Course Title: Object Oriented Programming in Java (3 Cr.)
Course Code: CACS204
Year / Semester: II / III
Class Load: 6 Hrs. / Week (Theory: 3 Hrs. Tutorial: 1 Hr. Practical: 2 Hrs.)

Course Description

This course covers preliminary concepts of object-oriented approach in programming with basic skills using Java. Control structures, Classes, methods and argument passing and iteration; graphical user interface basics programming and documentation style.

Course Objectives

The general objectives of this course are to provide fundamental concepts of Object Oriented Programming and make students familiar with Java environment and its applications.

Course Detail

Specific Objectives	Course Content	Hours	References
• Define Java programming language and exploring its history • Explore role of Java for developing Internet applications • Explain applications and applets development in Java and their comparisons • Define Java Virtual Machine and its role • Know bytecode and its execution • Explain and compare procedure and object oriented programming • Know how to compile and run Java programs • Installing and setting environment variables for Java environment • Know to write Java programs • Know to compile, interpreter and run Java programs • Know to handle common Java programming errors and removing them	**Unit 1 : Introduction to Java** 1.1 Definition and History of Java 1.2 The Internet and Java's Place in IT 1.3 Applications and Applets 1.4 Java Virtual Machine 1.5 Byte Code – not an Executable code 1.6 Procedure – Oriented vs. Object-Oriented Programming 1.7 Compiling and Running a Simple Program 1.8 Setting up your Computer for Java Environment 1.9 Writing a Program 1.10 Compiling, Interpreting and Running the Program 1.11 Handling Common Errors	2 Hrs.	1. Chapter 1: Deitel & Deitel, "Java: How to program", 9th Edition, Pearson Education, 2011, ISBN:9780273759768 2. Chapter 1 and 2: Herbert Schildt, "Java: The Complete Reference", Seventh Edition, McGraw-Hill 2006, ISBN: 0072263857

• Define data type and explain all primitive data types and their uses • Define and explain user-defined data types • Know to declare variables and constants, use identifiers and literals • Convert one data type to other; Automatic and explicit conversion • Know to declare and assign values to variables • Explain default variable initialization • Know to use command line arguments • Define array and use array of primitive types • Know to use different styles of writing comments • Know about garbage collection features in Java • Define and use expressions • Know to use different types of operators • Explain and know to use all control statements: branching, looping, and jump	**Unit 2 : Tokens, Expressions and Control Structures** 2.1 Primitive Data Types: Integers, Floating-Point types, Characters, Booleans 2.2 User-Defined Data Types 2.3 Declarations, Constants, Identifiers, Literals 2.4 Type Conversion and Casting 2.5 Variables: Variable Definition and Assignment 2.6 Default Variable Initializations 2.7 Command-Line Arguments 2.8 Arrays of Primitive Data Types 2.9 Comment Syntax 2.10 Garbage Collection 2.11 Expressions 2.12 Using Operators: Arithmetic, Bitwise, Relational, Logical, Assignment, Conditional, Shift, Ternary, Auto-increment and Auto-decrement 2.13 Using Control Statements (Branching: IF, Switch; Looping: While, do-while, for; Jumping statements: break, continue and return	5 Hrs.	1. Chapter 4, 5, 7 and 8: Deitel & Deitel, "Java: How to program", 9th Edition, Pearson Education, 2011, ISBN:9780273759768 2. Chapter 3, 4 and 5: Herbert Schildt, "Java: The Complete Reference", Seventh Edition, McGraw-Hill 2006, ISBN: 0072263857
• Defining classes and objects; Know to create classes and objects; Adding and calling members to classes • Define and explain abstraction and encapsulation • Explain and know to use 'this' keyword • Define and explain different types of constructors and their importance in Java programming • Know to pass parameters in methods: by value and by reference	**Unit 3 : Object Oriented Programming Concepts** 3.1 Fundamentals of Classes: A Simple Class, Creating Class Instances, Adding methods to a class, Calling Functions/Methods 3.2 Abstraction, Encapsulation 3.3 Using 'this' keyword	9 Hrs.	1. Chapter 3, 6, 8, and 18: Deitel & Deitel, "Java: How to program", 9th Edition, Pearson Education, 2011, ISBN:9780273759768 2. Chapter 6 and 7: Herbert Schildt, "Java: The Complete Reference", Seventh Edition, McGraw-Hill 2006, ISBN: 007226385

