# FUNDAMENTALS OF OBJECT ORIENTED PROGRAMMING USING JAVA

(Open Elective-1: Common to all branches except CSE, IT and CSIT)

| | | | | | |
|---|---|---|---|---|---|
| Instruction | : | 3 Periods / week | Continuous Internal Evaluation | : | 30 Marks |
| Tutorial | : | | Semester End Examination | : | 70 Marks |
| Credits | : | 3 | Semester End Exam Duration | : | 3 Hours |

**Prerequisites:** Data Structures through C

**Course Objectives:**

1. To introduce the object oriented programming principles
2. To design a real world problem through well-defined classes
3. To impose security policies on a large scale applications
4. To give persistence to data

**Unit I - Introduction to Java and Building Blocks of Java Language**

Introduction to Java and Building Blocks of Java Language: Basics of Java: History/ Background of Java, Java Buzzwords, Java Virtual Machine and Byte code, Java Environment setup, Java Program structure, Data Types, Variables -- Scope and Life Time, Operators, Expressions, Type Conversions and Type Casting, Conditional statements and Control statements, Simple Java Programs, javac and java command flags.

Encapsulation: Classes and Objects, Classes: Class structure, class components, Objects: Object declaration, Reference variables, Constructors - default Constructor, Parameterized Constructors, Constructor overloading, this keyword and its uses, Arrays concept, static modifier, Access modifiers, Wrapper classes.

Methods and Packages: Passing parameters to methods– Passing primitive types and Passing Objects, Method Overloading, Garbage collection, java.lang.System.gc(), finalize(), Packages – package access, classpath setting, package access rules.

**Unit II - OOP Concepts**

OOP Concepts: Inheritance, Inheritance concept, superclass and subclass relationship, principle of substitution, effect of access modifiers on inheritance. Usage of super (field, method, constructor) and final (field, class, method) keywords,

Polymorphism- method overriding, dynamic method dispatch

Abstract Classes and Interfaces: Abstract classes -- concept, usage, Interfaces– declaration, implementation and applications, components of an interface, extending interfaces.

String Handling: String class, String APIs

**Unit III - Dealing Exceptions and I/O**

Dealing Exceptions and I/O: Exceptional Handling: Concepts of exception handling, benefits of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, Built in Exceptions, Custom exceptions, Introduction to Java I/O package

**Unit IV - Multithreading**

Multithreading: Fundamentals, Thread Life Cycle, Ways of creating threads - Thread class and Runnable interface, Thread priorities, Creating multiple threads, core methods of Thread class, Thread Synchronization.

**Unit V - GUI Development**

GUI Development: AWT, Basics of GUI Programming, Event handling – Delegation event model, event sources, event listeners, event classes, adapter classes, nested classes and interfaces, handling keyboard and mouse events.

Swing: Containers, components, layout managers, frames and windows, panels, buttons, checkboxes, radio buttons, combo boxes, lists, labels, color choosers, file choosers, text fields, text areas, tool tips.

**Course Outcomes:** At the end of the course, the student should be able to

CO 1 : Apply the concepts of data encapsulation, inheritance, and polymorphism
CO 2 : Acquire the concepts of Graphical User Interfaces
CO 3 : To be able to apply an object oriented approach to programming and identify the potential benefits of object -oriented programming over other approaches.
CO4 : To be able to reuse the code and write the classes which work like built-in types.
CO5 : To be able to apply object -oriented concepts in real world applications.

**Text Books:**

1. Herbert Schildt, *Java: The complete Reference*, 9th Edition, Oracle Press.
2. Cay S. Horstmann and Gary Cornell, *Core Java, Volume II- Advanced Features*, 9th Edition, Prentice Hall.

**References:**

1. Cay S. Horstmann and Gary Cornell, *Core Java, Volume I: Fundamentals*, 9th Edition, Prentice Hall.
2. Kathy Sierra and Bert Bates, *Head First Java*, 2nd Edition, O'reilly Publications.

# FUNDAMENTALS OF OPERATING SYSTEMS AND SHELL PROGRAMMING

(Open Elective-1: Common to all branches except CSE, IT and CSIT)

| | | | | | |
|---|---|---|---|---|---|
| Instruction | : | 3 Periods / week | Continuous Internal Evaluation | : | 30 Marks |
| Tutorial | : | | Semester End Examination | : | 70 Marks |
| Credits | : | 3 | Semester End Exam Duration | : | 3 Hours |

**Prerequisites:** Data Structures through C, Computer Organization

**Course Objectives:**

1. To introduce the operating system abstraction of devices.
2. To offer different memory management techniques and implementation mechanisms for efficient use of memory.
3. To give clear understanding on filters.
4. To make students to write automated scripts.

