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| **Pokhara University**  **Faculty of Science and Technology** | |
| Course Code: CMP 215 (3 Credits) | Full Marks: 100 |
| Course Title: Object Oriented Programming using Java(3-0-3) | Pass Marks: 45 |
| Nature of the Course: Theory/Practical | Total Lectures: 48 hours |
| Level: Bachelor | Year: II / Semester: III | Program: Bachelor of Computer Application |

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| **1. Course Description:** | | |
| This course equips students with comprehensive knowledge of various Object-Oriented aspects of Java, guiding them through fundamental OOP concepts such as Classes, Objects, Inheritance, Interfaces, Polymorphism, and Packages. It also covers the basics of graphical user interfaces. The skills acquired in this course will enable students to develop standalone applications for real-world use. By the conclusion of this course, students will have the ability to write efficient, error-free Java programs, establishing a strong foundation for future endeavours. | | |
| **2. General Objectives**: | | |
| The general objectives of this course are as follows:   1. To acquaint the students with Object Oriented Programming knowledge of java environment. 2. To acquaint the students to develop simple applications with OOPS concepts 3. To introduce interfaces, packages, JavaFX and Socket programming basic concepts. 4. To enhance programming skills through a series of practical exercises and assignments, encouraging the application of learned concepts in real-world scenarios. | | |
| **3.** **Methods of Instructions:** | | |
| * Lecture and discussion * Practical * Demonstration * Presentation * Case study | | |
| **4. Course Contents:** | | |
| **Specific Objectives** | **Contents** | |
| **Unit 1: Introduction to Java Programming 4 hours** | | |
| * Describe the basic concepts of Object-Oriented Programming * Explain the user friendly in JAVA environment with basic structure of the program | * 1. History and Features of Java   2. C++ vs Java   3. Introduction      1. JDK      2. JVM      3. Bytecode      4. Java Environment.   4. Procedure Oriented Vs Object Oriented   5. Basic Concepts of Object-Oriented Programming   6. Structure of Java Programming, Naming conversions   7. Compiling and executing simple program   8. Scanner class | |
| **Unit 2: Java Fundamental Concepts 7 hours** | | |
| * Explore the Fundamental of JAVA language * Describe the concept of Arrays and Strings | * 1. Java Tokens, Keywords, Statements   2. Constants and Variable   3. Data Types   4. Operators   5. Control Statements      1. Branching      2. Looping Statements      3. Jump Statements   6. Arrays in Java      1. One dimensional      2. Two dimensional   7. Java Strings      1. String Length      2. Concatenation      3. String Comparison      4. String Buffer   8. Methods in Java      1. Predefined methods      2. User defined methods      3. Static methods | |
| **Unit 3: Java Object Oriented Programming 8 hours** | | |
| * Familiarize the concept of Class and Object, methods in real life Application * Explore java. Lang package | * 1. Fundamental of Class   2. Object fundamental   3. new Keyword   4. Member methods of a class   5. Instance method   6. Constructor and its types   7. Finalize method   8. Abstraction   9. Encapsulation   10. Using this keyword   11. Method overloading   12. Wrapper classes   13. Autoboxing and unboxing   14. Visibility Modes | |
| **Unit 4: Inheritance, Polymorphism, Interface and Packages 8 hours** | | |
| * Implement the Inheritance and interface concept in application | * 1. Inheritance      1. Using Extends      2. Member access      3. Super classes and sub classes      4. Single Inheritance      5. Multi-level Inheritance      6. Hierarchy Inheritance   2. Constructor and inheritance   3. Polymorphism-Method overriding   4. Abstract class   5. Using final keyword   6. Interface      1. Creating and implementing an interface      2. Extending interface   7. Packages      1. Creating Packages      2. Accessing a Package | |
| **Unit 5: Multithreading, Java Collections** | | **6 hours** |