• Know to use different access control techniques • Explain return values from methods • Define, explain, and implement polymorphism and overloading • Recursion, recursive method, and its importance • Know to use and importance of nested and inner classes	3.4 Constructors, Default Constructors, Parameterized Constructors 3.5 More on Methods: Passing by Value, by Reference 3.6 Access Control 3.7 Methods that Return Values 3.8 Polymorphism and Method Overloading 3.9 Recursion 3.10 Nested and Inner Classes		
• Know to use extends keyword for inheritance • Concept of subclass and superclass • Know to use 'super' keyword add its use • Know to write programs using method overriding • Concept of dynamic method dispatch and its uses • Know the concept of Object class and its members • Explain and compare abstract and final classes • Define and Know to use packages • Explain and use different access control techniques • Know the concept and uses of interfaces including definition and implementation of interfaces	**Unit 4 : Inheritance & Packages** 4.1 Inheritance: Using 'extends' keyword 4.2 Subclasses and Superclasses 4.3 'super' Keyword Usage 4.4 Overriding Methods 4.5 Dynamic Method Dispatch 4.6 The Object Class 4.7 Abstract and Final Classes 4.8 Packages: Defining a Package, Importing a Package 4.9 Access Control 4.10 Interfaces: Defining an Interface, Implementing and Applying Interfaces	3 Hrs.	1. Chapter 9 and 10: Deitel & Deitel, "Java: How to program", 9th Edition, Pearson Education, 2011, ISBN:9780273759768 2. Chapter 8 and 9: Herbert Schildt, "Java: The Complete Reference", Seventh Edition, McGraw-Hill 2006, ISBN: 007226385
• Know the concept and uses of exceptions • Know to create user defined exceptions • Exception handling using 'try' and 'catch' keywords • Know to use' throw' and 'throws' keywords • Know to use finally clause and its uses	**Unit 5 : Handling Error/Exception** 5.1 Basic Exceptions, Proper Use of Exceptions 5.2 User Defined Exceptions 5.3 Catching Exception: try, catch 5.4 Throwing and Re-throwing: throw, throws 5.5 Cleaning Up Using the finally Clause	2 Hrs.	1. Chapter 11: Deitel & Deitel, "Java: How to program", 9th Edition, Pearson Education, 2011, ISBN:9780273759768 2. Chapter 10: Herbert Schildt, "Java: The Complete Reference", Seventh Edition, McGraw-Hill 2006, ISBN: 007226385

