PARVATHANENI BRAHMAYYA
SIDDHARTHA COLLEGE OF ARTS & SCIENCE
Autonomous
Siddhartha Nagar, Vijayawada–520010
Re-accredited at 'A+' by the NAAC

Course Code				23DSMAL233			
Title of the Course				**Object Oriented Programming Using Java**			
Offered to:				**B. Sc. Honours (Data Science)**			
L	4	**T**	0	**P**	0	**C**	4
Year of Introduction:		**2024-25**		Semester:			3
Course Category:		MAJOR		**Course Relates to:**		GLOBAL	
Year of Revision:		--		**Percentage:**		NA	
Type of the Course:				**Employability**			
Crosscutting Issues of the Course :				**Professional Ethics**			
Pre-requisites, if any				**Programming Knowledge**			

Course Description:

This course on Object-Oriented Programming using Java introduces fundamental concepts and techniques essential for Java programming. Students will explore the object-oriented paradigm, basic Java syntax, and program structure, covering variables, data types, operators, and control statements. The course delves into classes, objects, methods, inheritance, arrays, and interfaces. It further includes multi-threading, exception handling, and Java packages. Students will gain practical skills in graphics programming using the Graphics class and file handling, including reading and writing files. By the end of the course, students will be adept at designing and implementing Java applications with robust functionalities.

Course Aims & Objectives:

S. No	COURSE OBJECTIVES
1	Learn the basics of Java programming and Object-Oriented Programming (OOP) concepts.
2	Understand and use Java control statements, classes, objects, and methods to build structured programs.
3	Implement inheritance, arrays, and interfaces to create efficient and reusable Java code.
4	Learn how to handle errors and manage multiple threads to improve program performance.
5	Evaluate file handling and create simple graphics in Java to solve practical programming problems.

Course Outcomes:

At the end of the course, the student will / will be…

NO	COURSE OUTCOME	BTL	PO	PSO
CO1	**Remember** the basic concepts of Object-Oriented Programming (OOP) and the structure of a simple Java program.	K1	PO1, PO5, PO6, PO7	PSO1, PSO2
CO2	**Explain** how control statements and classes work in Java to manage the flow and structure of a program.	K2	PO5, PO6, PO7	PSO1, PSO2
CO3	**Apply** concepts of inheritance, arrays, and interfaces to create basic Java programs.	K3	PO5, PO6, PO7	PSO1, PSO2
CO4	**Analyze** how multi-threading and exception handling can be used to improve program performance and error management.	K4	PO5, PO6, PO7	PSO1, PSO2
CO5	**Evaluate** file handling techniques in Java and **Create** simple graphics programs using the Java Graphics class.	K5, K6	PO5, PO6, PO7	PSO1, PSO2

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO-PSO MATRIX									
CO NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	1	-	-	-	2	3	2	3	3
CO2	-	-	-	-	3	3	2	3	3
CO3	-	-	-	-	3	3	2	3	3
CO4	-	-	-	-	3	3	2	3	3
CO5	-	-	-	-	3	3	2	3	3

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively.

Course Structure:

Unit – I: Introduction to Java Programming (12 Hrs.)
Introduction-Object Oriented paradigm-Basic Concepts of OOP-Benefits of OOP-Applications of OOP- Java features-Simple Java program structure-Java tokens-Java Statements-Implementing a Java Program-Java Virtual Machine-Command line arguments-Constants-Variables-Data Types-Declaration of Variables-Giving Value to Variables-Scope of variables-Symbolic Constants-Type casting-Getting Value of Variables - types of operators with examples-expressions
Description:
This course is tailored to understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
Examples:
1. Operators concept in java
2. Type casting in java

Exercises:

3. Design Java program to perform Type Casting in java.
4. Develop a Java program for sorting a given list of names in ascending order.

Learning Outcomes:

By the end of the unit, students will understand the concept and underlying principles of Object-Oriented Programming and object-oriented concepts are incorporated into the Java programming language

Web Resources:

- Prof.DebasisSamanta, Dept of Computer science, IIT Kharagpur."Basic Concepts of Java Programming", 2018.
  https://www.youtube.com/watch?v=OjdT2l-EZJA&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=1

Unit – II: Control statements, Classes, Objects and Methods   **(12 Hrs.)**

Introduction-Decision making with if statement-Simple if statement-If Else statement-Nesting of if else statements-The else if ladder-The switch statement-The conditional operator-The While statement-The do-while statement-The for statement- Jumps in loops-Defining a class-Adding variables-Adding methods-Creating objects-Accessing class members-Constructors-Method overloading-Static members-Nesting of methods

Description:

This unit provides fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.