**Unit I – Operating System Overview, Process Management**
Operating System Overview: Operating System Functions and Services, Overview of Computer Operating Systems, Distributed and Special Purpose Systems, System Calls and System Programs, Operating System Structure.
Process Management: Process Concepts, Scheduling-Criteria, Scheduling Algorithms.

**Unit II – Synchronization, Deadlocks**
Synchronization: The Critical-Section Problem and Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.
Deadlocks: Deadlock Characterization, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

**Unit III – Memory-Management Strategies**
Memory-Management Strategies: Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation.
Virtual-Memory Management: Virtual Memory and Demand Paging, Introduction to Page Replacement & Page-Replacement Algorithms.

**Unit IV – Simple Filters, Filters Using Regular Expressions**
Simple Filters: Cat, Head, Tail, Cut, Tr, Uniq, Comm, Filters Using Regular Expressions: Patterns, Regular Expressions, grep family, Regular Expressions Supported by grep family, Searching Based on Content.

**Unit V – Korn Shell Programming**
Basic Script Concepts, Expressions, Decisions, Making Selections, Repetition, Special Parameters and Variables, Changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

**Course Outcomes:** At the end of the course, the student should be able to

CO 1 : Acquire Basic Knowledge about different functions, structures and design features of contemporary operating systems.
CO 2 : Classify different Process Scheduling, Synchronization, and Deadlock algorithms.
CO 3 : Appreciate Virtual Memory Implementation.
CO4 : Process Text Files that represent different Use cases.
CO5 : Develop Interactive Menu Driven Shell Scripts.

**Text Books:**

1. Abraham Silberchatz, Peter B.Galvin and Greg Gange, *Operating System Concepts*, 8th Edition, John Wiley, 2008.

2. Behrouz A. Forouzan and Richard F.Gilberg, *Unix and Shell Programming*, Brooks/Cole Thomson Learning, 2003.

**References:**

1. Graham Glass and King Ables, *Unix for Programmers and Users*, 3rd Edition, Pearson Education, 2003.
2. Kenneth Rosen, Douglas Host, Rachel Klee and Richard Rosinski, *Unix Programming Environment*, 2nd Edition, TMH, 2007.

# FUNDAMENTALS OF WEB PROGRAMMING

(Open Elective-2: Common to all branches except CSE, IT and CSIT)

| | | | | | |
|---|---|---|---|---|---|
| Instruction | : | 3 Periods / week | Continuous Internal Evaluation | : | 30 Marks |
| Tutorial | : | | Semester End Examination | : | 70 Marks |
| Credits | : | 3 | Semester End Exam Duration | : | 3 Hours |

**Prerequisites:** Java

**Course Objectives:**

1. To learn the basics of HTML elements
2. To learn the basics of java Console and GUI based programming
3. To introduce XML and processing of XML Data with Java
4. To introduce Server side programming with Java Servlets and JSP
5. To introduce Client side scripting with Javascript.

**Unit I - Introduction to HTML, CSS**

Introduction to HTML: A review of all basic elements (Phrase and Presentation elements, Links, Images, Tables, Lists, Frames and Forms).
CSS: Syntax structure, using style sheets, borders, margins, box model, fonts, and other advanced elements.

**Unit II - JavaScript, XML**

JavaScript: Introduction to JavaScript, data types, operators, loop structures, conditions, functions, Arrays, Objects, Regular expressions, error handling, JS HTML DOM
XML: Syntax, namespaces, DTD, Schema, XSLT, XML Processors

**Unit III - Database Technologies**

Database Technologies: JDBC Drivers and types, JDBC Configuration (Database URLs, Registering a driver, connecting to a database), Executing SQL statements (Statement and ResultSet classes), query execution (Prepared Statements and Callable Statements, Meta Data (Database Meta Data and ResultSet Meta Data).
Web Servers: An introduction to the various Web Servers, Web application structure and deployment in Tomcat.

**Unit IV - Servlet Technology**

Servlet Technology: Servlets necessity, Servlet lifecycle, The Servlet API packages and class and interface hierarchy, Basic servlet program template, Handling requests and responses, Using form parameters, Using ServletContext and ServletConfig objects, Using initialization parameters (both context and config level), Session management (cookies, Seesion API, URL Rewriting).