| * Explain how threads work in the real time applications * Implement the java. Utility package | * 1. Introduction Multithreading      1. Thread class and Runnable Interface      2. Creating Threads      3. Stopping and Blocking a Thread      4. Life Cycle of a Thread      5. Using Thread Methods      6. Thread Priority   2. Collection Framework in Java      1. Overview of java collection framework.      2. Commonly used collection classes- ArrayList, Vector | |
| **Unit 6: Exception Handling, Java IO and Streams** | | **7 hours** |
| * Familiarize the students with the exception handling process in real life applications * Explain the role of Stream and file handling | * 1. Managing Errors and Exceptions   2. Syntax of Exception Handling Code   3. Types of Exceptions   4. Using try and catch keywords   5. Multiple catches   6. Using Finally Statement   7. Throwing Exceptions   8. Streams: Byte Streams and Character Streams   9. Reading / Writing Console Input / Output   10. Reading and Writing files | |
| **Unit 7: Java JDBC** | | **4 hours** |
| * Describe and gain knowledge of database connectivity in java | * 1. JDBC introduction   2. JDBC drivers   3. Connecting to Database   4. Querying a database and processing the results | |
| **Unit 8: JavaFX** | | **4 hours** |
| * Explore the GUI based programming. | * 1. Introduction to JavaFX   2. JavaFX Architecture   3. JavaFX Application Basics-Line, rectangle and text | |
| **6. Practical Works:**  The laboratory works should cover all the features of Object Oriented Systems using Java so that students would be motivated to solve the real-life problems.   1. Program to define a structure of a basic JAVA program. 2. Program to define the data types, variable, operators. 3. Program to define the arrays, string and control structures. 4. Program to define class and constructors. 5. Program to define class, methods and objects and method overloading. 6. Program to define inheritance and show method overriding. 7. Program to demonstrate Packages. 8. Program to demonstrate Exception Handling. 9. Program to demonstrate Multithreading. 10. Program to demonstrate I/O operations, demonstrate JDBC and JavaFX.   *By incorporating all the lab activities, a mini project should be developed and presented individually. Course instructor must include the mini project weightage in the practical evaluation.* | | |
| **7. Evaluation System and Students’ Responsibilities:** | | |
| **7.1 Evaluation System:** | | |
| In addition to the formal exam(s) conducted by the Office of the Controller of Examination of Pokhara University, the internal evaluation of a student may consist of class attendance, class participation, quizzes, assignments, presentations, written exams, etc. The tabular presentation of the evaluation system is as follows.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Internal Evaluation** | **Weight** | **Marks** | **External Evaluation** | **Marks** | | **Theory** |  | **30** | **Semester End examination** | **50** | | Attendance / Class Participation | 10% |  | | Assignments | 20% |  | | Project Work/Presentations | 10% |  | | Term Exam | 60% |  | | **Practical** |  | **20** | | Attendance and Lab Participation | 10% |  | | Lab Report | 20% |  | | Lab Examination | 40% |  | | Viva Examination | 30% |  | | **Total Internal Marks** |  | **50** | | **Full marks=50+50** | | | | | | | |
| **7.2 Students’ Responsibilities**: | | |
| To be eligible for the Semester End Examinations, each student must secure at least 45% marks in the internal evaluation with 80% attendance in the class to appear in the Semester End Examination. Failing to obtain such score will be given NOT QUALIFIED (NQ) and the student will not be eligible to appear in the End-Term examinations. Students are advised to attend all the classes and complete all the assignments within the specified time period. If a student does not attend the class(es), it is his/her sole responsibility to cover the topic(s) taught during the period. If a student fails to attend a formal exam, quiz, test, etc. there won’t be any provision for a re-exam. | | |
| **8. Prescribed Books and References:** | | |
| **Text Books**   1. Herbert Schildt, Java the Complete Reference, 11th Edition, Tata McGraw-Hill Publishing Co. Ltd. 2. E. Balagurusamy, “Programming with Java: A Primer”, Edition, Tata McGraw Hill Publication. | | |
| **Reference Books**   1. Y. Daniel Liang, Introduction to Java Programming Brief Version, 8th Edition Kindle Edition. 2. Cay S. Horstmann, Core Java Volume I–Fundamentals, 11th Edition, Pearson 2019. | | |