul Kahate "Web Technologies: TCP/IP, Web/Java Programming, and Cloud Computing", Third Edition, McGraw Hill Education, 2013.

**REFERENCE BOOKS:**

1. Deitel, Deitel, Goldberg, "Internet & World Wide Web How to Program", Third Edition, Pearson Education, 2006.
2. Raj Kamal, "Internet and Web Technologies", Tata McGraw-Hill, 2007.

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## CS315 OPERATING SYSTEMS

**Course Description & Objective:**

*In this course students should understand how the operating system effectively manages system resources.*

**Course Outcomes:**

- *To understand the types of Operating systems and analyze the process scheduling Algorithms and Case study on processing Scheduling.*
- *To understand the resource sharing among the processes in the system.*
- *To understand how to manage the memory during the process execution (Memory Management) and File Management system.*

**UNIT I - Introduction**

What Operating System do, Operating System structure. Process Concept: Overview, Process scheduling, Operations on process, Inter process communication. Process Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Case Study: Process scheduling in Linux.

**UNIT II - Process Synchronization**

The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Monitors, Classical problems of synchronization, Case Study : Process Synchronization in Linux.

**UNIT III - Deadlocks**

Deadlock Characterization, Methods of Handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock Detection and Recovery.

**UNIT IV - Memory Management**

Continuous memory allocation, paging, structure of the page table, segmentation, demand paging, page replacement algorithms.

**UNIT V - File System**

File Concept, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection, File-System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free Space Management. Secondary-Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Scheduling, RAID Structure.

**TEXT BOOK:**

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Principles", 7<sup>th</sup> edition, John Wiley & Sons Inc, 2006.

**REFERENCE BOOKS:**

1. William Stallings, "Operating Systems – Operating System: Internals and Design Principles", 6<sup>th</sup> edition, , Prentice Hall, 2005.
2. Andrew S Tanenbaum , "Modern Operating Systems", 3<sup>rd</sup> edition, , Prentice Hall, 2007.

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## IT311 UNIX AND SHELL PROGRAMMING

### **Course Description & Objectives :**

*Effectively use Unix and C to write, test, debug, and maintain modest-sized programs, design, build, and use software tools that fit well into Unix, writing such tools both in the Bourne Shell and in C, using Unix arguments and standard input and output facilities, design modest-sized program using independent modules (abstract data types), that offer some potential for reuse, clearly explain the principles behind Unix concepts such as the file system structure, pipelines, file permissions, and environments use standard C libraries (including the standard C library, stdio, and ctype) and their associated header files effectively in writing programs.*

### **Course Outcomes:**

- *Students will have learned to use the Unix system as programmers and developers.*
- *Students will learn Unix structure, commands, and utilities.*
- *Students will become versed with regular expressions and shell programming.*

### **UNIT I - Introduction to Unix**

Introduction to UNIX, Unix structure, Unix Features, Common commands - Date, Time, Calender, Who, Password, Echo and Man, Basic Vi editor - Modes, Commands Related to Modes, Inserting, Deleting Text and Moving Cursor, FileSystems, FileNames, FileTypes, Directories, File Permissions, Commands to be covered here are : cp, mv, ln, rm, unlink, mkdir, rmdir, du, df, mount, umount, find, umask, ulimit, ps, who, finger, arp, ftp, telnet and rlogin, process utilities, Disk & network utilities.

### **UNIT II - Unix Utilities**

What is a shell, Shell relationships, Standard streams, Redirection, Pipes, Tee command, Command Substitution, Shell variables, Conditions, History and control structures and Shell programming. Filters, Text processing utilities

and backup utilities, Detailed commands to be covered are: cat, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, more, pg, comm, cmp, diff, tr, awk and tar.

#### **UNIT III- File I/O & File Directories**

File descriptor, open function, close function, Create function, lseek, read, write, File sharing, dup and dup2 functions, fcntl, ioctl functions. File status, Stat, fstat, lstat Functions, File types, Permission, Ownership of new files and Directories, File system, Links, File times, Directory related functions, The System calls to be covered are : access, umask, chmod, fchmod, chown, link, unlink, symlink, mkdir, rmdir, chdir, fchdir, getcwd and utime.

#### **UNIT IV- Environment of Unix Process & Process control**

Process identifiers, fork, vfork, exit, wait, waitpid, wait3, exec Functions, Race conditions, Zombie process. Signal Concepts, Signal handling, Important signals: kill, raise, alarm, pause, and abort.

#### **UNIT V -Inter Process Communication**

Pipes, FIFO, System V IPC – Message Queue, Semaphore and Shared Memory.

