PROGRAMMING WITH JAVA (2-0-0-0-2)

Course Content:

1. **Java Fundamentals:** Introduction to Programming in Java, Java Language and Java Platform, Program Structure, Translation Process, Simple I/O, Constants, Variables, Type, Mixed Mode Operation, Primitive Types and Reference Types. **Object Based Programming:** Abstraction, Encapsulation, Composition, Class Attributes, Behaviour, Objects, and Methods. **Interface and Implementation**: Instance Fields and Methods, Initialization of Fields, Role of Constructors and Destructors, Garbage Collector, Parameter Passing, Value Type and Reference Type, Overloading of Methods, Scope. **Control Structures**: Selection – if, switch, Looping – while, for, do while, break and continue, Nested Control Structures.
2. **Recursion. Class Attributes and Behaviour:** Difference between Class Methods and Instance Methods, Necessity to Use Class Methods. **Enumerated Data Type:** Class Containing Fixed Number of Objects. **Programming for Safety:** Assertions, Exception Handling, Exception Propagation, Use and Misuse of Exception Mechanism.
3. **Arrays as Abstract Data Type:** Creation, Initialization, Methods on Arrays, Built-In Methods, Higher Order Arrays, **Strings as Abstract Data Type:** Creation, Initialization, Immutability, String Methods. **Composition and Inheritance: "**has a" and "is a" Relationship, LISKOV's Property of Substitution, When to Use and When Not to Use Inheritance, Super and Sub Classes, Polymorphism, Overriding.
4. **Inheritance (Continued):** Concepts of Single Rooted Hierarchy and Interface, Abstract Class in Programming Languages, Object Class in Java. **Composition**: Flexibility of Composition over Inheritance, Examples of Composition and Inheritance. **Package:** Need of Package Concept, User Defined Package, Introduction to Built-In Packages.
5. **Nested Types:** Need for Type within Type, Different Types of Inner Classes, Anonymous Inner Classes, Callback Mechanism. **Persistence:** Reading from Files, Writing into Files, Concept of Serialization. **Introduction to Generics and Collections:** Generic Programming Concepts, Concept of Generic Box, List Interface, Sort and Search.

Reference Book(s):

1. "Core Java Volume I – Fundamentals", Cay S Horstmann, Gary Cornell, 9th Edition, Pearson.
2. "Learning Java", Patrick Niemeyer and Daniel Leuck, 4th Edition, O'Reilly.

Evaluation Policy:

1. ISA - 40%
2. ESA - 60%