• Know to use different string operations • Explain StringBuffer class and its comparison with String class	**Unit 6 : Handling Strings** 6.1 Creation, Concatenation and Conversion of a String, Changing Case, Character Extraction, String Comparison, Searching Strings, Modifying Strings 6.2 String Buffer	2 Hrs.	1. Chapter 3 and 16: Deitel & Deitel, "Java: How to program", 9th Edition, Pearson Education, 2011, ISBN:9780273759768 2. Chapter 15: Herbert Schildt, "Java: The Complete Reference", Seventh Edition, McGraw-Hill 2006, ISBN: 007226385
• Know to create, instantiate, and start a new thread • Know to write multithreaded programs using Thread class • Know to write multithreaded programs using Runnable interface • Understand thread execution and its states during execution • Know the concept of thread priorities • Know the concept of thread synchronization • Explain inter-thread communication • Concept of deadlock and deadlock handling	**Unit 7 : Threads** 7.1 Create/Instantiate/Start New Threads 7.2 Extending java.lang.Thread 7.3 Implementing java.lang.Runnable Interface 7.4 Understanding Thread Execution 7.5 Thread Priorities 7.6 Synchronization 7.7 Inter-Thread Communication 7.8 Deadlock	3 Hrs.	1. Chapter 26: Deitel & Deitel, "Java: How to program", 9th Edition, Pearson Education, 2011, ISBN:9780273759768 2. Chapter 11: Herbert Schildt, "Java: The Complete Reference", Seventh Edition, McGraw-Hill 2006, ISBN: 007226385
• Know to use java.io package and its different classes • Know to read and write data to and from console • Know to read and write files from Java programs • Concept of serialization and deserialization	**Unit 8 : I/O and Streams** 8.1 java.io Package, Files and Directories, Streams: Byte Streams and Character Streams 8.2 Reading/Writing Console Input/Output 8.3 Reading and Writing Files 8.4 The Serialization Interface, Serialization & Deserialization	2 Hrs.	1. Chapter 17: Deitel & Deitel, "Java: How to program", 9th Edition, Pearson Education, 2011, ISBN:9780273759768 2. Chapter 13: Herbert Schildt, "Java: The Complete Reference", Seventh Edition, McGraw-Hill 2006, ISBN: 007226385
• Concept of java.lang packate; Know to use java.lang package and its different classes • Concept of java.util packate; Know to use java.util package and its core classes	**Unit 9 : Understanding Core Packages** 9.1 Using java.lang Package: java.lang.Math, Wrapper Classes and Associated Methods (Number, Double, Float, Integer, Byte, Short,	3 Hrs.	1. Chapter 16, 17 and 18: Herbert Schildt, "Java: The Complete Reference", Seventh Edition, McGraw-Hill 2006, ISBN: 007226385

	Long, Character, Boolean) 9.2 Using java.util Package: Core Classes (Vector, Stack, Dictionary, Hashtable, Enumerations, Random Number Generation)		
• Concept of arrays and different collection classes and associated interfaces • Concept of map, list, and set and their uses • Know to use different collection classes like array list, linked list, hash set and tree set • Know to access collections using iterator and comparator	**Unit 10 : Holding Collection of Data** 10.1 Arrays and Collection Classes and Interfaces 10.2 Map/List/Set Implementations: Map Interface, List Interface, Set Interface 10.3 Collection Classes: Array, List, Linked List, Hash Set and Tree Set 10.4 Accessing Collections/Use of An Iterator/Comparator	3 Hrs.	1. Chapter 7 and 20: Deitel & Deitel, "Java: How to program", 9th Edition, Pearson Education, 2011, ISBN:9780273759768 2. Chapter 17: Herbert Schildt, "Java: The Complete Reference", Seventh Edition, McGraw-Hill 2006, ISBN: 007226385
• Explain and compare AWT and swing • Know to use JFrame as a top level container • Explain and know to use different swing components • Know to use IDEs for developing Java applications • Concept and uses of adapter classes; Compare adapter classes with event listeners	**Unit 11 : Java Applications** 11.1 About AWT & Swing 11.2 About JFrame (a Top Level Window in Swing) 11.3 Swing Components (JLabel, About Text Component like JTextField, JButton, Event Handling in Swing Applications, Layout Management using Flow Layout, Border Layout, Grid Layout, Using JPanel, Choice Components like JCheckBox, JRadioButton, Borders Components, JComboBox & its events, JList & its events with MVC Patterns, Key and Mouse Event Handling, Menus in Swing, JTextArea, Dialog Boxes in Swing, JTable for Displaying Data in Tabular form, MDI using JDeskto Pane & JInternet Frame)	8 Hrs.	1. Chapter 14 and 25: Deitel & Deitel, "Java: How to program", 9th Edition, Pearson Education, 2011, ISBN:9780273759768 2. Chapter 23, 24, 29 and 30: Herbert Schildt, "Java: The Complete Reference", Seventh Edition, McGraw-Hill 2006, ISBN: 007226385

