Syllabus

Basic Concepts of Object-Orientation

Introduction to OOP Principles

- Data abstraction
- Encapsulation
- Inheritance
- Aggregation

Object Model

- Evolution of the object model
- Elements of the object model and its applications

Fundamentals of OOP

- Classes and objects
- Nature of an object
- Relationship among objects
- Nature of classes
- Relationships among classes
- Interplay of classes and objects
- Methods and messages
- Inheritance
- Dynamic binding and polymorphism
- Virtual functions
- Virtual function table
- Different perspectives of inheritance
- Interface vs implementation
- Single vs multiple inheritance

Object-oriented Programming Languages

- Evolution of OOPLs
- Simula
- Smalltalk
- Eiffel
- C++

- Java
- C#

Object-oriented Programming Using Java

- Introduction
- Operators
- Data types, variables
- Arrays
- Control statements
- Classes and methods
- Inheritance
- Package and interface
- Exception handling
- Strings
- Event handling
- Multi-threaded programming
- Programming for networks

Advanced Object Oriented Concepts

Prototype Based OOPLs

- Class vs prototype
- Cloning
- Delegation
- The 'self' reference
- Object behavioral evolution
- Dynamic inheritance

Theory of Objects

- Types and subtypes
- The substitution principle
- Covariance and contravariance
- Overloading
- Parametric polymorphism
- Inclusion polymorphism
- Lambda calculus
- Object calculus
- Denotational semantics

Unified Modelling Language (UML)

- Class diagrams
- Object diagrams
- Sequence diagrams
- Use case diagrams
- Collaboration diagrams
- State-chart diagrams
- Activity diagrams
- Component diagram
- Deployment diagram