**Unit V - JSP Technology**

JSP Technology: The Anatomy of a JSP Page, JSP Lifecycle, Scripting elements (Scriptlets, expressions, declarations, comments),JSP Directives, JSP Standard actions, JSP Implicit objects, JSP page scope.

**Course Outcomes:** At the end of the course, the student should be able to

CO 1 : Able to write html, CSS codes.
CO 2 : Demonstrate JavaScript, XML, DHTML and related Technologies.
CO 3 : Implement the Database Connectivity and Component Technologies like Beans.
CO4 : Deploy the servlet technology & API.
CO5 : Construct the fundamentals of JSP.

**Text Books:**

1. Jon Duckett, *Beginning HTML, XHTML, CSS, and JavaScript*, Wrox Publications, 2010
2. Bryan Basham, Kathy Sierra and Bert Bates, *Head First Servlets and JSP*, 2nd Edition, O'Reilly Media, 2008
3. Cay Horstmann and Gary Cornell, *Core Java: Advanced Features, Volume II*, 9th Edition, Prentice Hall, 2013. (Only Chapter 4 for Database Programming).

**References:**

1. E-resource: http://www.w3schools.com/
2. Martin Hall and Larry brown, Core Servlets and JSPs, Volume I and II, Pearson

# FUNDEMENTALS OF COMPUTER NETWORKS

(Open Elective-2: Common to all branches except CSE, IT and CSIT)

| | | | | | |
|---|---|---|---|---|---|
| Instruction | : | 3 Periods / week | Continuous Internal Evaluation | : | 30 Marks |
| Tutorial | : | | Semester End Examination | : | 70 Marks |
| Credits | : | 3 | Semester End Exam Duration | : | 3 Hours |

**Prerequisites:** Fundamentals of Operating Systems and Shell Programming

**Course Objectives:**

1. To learn the basic concepts of data communications and computer networking models in wide sense.
2. An understanding of computer networking theory, including principles involved in the protocols designed for application layer, transport layer, network layer and data link layer of a networking stack
3. An understanding of specific implemented protocols covering application layer, transport layer, network layer and data link layer of the Internet (TCP/IP) stack.
4. Pre-requisite knowledge to enable students to study more advanced topics in computer networking.

**UNIT I - Introduction**

Introduction: Data communication Networks, The internet, Protocols and standards, Networks Models: The OSI Model, TCP/IP protocol Suite, Addressing, Physical Layer and Media Transmission Media, Switching: Circuit-Switched Networks, Datagram Networks, Virtual-Circuit Networks.

**UNIT II – Data Link Layer**

Data Link Layer: Introduction, Block Coding, Cyclic Codes, Checksum, Data Link Control: Framing, Flow and Error Control protocols, Noiseless Channels, Noisy Channels, Multiple Access, IEEE Standards, Standard Ethernet, Connecting Devices, Backbone Networks, VirtualLANs.

**UNIT III - Network Layer**

Network Layer: Logical Addressing, Internet Protocol, Address Mapping, Error Reporting and Multicasting, Address Mapping, Forwarding and Routing: Unicast Routing Protocols, Multicast Routing Protocols.

**UNIT IV - Transport Layer**

Transport Layer: Process-Process Delivery: UDP,TCP, Congestion Control and Quality of Service, Data Traffic, Congestion, Congestion Control, Two Examples, Quality Service.

**UNIT V - Application Layer**

Application Layer: Domain Name System, Remote Logging, Electronics Mail and File Transfer Protocol, WWW and HTTP.

**Course Outcomes:**

| | | |
|---|---|---|
| CO 1 | : | Represent the data in various coding formats. |
| CO 2 | : | Implement different routing protocols. |
| CO 3 | : | Select components and network for particular application. |
| CO4 | : | Have experience in designing communication protocols. |
| CO5 | : | Implement QOS based network services. |

**Text Books:**

1. Games F. Kurose and K.W.Ross, *Computer Networking: A Top down approach feature in the internet*, 3rd Edition, Pearson education, 2012.
2. Behrouz A.Forouzan, *Data Communications and Networking*, 4th Edition, TMH, 2009.

**References:**

1. A.S.Tanenbaum, *Computer Networks*, 4th Edition, Pearson Education, 2008.
2. W.Tomasi, *Introduction to data communications and networking*, Pearson education, 2009.
3. S.Keshav, *Engineering approach to computer network*, 2nd Edition, Pearson education, 2008.