#### **TEXT BOOKS :**

1. Behrouz A. Forouzan, Richard F. Gilberg, "Unix and shell Programming", 1st ed., Thomson, 2005.
2. W.R. Stevens, "Advanced Programming in the UNIX environment", 1st ed., Pearson Education, 2006.

#### **REFERENCE BOOKS :**

1. Uresh vahalia, "Unix internals, the new frontiers", 1st ed., Prentice Hall Publications, 1995.
2. Meeta Gandhi, "The C Odyssey UNIX", 3rd ed., BPB Publications, 2004.
3. Yashwant Kanitkar, "Unix Shell programming", 1st ed., BPB publications, 1996
4. Sumithabha Das, "Unix The Ultimate Guide", 1st ed., Tata McGraw Hill, 2008.

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## CS222 DATABASE SYSTEMS

### **Course description and Objectives:**

*The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS. The course will focus on 5 main areas such as Information gathering, Data analysis, Database design, Concurrency and robustness, Efficiency and scalability.*

### **Course Outcomes:**

*Upon successful completion of this course, students should be able to:*

- *Describe the fundamental elements of relational database management systems*
- *Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.*
- *Design ER-models to represent simple database application scenarios*
- *Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.*
- *Improve the database design by normalization.*

### **UNIT I - Database System- concepts and architecture**

Data modelling using the Entity Relationship (ER) modelling and Enhanced Entity Relationship (EER) modelling, Specialization and Generalization.

### **UNIT II - The Relational Model**

Relational database design using ER to relational mapping, Relational algebra and relational calculus, Tuple Relational Calculus, Domain Relational Calculus, SQL.

### **UNIT III - Database design theory and methodology**

Functional dependencies and normalization of relations, Normal Forms, Properties of relational decomposition, Algorithms for relational database schema design.



**UNIT IV - Transaction processing concepts**

Schedules and serializability, Concurrency control, Two Phase Locking Techniques, Optimistic Concurrency Control, Database recovery concepts and techniques.

**UNIT V - Data Storage and indexing**

Single level and multi level indexing, Dynamic Multi level indexing using B Trees and B+ Trees, Query processing and Query Optimization, Introduction to database security.

**TEXT BOOKS:**

1. Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems (5/e), Pearson Education, 2008.
2. Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems (3/e), McGraw Hill, 2003.

**REFERENCE BOOKS:**

1. Silberschatz, Korth, "Data base System Concepts", 4th ed., McGraw hill, 2006.
2. Peter Rob and Carlos Coronel, Database System- Design, Implementation and Management (7/e), Cengage Learning, 2007.

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**CS434 MULTIMEDIA SYSTEMS**


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**Course Description and Objectives:**

*Understand the characteristics of multimedia systems and how to address issues Be aware of the differences among multimedia authoring systems. Be familiar with the software development process as practiced in a multimedia development environment Be able to design, write, document, debug and evaluate a non trivial multimedia system. Appreciate and understand the legal and ethical issues associated with developing multimedia systems, particularly in regard to use of media clips developed by others.*

**Course Outcomes:**

- *Write action script for a particular problem.*
- *Design and Draw customized GUI components.*
- *Apply Transformations on Components.*
- *To make use of fundamental concepts and formulate best practices*

**UNIT I**

Introduction to Multimedia, Media and Data Streams, Sound/Audio, Images and Graphics, Video and Animation.

**UNIT II**

Data Compression, Optical Storage Media; Computer Technology, Multimedia Operating Systems.

**UNIT III**

Networking Systems, Multimedia Communication Systems; Database Systems.

**UNIT IV**

Multimedia Architecture; Multimedia Documents, Hypertext and MHEG.

**UNIT V**

User Interfaces, Synchronization, Abstractions for Programming; Multimedia Application Development; Virtual Reality; Future Directions.

**TEXT BOOKS:**

1. Ralf Steinmetz, Klara Nahrstedt "Multimedia: Computing Communications & Applications" Pearson Education (2004)
2. Parekh Ranjan "Principles of Multimedia" Tata McGraw-Hill (2007)

**REFERENCE BOOKS:**

1. John E Koegal, Buford "Multimedia Systems" IIBK. (1994)
2. John Vince "Virtual Reality Systems" ACM Press (1995)

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## CS225 SOFTWARE ENGINEERING

### **Course Description and Objectives:**

*This course will be helpful for the student to understand the concept of a software life cycle, the role of process models and how to produce a set of software requirements. This course introduces the concepts and methods required for the construction of large software intensive systems. It aims to develop a broad understanding of the discipline of software engineering.*

