

Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B.Sc. in Computer Science
Effective from academic session 2023-24
Semester-IV

Paper Name: Object Oriented Programming Using JAVA/ OOP using JAVA Laboratory

Code: CS 401 / CS 491

Contact: 3L+2P

Credit:3+2

Course Objectives:

- CO1. To understand the concept of Class, Data, Polymorphism, Inheritance, Dynamic Binding
- CO2. To understand the concept of Overview of JAVA
- CO3. To understand the different types of natural Data type, Variable and Constants token in JAVA
- CO4. To understand the concept of Control Statement of JAVA
- CO5. To understand the Iteration Statement, Arrays and Vector, Classes and Objects, Inheritance.
- CO6. To understand Packages, Interfaces, Exception Handling, Multithreaded Programming, Applets, Abstract Window Toolkit

Module I: Oops Concept

Object, Class, Data abstraction, Data encapsulation, Inheritance, Polymorphism, Dynamic including

Module II: An overview of Java

Java features, JVM, Comparison between Java and C++, Idea of any Java Development Kit (JDK), learn to run javaprogram through command line and with any JDK

Module III: Data Concept

Data Types, variables and constants Tokens in Java (Identifiers, Literals, Keywords, Operator)

Module IV: Control Statements

Simple if statement, if...else statement, Nesting of if-else statement, switch statement

Module V: Iteration Statement

For loop, While loop, Do-While loop

Module VI: Arrays and Vector

1D and 2D array, vector concepts

Module VII: Classes and Objects

Creating main() in a separate class, Methods with parameters, Methods with a return type, Method overloading, Passing Objects as Parameters, Passing Values to methods and Constructor, Abstract classes

Module VIII: Inheritance

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Basic concepts, types of inheritance, use of super keyword, overriding methods.

Module X: Packages, Interfaces

User defined package, import package, Class path, How to create interface, use and extend interface

Module XI: Exception Handling

Overview, What is Exceptions and handling exception?, Compile time errors Run time errors, try...catch, Using Multiplecatch Blocks, finally Block, Throwing an Exception, Using the throw and throws Statement.

Module XII: Stream

Byte Streams, Input Stream, Output Stream Character Streams (Reader, Writer), How Files and Streams Work, Workingwith Reader classes (Input Stream Reader, Buffered Reader)

Module XIII: Multithreaded Programming

Overview, Thread Life cycle, Advantages of multithreading over multi-tasking Thread Creation and simple programs,Synchronized threads, Synchronized Methods

Module XIV: Applets

Applet vs. Application, Applet class, Advantages of Applet, Applet Lifecycle My First Applet, Applet tag, How to runapplet

Module XV: Abstract Window Toolkit

GUI Components, Interface and Classes of AWT Package, Labels, Buttons, Check Boxes, Radio button, Text Area, TextField, Scrollbar, Panels, Layout managers, Simple event driven programming with Text Field and Button

OOP using JAVA Laboratory:

Practical: Based on Theory

Reference Books:

1. Let Us JAVA 2 Edition, YashavantKanetkar BPB Publications
2. Programming with JAVA 5th Edition, E Balagurusamy, TMH
3. Core JAVA, TanweerAlam, Khanna Publishing House

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Paper Name: Data Communication and Computer Networks

Code: CS 402

Contacts: 3L + 1T

Credit:4

Course Objectives:

CO1. Build an understanding of the fundamental concepts of computer networking.

CO2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.

CO3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

CO4. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Unit	Content
1	<p>Introduction:</p> <p>Data communications Components, data representation, direction of data flow (simplex, half duplex, full duplex).</p> <p>Network Hardware: Physical structure (type of connection, topology), categories of network (LAN, MAN, WAN).</p> <p>Internet: Brief history, Protocols and standards, Reference models: OSI reference model, properties of all the layers, TCP/IP reference model, their comparative study.</p>
2	<p>Physical Layer</p> <p>Data & Signals: Analog & Digital Data and Signals, periodic and non-periodic signals, composite signals, bandwidth, bit rate, transmission of digital signals.</p> <p>Transmission Impairments: Attenuation, Distortion and Noise.</p> <p>Data Rate Limits: Noiseless Channel: Nyquist Data rate, Noisy Channel: Shannon's Capacity, calculation of data rate using both limits.</p> <p>Digital Transmission</p> <p>Digital to Digital Conversion: Line coding, schemes (RZ, NRZ, Manchester, Differential Manchester), block coding.</p> <p>Analog to Digital Conversion: Sampling, Nyquist rate of sampling, Pulse code</p>

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modulation (PCM), Delta Modulation (DM), Adaptive Delta Modulation (ADM), parallel and serial transmission.

