

COURSE TITLE	OBJECT ORIENTED PROGRAMMING
COURSE CODE	01CT0105
COURSE CREDITS	4

Objective:

- 1 To gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc. It is also make able to understand the fundamentals of object-oriented programming in Java, including classes, objects, invoking methods etc and exception handling mechanisms. Same way it is used to understand the principles of inheritance, packages and interfaces, Multithreading and I/O files in Java. Through Java programming Students are able to understand the fundamental of AWT, SWING which are the concept use to develop GUI application.
- 2 Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
- 3 Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms
- 4 Understand the principles of inheritance, packages and interfaces
- 5 Understand Multithreading and I/O files in Java
- 6 Understand the fundamental of AWT, SWING and Graphics based window
- 7 Understands Collection of classes and basic java utensils packages
- 8 To gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
- 9 To understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms
- 10 To understand the principles of inheritance, packages and interfaces
- 11 To understand Multithreading and I/O files in Java
- 12 To understand the fundamental of AWT, SWING and Graphics based window
- 13 To understands Collection of classes and basic java utensils packages
- 14
 - 1.To gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
 2. To understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms
 3. To understand the principles of inheritance, packages and interfaces
 4. To understand Multithreading and I/O files in Java
 5. To understand the fundamental of AWT, SWING and Graphics based window
 6. To understands Collection of classes and basic java utensils packages

Course Outcomes: After completion of this course, student will be able to:

- 1 Use Object Oriented Programming concepts for problem solving.
- 2 Apply OOP principles to create java application programs and proper program structuring.

Course Outcomes: After completion of this course, student will be able to:

- 3 Ensure design stability for various applications- by applying exception handling and inheritance
- 4 Implement multithreading, Interfaces and class collection with the help of Utensils package and Construct GUI and I/O based window application.
- 5 Analyze the various techniques of OOP to reduce programming complexity.

Pre-requisite of course:To gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Exp1 Use eclipse or Netbean platform and acquaint with the various menus, create a test project, add a test class and run it see how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop., Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.	
2	Exp2 Develop an applet that displays a simple message, Develop an Applet that receives an integer in one text field & compute its factorial value & returns it in another text filed when the button “Compute” is clicked	
3	Exp3 Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box, Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.	

Contents : Unit	Topics	Contact Hours
4	Exp4 Write a java program that connects to a database using JDBC and does add, deletes, modify and retrieve operations, Write a java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “stop” or “ready” or “go” should appear above the buttons in a selected color. Initially there is no message shown.	
5	Exp5 Write a java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea() that prints the area of the given shape., Suppose that a table named Table.txt is stored in a text file. The first line in the file header and the remaining lines correspond to row in the table. The elements are separated by commas. Write a Java program to display the table using labels in grid layout.	
6	Exp6 Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes), Write a java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t).it takes a name or phone number as input and prints the corresponding other value from the hash table(hint: use hash tables)	
7	Exp7 Implement the above program with database instead of a text file., Write a java program that takes tab separated data (one record per line) from a text file and inserts them into a database, Write a java program that prints the meta-data of a given table.	
8	Exp8 Write a Java program that prints all real solutions to the quadratic equation $ax^2 + bx + c = 0$. Read in a, b, c and use the quadratic formula. If the discriminate $b^2 - 4ac$ is negative, display a message stating that there are no real solutions?, The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 1, 1. Every subsequent value is the sum of the 2 values preceding it. Write a Java program that uses both recursive and non-recursive functions to print the nth value of the Fibonacci sequence?, Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer?	

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9	Exp9 Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome?, Write a Java program for sorting a given list of names in ascending order?, Write a Java program to multiply two given matrices?, Write a Java program that reads a line of integers and then displays each integer and the sum of all integers. (use StringTokenizer class)?, Write a Java program that reads on file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes?	
10	Exp10 Write a Java program that reads a file and displays the file on the screen, with a line number before each line?, Write a Java program that displays the number of characters, lines and words in a text.	
11	INTRODUCTION TO OBJECT ORIENTED PROGRAMMING Object oriented paradigm, object and classes, Data abstraction and encapsulation, inheritance, polymorphism, Dynamic binding, benefits and application of OOP	3
12	JAVA EVALUATION AND OVERVIEW Java evaluation: Java History, Java features, difference with other language, java with internet, www and web browsers, Java environment, JDK, Java overview: Java program structure, java program implementation on various IDE's like NetBeans and Eclipse, Byte Code and JVM.	2
13	STRINGS Introduction to String and String class, Operations on string, Command line argument, Use of Wrapper Class.	2
14	OBJECT, CLASSES AND METHODS Introduction to class, objects, members data and member functions, declaration of fields and methods, accessing class members, Introduction and Application of constructors and destructors, Method overloading & static members, Inheritance, method overriding, final variable, final member, final class, finalizer methods, Abstract method and class, Visibility modifiers in classes	6
15	INTERFACES(Multiple Inheritance) Introduction and declaration of Interfaces, Extending and implementing interface, Accessing interface variables	4
16	JAVA PACKAGES Introduction and declaration of Packages in Java, creating and accessing package, Adding class to a package, static import.	2
17	ERRORS AND EXCEPTION HANDLING IN JAVA Types of Errors, Exceptions, syntax of exception handling code, single and multiple catch statements, Importance and execution of throws and Finally statement, Built in Exception, Custom exception, Throwable Class	4