	11.4 Using like NetBeans, JBuilder for building java applications using Drag & Drop 11.5 Adapter Classes		
• Define applet and compare it with applications • Explain different applet life cycle methods • Know to build simple applets • Know to use appletviewer command • Know to add different controls to applits	**Unit 12 : Introduction to Java Applets** 12.1 Definition 12.2 Applet Lifecycle Methods 12.3 Build a Simple Applet 12.4 Using Applet Viewer 12.5 Adding Controls: Animation Concepts	1 Hr.	1. Chapter 23: Deitel & Deitel, "Java: How to program", 9th Edition, Pearson Education, 2011, ISBN:9780273759768 2. Chapter 13: Herbert Schildt, "Java: The Complete Reference", Seventh Edition, McGraw-Hill 2006, ISBN: 007226385
• Know to use JDBC to connect with databases using connection class • Concept of statement and result set to manipulate data in the database	**Unit 13 : Database Programming using JDBC** 13.1 Using Connection 13.2 Statement & Result Set Interfaces for Manipulation Data with Databases	2 Hrs.	1. Chapter 28: Deitel & Deitel, "Java: How to program", 9th Edition, Pearson Education, 2011, ISBN:9780273759768

Teaching Methods

The general teaching methods includes class lectures, group discussions, case studies, guest lectures, research work, project work, assignments(theoretical and practical), and exams, depending upon the nature of the topics. The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

Evaluation Scheme				
Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	100
20	20 (3 Hrs.)	60 (3 Hrs.)	-	

Internal/Practical Assessment Format [FM = 40]

Internal Assessment Format [FM = 20] – Subject Teacher				
Term Examination		Assignment	Attendance	Total
Mid – Term	Pre - Final			
5	5	5	5	20

Practical Assessment Format [FM = 20] – External Examiner will be assigned by Dean Office, FOHSS.			
Practical	Viva	Lab Reports	Total
10	5	5	20

Note: Assignment may be subject specific case study, seminar paper preparation, report writing, project work, research work, presentation, problem solving etc.

Final Examination Questions Format [FM = 60, PM = 24, Time = 3 Hrs.]

SN	Question Type	Number of Questions Given	Marks per Question	Total Marks
1	Group – 'A' Objective Type Questions(Multiple Choice Questions)	10	1	10 x 1 = 10
2	Group – 'B' Short Questions (Attempt any SIX questions)	7	5	6 x 5 = 30
3	Group – 'C' Long Questions (Attempt any TWO questions)	3	10	2 x 10 = 20

- Student must pass 'Internal Assessment', 'Practical Assessment' and 'Final Examination' separately.
- Student must attend each and every activity of 'Internal Assessment' otherwise he/she will be declared as 'Not Qualified' for final Examination.

Text Books

1 Deitel & Deitel, "Java: How to program", 9th Edition, Pearson Education, 2011, ISBN:9780273759768
2 Herbert Schildt, "Java: The Complete Reference", Seventh Edition, McGraw-Hill 2006, ISBN: 0072263857

Reference Books

1 Bruce Eckel, "Thinking in Java", 4th Edition, Prentice Hall, 2006, ISBN: 0-13-187248-6
2 Cay Horstmann ad Grazy Cornell, "Core Java Volume I – Fundamentals", Ninth Edition, Prentice Hall, 2012, ISBN: 978-013708199
3 E. Balagurusamy, "Programming with Java: A Primer", 4th Edition, Tata McGraw Hill Publication, India

Internal Assessment marks Submission format

Campus Name:									
Subject Name: Digital Logic						**Subject Code: CACS105**			
SN	**TU Registration No.**	**Name**	**Symbol No.**	**Mid – Term [5]**	**Pre – Final [5]**	**Assignment [5]**	**Attendance [5]**	**Total [20]**	**Remarks**

Name of Subject Teacher:

Signature:

Date:

Name of Director/HoD/Coordinator:

Signature:

Date:

Tribhuvan University

Bachelor in Computer Application (BCA) – 3rd Semester

Object Oriented Programming in Java (CACS204)

Laboratory Report format

1. **Title:**

2. **Objectives:**

3. **Source Code:**

4. **Input:**

5. **Output:**

6. **Remarks/Comments:**

Laboratory Activities

The laboratory works includes writing computer programs using Java programming language as given below.