Examples:

1. Control statements in java
2. Constructors, Method overloading, Static keyword in java

Exercises:

3. Create a class Rectangle. The class has attributes length and width. It should have methods that calculate the perimeter and area of the rectangle. It should have read Attributes method to read length and width from user.
4. Construct a Java program that implements method overloading

Learning Outcomes:

By the end of this unit, students will be able to gain knowledge in Implementing Object Oriented Programming Concepts like class, constructor, overloading concepts in java

Web Resources:

- Introduction to Classes and Objects in Java ,Neso Academy, 7 june 2020
  https://www.youtube.com/watch?v=W-D71ZeMixQ&list=PLBlnK6fEyqRiwWLbSXKFtdGV8OVqr9dZr

Unit – III: Inheritance, Arrays, Strings and Interfaces   **(12 Hrs.)**

Extending a class-Overloading methods-Final variables and methods-Final classes-Abstract methods and classes-Arrays-One dimensional arrays- Creating an array – Two dimensional arrays- Strings- Wrapper classes.

MULTIPLE INHERITANCE: Introduction- Defining interfaces- Extending interfaces-Implementing interfaces-Accessing interface variables.

Description:

This unit helps in understanding the principles of inheritance and interfaces, array creation and string handling functions

Examples:

3. Types of inheritances.
4. String handling functions and array creation in java

Exercises:

2.

Learning Outcomes:
By the end of this unit, students will be able to understand and implement inheritance and interfaces, array creation and string handling functions in a Java program.

Web Resources:
4. Prof.DebasisSamanta, Dept of Computer science, IIT Kharagpur."Inheritance in Java", 2018.
   https://www.youtube.com/watch?v=rxsl1TzcEgg
5. Arrays in Java by Neso Academy, 2019
   https://www.youtube.com/watch?v=kWJHzambtNo&list=PLBlnK6fEyqRiraym3T703apTvEZLaSVtJ
6. What is string in Java by Lab Mug, 2023
   https://www.youtube.com/watch?v=Vv8ijzbz22s

Unit – IV: Multi-Threading, Exception Handling and Packages   (12 Hrs.)

Introduction-Creating Threads-Extending the Threads-Stopping and Blocking a Thread-Lifecycle of a Thread-Using Thread Methods-Thread Exceptions-Thread Priority-Implementing the 'Runnable' Interface-Types of errors-Compile time errors-Run-time errors-Exceptions-Exception handling-Multiple Catch Statements-Using finally statement-Java API Packages-Creating Packages-Accessing a Package- Using a Package.

Description:
This unit helps in understanding and implementing multi-threaded programs, Exception handling and packages.

Examples:
3. Multi-threading in java
4. Types of exception handling mechanisms

Exercises:
3. **Construct Java program to implement various types of Exception Handling Mechanisms**
4. **Design a program to create and Import Packages**

Learning Outcomes:
By the end of this unit, students will be able to Implement Multithreading, exception handling and packages in Java

Resources:
4. Prof.DebasisSamanta, Dept of Computer science, IIT Kharagpur."Packages in Java", 2018.
   https://www.youtube.com/watch?v=TwU3cv1FFis&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=17
5. Prof.DebasisSamanta, Dept of Computer science, IIT Kharagpur."Exception Handling in Java", 2018.
   https://www.youtube.com/watch?v=vUov8EkjZjU&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=23
6. Prof.DebasisSamanta, Dept of Computer science, IIT Kharagpur."Multi Threading in Java", 2018.
   https://www.youtube.com/watch?v=6rYOyIGfy3w&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=27

Unit – V: Graphics Programming and I/O Files   (12 Hrs.)

Graphics Programming: The Graphics class Lines and rectangles-Circles and ellipses-Drawing arcs -Line graphs -Drawing Bar charts.

I/O files: Concept of Streams-Stream classes-Byte Stream Classes-Character Stream classes: Reader stream classes, Writer Stream classes-Reading and writing files.

Description:

This unit focuses Understanding the principles of applets, I/O streams in java and java database connectivity

Examples:
- Writing and Reading Files.

Exercises:
- Develop a program for writing and reading Files
- Draw a circle with a radius of 50 pixels.

Learning Outcomes:
By the end of this unit, students will be able to implement graphical user interface in Java programs, Input/output Streams in java and java database connectivity with oracle

Resources:
- "File Handling in Java", Learn Coding, 2021.
  https://www.youtube.com/watch?v=VJgCjLuU4e8&list=PLqleLpAMfxGDVu5tUmUg9jSQUUB8_5DB0

Specific Resources:
Text Books:
2. E.Balaguruswamy, Programming with JAVA, A primer, 3e, TATA McGraw-Hill Company.

Reference Books:
6. Programming in Java by Sachin Malhotra, OXFORD University Press
7. John R. Hubbard, Programming with Java, Second Edition, Schaum's outline Series, TATA McGraw-Hill Company.
8. Deitel&Deitel. Java TM: How to Program, PHI (2007)
9. Java Programming: From Problem Analysis to Program Design- D.S Mallik
10. Object Oriented Programming Through Java by P. Radha Krishna, Universities Press (2008)

Web Resources:
2. Prof.DebasisSamanta, Dept of Computer science, IIT Kharagpur."Basic Concepts of Java Programming", 2018.
   https://www.youtube.com/watch?v=OjdT2l-EZJA&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=1