

## CS 211: OBJECT ORIENTED PROGRAMMING (3-0-2: 4)

**Introduction:** Introduction to object oriented programming, user defined types, structures, unions, polymorphism, encapsulation; getting started with C++ syntax, data types, variables, strings, functions, default values in functions, recursion, namespaces, operators, flow control, arrays and pointers.

**Abstraction Mechanism:** Classes, private, public, data members, member functions, inline function, friend functions, static members, and references, constructors, destructors

**Inheritance:** Class hierarchy, derived classes, single inheritance, multiple, multilevel, hybrid inheritance, role of virtual base class, constructor and destructor execution, base initialization using derived class constructors

**Polymorphism:** Binding, Static binding, Dynamic binding, Static polymorphism: Function Overloading, Ambiguity in function overloading, Dynamic polymorphism: Base class pointer, object slicing, late binding, method overriding with virtual functions, pure virtual functions, abstract classes

**Operator Overloading:** This pointer, applications of this pointer, Operator function, member and non-member operator function, operator overloading, I/O operators

**Exception Handling:** try, throw and catch, exceptions and derived classes, function exception declaration, unexpected exceptions, exception when handling exceptions, resource capture and release

**Memory Management:** Dynamic memory management, new and delete operators, object copying, copy constructor, assignment operator, virtual destructor

**Templates:** Template classes, template functions

**Standard Template Library:** Fundamental idea about string, iterators, hashes, iostreams and other types

**Namespaces:** User defined namespaces, namespaces provided by library

**Files:** Working with files

### Suggested Laboratory Assignments:

1. Programs on concepts of classes and objects.
2. Programs using inheritance.
  - (i) Single inheritance
  - (ii) Multiple inheritance
  - (iii) Multi-level inheritance
  - (iv) Use of virtual base classes
3. Programs using static polymorphism.
  - (i) Function overloading
  - (ii) Ambiguities while dealing with function overloading
4. Programs on dynamic polymorphism.
  - (i) Use of virtual functions
  - (ii) Use of abstract base classes
5. Programs on operator overloading.
  - (i) Operator overloading using member operator functions.
  - (ii) Operator overloading using non-member operator functions.
  - (iii) Advantages of using non-member operator functions.
6. Programs on dynamic memory management using new, delete operators.
7. Programs on copy constructor and usage of assignment operator.
8. Programs on exception handling.

9. Programs on generic programming using template function and template class.
10. Programs on file handling.

**Text Book:**

1. E. Balagurusamy, Object Oriented Programming with C++, McGraw-Hill

**References:**

1. ANSI and Turbo C++ by Ashoke N. Kamthane, Pearson Education
2. H. Schild, C++: The Complete Reference, McGraw-Hill
3. Rajiv Sahay, Object Oriented Programming with C++, Oxford
4. Venugopal, Mastering C++ McGraw-Hill