### **Course Outcomes:**

*After completing the course students will be able to:*

- *Plan a software engineering process to account for quality issues and non-functional requirements;*
- *Employ a selection of concepts and techniques to complete a small-scale analysis and design project.*
- *Interact with a client to elicit input, and communicate progress.*
- *Employ group working skills - including general organization, planning and time management, and inter-group negotiation, etc.*
- *Translate a specification into a design, and then realize that design practically, all using an appropriate software engineering methodology.*

### **UNIT I - Introduction to Software Engineering**

The evolving role of software, Changing Nature of Software, Software myths. Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models. The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

### **UNIT II - Requirements Engineering & Analysis Modeling**

Requirements engineering Tasks: Inception, elicitation, elaboration, negotiation, specification, validation, requirements management.

Initiation of requirements engineering process: Identify stakeholders recognizing multiple view points, working towards collaborator, asking the first question. Building the analysis model: data modeling-data objects, attributes, relationship, cardinality and modularity. Class based modeling: identify analysis classes, specify attributes, and define operations, CRC model, association and dependency, analysis package.

### **UNIT III - Software Design**

Design Engineering: Design process and Design quality, Design concepts, the design model, Data flow diagrams, process specification.

Creating an architectural design: Software architecture, Data design, Architectural styles and patterns, Architectural Design.

Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

### **UNIT IV - Process & Product Metrics and Software Testing**

Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance. Metrics for Process and Products: Software Measurement, Metrics for software quality.

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

### **UNIT V - Risk & Quality Management**

Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Quality Management: Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

### **TEXT BOOKS**

1. Roger S. Pressman "Software Engineering, A practitioner's Approach", 6<sup>th</sup> ed., McGrawHill International Edition, 2008.

### **REFERENCE BOOKS**

1. Sommerville "Software Engineering", 7<sup>th</sup> ed., Pearson education, 2008.
2. Shely Cashman Rosenblatt, "Systems Analysis and Design" 1<sup>st</sup> ed., Thomson Publications, 2006.

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## CS425 DATAWAREHOUSING & DATAMINING

### **Course Description and Objectives:**

*This course is about knowing of how to make use of historical data so that high end business decision can be taken for the growth of an organization. The main objective of this course is to designing the intelligent machines which can take risk business decisions behalf of humans using the datamining techniques like classification, clustering, outlier detection, association rule mining.*

### **Course Outcomes:**

*Students are able to*

- *Learn the basic concepts of Database Technology Evaluation steps and also understood the need of data mining and its functionalities*
- *Explore the efficient and effective maintenance of Data Warehouses.*
- *Apply the data mining functionalities like Clustering, Classification, Association Analysis to real world data.*
- *Discover interesting patterns and association rules from huge volume of data used to do classifications and predictions.*
- *Gain knowledge on developing areas like Web Mining, Text Mining, and Spatial Mining.*

### **UNIT I - Introduction & Data Warehousing**

Why Data Mining, What is Data Mining, Kinds of Data, Kinds of Patterns, and Technologies used, Kinds of applications adopted, Major issues in Data Mining.

Basic Concepts, Data Warehouse Modeling, Data Warehouse Design and Usage, Data Warehouse Implementation, Data Generalization by Attribute-Oriented Induction

### **UNIT II - Data Preprocessing**

Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity. An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

**UNIT III - Data Cube Technology**

Preliminary Concepts, Data Cube Computation Methods, Processing Advanced Kinds of Queries by Exploring Cube Technology, Multidimensional Data Analysis in Cube Space

Basic Concepts and Methods: Basic Concepts, Frequent Itemset Mining Methods, Which Patterns Are Interesting?—Pattern Evaluation Methods  
Pattern Mining in Multilevel, Multidimensional Space, Constraint-Based Frequent Pattern Mining

**UNIT IV - Classification & Advanced Classification**

Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy

Bayesian Belief Networks, Classification by Back propagation, Support Vector Machines, Classification Using Frequent Patterns, Lazy Learners, Other Classification Methods

**UNIT V - Cluster Analysis & Advanced Cluster Analysis**

Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Evaluation of Clustering

Probabilistic Model-Based Clustering, Clustering High-Dimensional Data

**TEXT BOOKS:**

1. Jiawei Han Micheline Kamber – “Data Mining Concepts & Techniques”, Third Edition, Morgan Kaufmann Publishers, 2012.

**REFERENCE BOOKS :**

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, “Introduction to Data Mining”, First Edition, 2012.
2. Ralph Kimball, Margy Ross, “The Data Warehouse Toolkit”, first edition John Wiley and Sons Inc., 2002.
3. Alex Berson, Stephen Smith, Kurt Thearling, “Building Data Mining Applications for CRM”, first edition, Tata McGraw Hill, 2000.
4. Margaret Dunham, “Data Mining: Introductory and Advanced Topics”, first edition, Prentice Hall, 2002.
5. Paulraj Ponnaiah, “Data Warehousing Fundamentals”, first edition, Wiley Publishers, 2001.