Analog Transmission

Digital to Analog: Amplitude shift keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK), Quadrature Amplitude Modulation (QAM).

Analog to Analog Conversion:

Amplitude Modulation (AM), Frequency Modulation (FM), Phase Modulation.

Bandwidth Utilization Techniques

Multiplexing: FDM, Synchronous & Statistical TDM, WDM.

Transmission Medium

Guided media: Twisted pair, Coaxial, Fiber optics.

Unguided: Radio waves, microwaves, Infrared, Antenna, Communication satellites

Switching and Telephone network

Circuit switched networks, Packet Switched networks, Virtual Circuit switch.

Major components of telephone network, Dial up modem, DSL and ADSL modems, Cable

TV for data transfer

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Data link Layer:

Types of errors, framing (character and bit stuffing), error detection & correction methods, Linear and cyclic codes, checksum.

Protocols: Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC.

Physical addressing: MAC address and its format.

Medium Access sub layer

Point to Point Protocol, Token Ring: Reservation, Polling. **Multiple access protocols:**

Pure & Slotted ALOHA, CSMA, CSMA/CD, CSMA/CA.

Channelization: FDMA, TDMA, CDMA.

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Wired and Wireless LAN: Standards, fast Ethernet, Protocol 802.11, Bluetooth.

4 **Network layer**

Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway,

Addressing: IP addressing, Subnetting, **Routing techniques:** static vs. dynamic routing

Protocols: RARP, ARP, IP, ICMP

5 **Transport layer**

Process to Process delivery: UDP, TCP

6 **Application Layer**

Introduction to DNS, Remote logging, FTP, Electronic mail, WWW & HTTP

Text book and Reference books:

1. Data Communication and Networking, B.A. Forouzan, Tata McGraw Hill.
2. Computer Networks, A.S. Tanenbaum, Pearson Education .
3. Data and Computer Communication, W. Stallings, Pearson Education.
4. Data & Computer Communication,Black, PHI.
5. Internet & World Wide Web: How to program,Harvey M. Deitel& Paul J. Deitel.

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Paper Name: Software Engineering

Code: CS 403

Contacts: 3L + 1T

Credit:4

Course Objectives:

CO1. Be successful professionals in the field with solid fundamental knowledge of software engineering

CO2. Utilize and exhibit strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams

CO3. Apply their foundations in software engineering

Unit	Content
1	Introduction Defining system, open and closed system, modeling of system through computer hardware, communication systems, external agents and software systems; Importance of Engineering Methodology towards computerization of a system.
2	Software Life Cycle Classical and Iterative Waterfall Model; Spiral Model; Prototype Model; Evolutionary model and its importance towards application for different system representations, Comparative Studies.
3	Software Requirement and Specification Analysis Requirements Principles and its analysis principles; Specification Principles and its representations Software Design Analysis – Different level of DFD Design, Physical and Logical DFD, Use and Conversions between them, Decision Tables and Trees, Structured analysis, Coupling and Cohesion of different modules Software Cost Estimation Modeling –COCOMO.
4	Software Testing Software Verification and Validation; Testing objectives, Testing Principles, Testability; Error and Faults; Unit Testing, White Box and Blank Box Testing, Test Case Design: Test Vector, Test Stub.

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Software Quality Assurances

Concepts of Quality, Quality Control, Quality Assurance, IEEE Standard for Statistical

Software Quality Assurances (SSQA) criterions.

Text book and Reference books:

1. Software Engineering: A Practitioner's Approach by R.S. Pressman, McGraw-Hill.
2. An Integrated Approach to Software Engineering by P. Jalote, Narosa Publishing House.
3. Software Engineering by K.K. Aggarwal and Y. Singh, New Age International Publishers.
4. Software Engineering by I. Sommerville, Addison Wesley.
5. Software Engineering for Students by D. Bell, Addison-Wesley.
6. Fundamentals of Software Engineering by R. Mall, PHI.