- Writing simple programs to demonstrate command line arguments
- Writing programs that include variables, data types, and operators
- Writing programs that include all control statements
- Writing programs with arrays
- Writing programs with classes and inheritance
- Writing programs with concepts of packages
- Writing programs with exception handling
- Writing programs to handle string methods
- Writing multithreaded programs using Thread and Runnable
- Writing programs with console and file input/output
- Writing programs using java.lang and java.util classes and interfaces
- Writing programs using collection classes
- Writing GUI programs using swing components, event handling, and layout management
- Writing Java applets
- Writing programs using JDBC to handle databases

TribhuvanUniversity

Faculty of Humanities & Social Sciences

Office of the Dean

Final Examination 2019

Bachelor in Computer Applications **Full Marks: 60**
Semester: Third **Pass Marks: 24**
Course Title: OOP in Java **Time: 3 hours**
Code No: CACS204

Name:	**Symbol No:**

Candidates are required to answer the questions in their own words as far as possible.

Group "A"

Attempt all the questions. **10×1 = 10**

Encircle the most appropriate answer from the given choices.

1. Which one of the following is not a valid java bitwise operator?
   a) >> b) <<
   c) >>> d) <<<
2. Which one of the following keyword is used to declare an exception?
   a) throws b) throw
   c) try d) catch
3. Which of these is an incorrect array declaration?
   a) intary[] = new int[5]; b) int[] ary = new int[5];
   c) intary = int[5] new; d) intary[];
   ary = new int[5];
4. Which one of the following access specifier is appropriate formembers of superclassto access only from subclass?
   a) private b) protected
   c) public d) default
5. Which one of the following is not a collection class defined in java?
   a) Linked List b) Hash Set
   c) Tree Set d) Graph Set
6. Which one of the following inheritance is best implanted using interface in java?
   a) single inheritance b) multi-level inheritance
   c) multiple inheritance d) hierarchical inheritance
7. Which one of the following method is called only once during the run time of your applet?
   a) stop() b) paint()
   c) init() d) start()
8. Which of these method of class String is used to compare two String objects for their equality?
   a) equals() b) Equals()
   c) isEqual() d) IsEqual()
9. What is the default value of priority variable MIN_PRIORITY and MAX_PRIORITY?
   a) 0 & 63 b) 1& 10
   c) 0 & 1 d) 1 & 32
10. Which one of the following is not java swing container?
    a) Panel b) TabbedPane
    c) Scroll Pane d) Scroll bar

TribhuvanUniversity

Faculty of Humanities & Social Sciences

Office of the Dean

Final Examination 2019

Bachelor in Computer Applications **Full Marks: 60**
Semester: Third **Pass Marks: 24**
Course Title: OOP in Java **Time: 3 hours**
Code No: CACS204

Candidates are required to answer the questions in their own words as far as possible.

Group "B"

Attempt any SIX questions. **6 × 5 = 30**

1. Define OOP. Explain features of Object Oriented Programming Language. [1 + 4]
2. Explain different types of control statements used in java. [5]
3. Define Abstract Class. Explain different types of Access controls available in java. [1 + 4]
4. Define method overriding? Write any program to implement concept of multiple inheritance in Java. [1 + 4]
5. Why it is important to handle exception in java? Write a program to illustrate the use of exception handling [1 + 4]
6. Define the use of **static** keyword. Write any four String methods used in java with example. [1 + 4]
7. Define **super**, **final** and **this** keywords in java. Explain the concept of MVC in brief. [1 + 1 + 1 + 2]

Group "C"

Attempt any TWO questions. **2×10 = 20**

8. a) Define multithreading. Write a java program to show the inter-thread communication. [1 + 4]
   b) Define Stream. Write a program in java to copy the content from one file to another. [1 + 4]
9. a) Define Collection Class. Explain different Wrapper classes and associated methods in java. [1 + 4]
   b) Define AWT. Explain different types of Layout Managers in java. [1 + 4]
10. a) List and explain any five swing controls with their uses. [5]
    b) Define JDBC. Write a program to display all records from a table of database. [1 + 4]

Answer Key

1	2	3	4	5	6	7	8	9	10
d	a	c	b	d	c	c	a	b	d