Contents : Unit	Topics	Contact Hours
18	COLLECTION FRAMEWORK Introduction to Collection Framework and Collection interface, Set, List and Map interface, Generics in the Collection Framework	2
19	MULTITHREADED PROGRAMMING Introduction to thread, Creating and Extending thread class, Stopping and blocking thread class, Life cycle of thread, Thread exception, thread priority, Synchronization, Implementing “Runnable” interface	5
20	MANAGING I/O FILE IN JAVA Concept of Stream and Stream classes, Byte Stream, Input/output Stream, Characters Stream, Reader Stream, Writer Stream, File Class, File InputStream, File Output Stream, InputStreamReader, OutputStreamWriter	3
21	GUI Introduction to AWT and SWING, Comparing AWT and swing features, AWT Components, Overview of the AWT components, Component properties, Graphics context, Containers, Container class, Layout Managers, Top-level containers, Window class, Decorated windows Frame and Dialog, Panel class, Events, Event Delegation Model, AWT Events, Adapter classes, Swing and MVC, J component, J option Pane, Showing Message, Confirm and Input Dialogs	8
Total Hours		41

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	INTRODUCTION TO OBJECT ORIENTED PROGRAMMING Object oriented paradigm, object and classes, Data abstraction and encapsulation, inheritance, polymorphism, Dynamic binding, benefits and application of OOP	
2	JAVA EVALUATION AND OVERVIEW Java evaluation: Java History, Java features, difference with other language, java with internet, www and web browsers, Java environment, JDK, Java overview: Java program structure, java program implementation on various IDE's like NetBeans and Eclipse, Byte Code and JVM.	
3	STRINGS Introduction to String and String class, Operations on string, Command line argument, Use of Wrapper Class.	

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
4	OBJECT, CLASSES AND METHODS Introduction to class, objects, members data and member functions, declaration of fields and methods, accessing class members, Introduction and Application of constructors and destructors, Method overloading & static members, Inheritance, method overriding, final variable, final member, final class, finalizer methods, Abstract method and class, Visibility modifiers in classes	
5	INTERFACES(Multiple Inheritance) Introduction and declaration of Interfaces, Extending and implementing interface, Accessing interface variables	
6	JAVA PACKAGES Introduction and declaration of Packages in Java, creating and accessing package, Adding class to a package, static import.	
7	ERRORS AND EXCEPTION HANDLING IN JAVA Types of Errors, Exceptions, syntax of exception handling code, single and multiple catch statements, Importance and execution of throws and Finally statement, Built in Exception, Custom exception, Throwable Class	
8	COLLECTION FRAMEWORK Introduction to Collection Framework and Collection interface, Set, List and Map interface, Generics in the Collection Framework	
9	MULTITHREADED PROGRAMMING Introduction to thread, Creating and Extending thread class, Stopping and blocking thread class, Life cycle of thread, Thread exception, thread priority, Synchronization, implementing "Runnable" interface, Introduction to JavaBeans and Network Programming	
10	MANAGING I/O FILE IN JAVA Concept of Stream and Stream classes, Byte Stream, Input/output Stream, Characters Stream, Reader Stream, Writer Stream, File Class, File InputStream, File Output Stream, InputStreamReader, OutputStreamWriter	
11	GUI Introduction to AWT and SWING, Comparing AWT and swing features, AWT Components, Overview of the AWT components, Component properties, Graphics context, Containers, Container class, Layout Managers, Top-level containers, Window class, Decorated windows Frame and Dialog, Panel class, Events, Event Delegation Model, AWT Events, Adapter classes, Swing and MVC, J component, J option Pane, Showing Message, Confirm and Input Dialogs	

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
12	<p>Experiments</p> <p>a) Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer b) Write a java program to find the Fibonacci series using recursive and non-recursive functions, a) Write a java program for Method overloading and Constructor overloading b) Write a java program to display the employee details using Scanner class. c) Write a java program that checks whether a given string is palindrome or not., a) Write a java program to represent Abstract class with example b) Write a java program to implement Interface using extends keyword., Write a java program to create user defined package. Import Package and Use it functionality in another Java File., a) Write a Java Program to demonstrate Exception Handling using try, catch and finally. b) Write a Custom Exception and Use it., Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number., Write a Java program to implement Collection Framework., Write a Java program that reads a file and displays the file on the screen, with a line number before each line., Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes), Develop an AWT/SWING program that receives an integer in one text field & compute its factorial value & returns it in another text filed when the button “Compute” is clicked, Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero., Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box, Write a java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “stop” or “ready” or “go” should appear above the buttons in a selected color. Initially there is no message shown., Suppose that a table named Table.txt is stored in a text file. The first line in the file header and the remaining lines correspond to row in the table. The elements are separated by commas. Write a Java program to display the table using labels in grid layout.</p>	28
Total Hours		28

Textbook :

- 1 Object Oriented Modeling and Design with UML, Michael Blaha, Pearson Education, 2005

References:

- 1 Programming with JAVA - A Primer: Third Edition, Programming with JAVA - A Primer: Third Edition, E. Balaguruswamy, McGraw-Hill Professionals, 2014
- 2 Java Fundamentals, Java Fundamentals, Herbert Schildt, Dale Skrien, Packt Publishing, 2019

Suggested Theory Distribution:

The suggested theory distribution as per Bloom’s taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
15.00	15.00	30.00	15.00	10.00	15.00

Supplementary Resources:

- 1 <https://ocw.mit.edu/courses/electrical...and.../6...programming.../lecture-14/>
- 2 <https://beginnersbook.com/2013/04/oops-concepts>
- 3 www.oracle.com/technetwork/java/oo-140949.html
- 4 nptel.ac.in/courses/106106147/3
- 5 Eclipse Oxygen.3a (Open Source software)
- 6 <https://www.studytonight.com/java/string-handling-in-java.php>
- 7 <https://www.javatpoint.com/java-tutorial>
- 8 <https://www.tutorialspoint.com/java/index.htm>
- 9 <https://www.w3schools.com/java/>