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## CS435 SOFTWARE TESTING METHODOLOGIES

### **Course Description and Objectives:**

Software testing is a subject where the student will learn and apply basic skills needed to create and automate the test plan of a software project. It aims to describe principles and strategies for generating system test cases and to understand the essential characteristics of tools used for test automation.

### **Course Outcomes:**

Students who have completed this course would have learned

- Various test processes and continuous quality improvement
- Types of errors and fault models
- Methods of test generation from requirements
- Behavior modeling using UML: Finite state machines (FSM)
- Test adequacy assessment using: control flow, data flow, and program mutations

### **UNIT I - Introduction**

Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

### **UNIT II - Transaction Flow Testing & Domain Testing**

Transaction flows, transaction flow testing techniques. Dataflow testing:- Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

Domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

### **UNIT III - Paths, Path products and Regular expressions**

Path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

**UNIT IV - Logic Based Testing & State, State Graphs and Transition testing**

Overview, decision tables, path expressions, kv charts, specifications.  
State graphs, good & bad state graphs, state testing, Testability tips.

**UNIT V - Graph Matrices and Application**

Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. Usage of JMeter and Winrunner tools for functional / Regression testing (Ref Text book2).

**TEXT BOOKS:**

1. Boris Beizer, "Software Testing Techniques", 2<sup>nd</sup> ed., Dreamtech, 2006.
2. Dr.K.V.K.K.Prasad, "Software Testing Tools", 1<sup>st</sup> ed., Dreamtech. 2008.

**REFERENCES BOOKS:**

1. Brian Marick, "The craft of software testing", 2<sup>nd</sup> ed., Pearson Education, 2007.
2. Edward Kit, "Software Testing in the Real World ", 2<sup>nd</sup> ed., Pearson Education, 2008.

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## CS322 OBJECT ORIENTED ANALYSIS & DESIGN

**Course Description and Objectives:**

*This course explains how a software design may be represented as a set of interacting objects that manage their own state and operations. It describes the activities in the object - oriented design process and introduces various models that can be used to describe an object-oriented design.*

**Course Outcomes:**

- *To understand the fundamental principles of Object Oriented programming.*
- *To master key principles in Object Oriented analysis, design, and development.*
- *Be familiar with the application of the Unified Modelling Language (UML) towards analysis and design.*



- *To know common patterns in Object Oriented design and implement them.*
- *To be familiar with alternative development processes.*

**UNIT I - Introduction to UML**

Importance of Modeling, Principles of Modeling, Object Oriented Modeling, Conceptual model of the UML, Architecture, Software Development Life Cycle.

**UNIT II - Basic Structural Modeling & Basic Behavioral Modeling**

Classes, Relationships, Common Mechanisms, and Diagrams. Use cases, Use case Diagrams, Interactions, Interaction Diagrams, Activity Diagrams.

**UNIT III - Class & Object Diagrams**

Terms, Concepts, Modeling Techniques for Class & Object Diagrams.

**UNIT IV - Advanced Structural Modeling & Advanced Behavioral Modeling**

Advanced Classes, Advanced Relationships, Interfaces, Types and Roles, Packages.

Events and Signals, State Machines, Processes and Threads, Time and Space, State Chart Diagrams.

**UNIT V - Architectural Modeling**

Component, Deployment, Component Diagrams and Deployment Diagrams.

**TEXT BOOKS:**

1. Booch G., Rumbaugh J. & Jacobsons I., "The Unified Modeling Language User Guide", Addison Wesley, 2002.

**REFERENCE BOOKS:**

1. Meilir Page-Jones, "Fundamentals of Object Oriented Design in UML", 4th ed., Pearson Education, 2008.
2. Pascal Roques, "Modeling Software Systems Using UML2", 2nd ed., WILEY- Dreamtech India Pvt. Ltd, 2004.
3. Atul Kahate, "Object Oriented Analysis & Design", 1st ed., The McGraw-Hill Companies, 2008.
4. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado, "UML 2 Toolkit", 1st ed., WILEYDreamtech India Pvt. Ltd., 2003.