# CS-104 Object Oriented Programming

**Credit Hours 4 (3-1)**

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| **Program:** BSCS | **Semester:** II |
| **Pre Requisite:** Programming Fundamentals | **Follow Up:** Data Structures and Algorithms, Introduction to Software Development |
| **Course Description**The course is designed to teach the concepts of Object Oriented paradigm. Object Oriented Design is concerned with developing an object-oriented model of a software system to implement the identified requirements Object Oriented Design. It offers a powerful way to cope with program complexity. Object-oriented programming languages (OOPLs) are the natural choice for implementation of an Object-Oriented Design because they directly support the object notions of classes, inheritance, information hiding, and dynamic binding. Because they support these object notions, Object Oriented Programming Languages make an object-oriented design easier to implement.  |
| **Course Objectives**The basic goal is to develop such programs that are clear, reliable and easily maintainable. The course includes concepts like Data Encapsulation, Classes, Objects, Constructors & Destructors, Operator and Function overloading, Virtual functions & Polymorphism, Inheritance, I/O & File handling, Templates & Exception handling. |
| **Learning Outcomes**Upon completion of this course the student should be able to: * Explain object-oriented programming concepts like- classes, instance variables, instance methods, constructors
* Explain advanced object-oriented programming concepts - inheritance, polymorphism
* Demonstrate creativity and problem-solving skills.
* Demonstrate proper use of the object-oriented principle of inheritance.
* Given a problem description, the student should be able to decide on appropriate classes in a class hierarchy tree.
* Demonstrate proper use of the object-oriented principle of composition.
* Given a description that involves two classes, the student should be able to decide on whether composition or inheritance is more appropriate.
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| **Textbooks**How to Programe C++ by Deitel & Deitel 5/e, Pearson |
| **Reference Books / Material*** *An Introduction to Object-Oriented Programming with Java*, C. Thomas Wu (2010). 5th Edition. McGraw-Hill. ISBN: 9780073523309
* *Java: How to Programme*, 5/e, Deitel and Deitel, Prentice Hall, 0131016210/ 0131202367 International Edition
* *Ivor Horton’s Beginning Java*, 7/e, Ivor Horton
* *C++: How to Programme*, Deitel and Deitel, 5/e, Pearson
* *Object Oriented Programming in C++*, 3rd Edition, Robert Lafore
 |
| **Course Distribution** | Theory: 45%Problem Analysis: 20%Solution Design: 30%Social and Ethical Issues: 5% |
| **Marks Distribution** | Test1: 10 Marks,Test 2: 10 Marks Assignment: 05 Marks,Presentation: 05 Marks,Final: 55 MarksPractical: 10 MarksAttendance: 05 Marks |
| **Technology Involved** (Multimedia, Overhead Projector, Web, etc.)Multimedia, Web |
| **Practiced Techniques** (Class Room Lecture, Presentation, Workshop, Group Discussion, Survey, etc.)Class Room Lecture, Presentation, Group Discussion. |

 **Theory**

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| **Week** | **Topic** | **Learning Activities** (Assignments, Quizzes, Presentations, etc.) |
| 1 | Types of programming. Different approaches. Modular approach. Object Oriented Approach. Different Systems as objects. Structured programming, procedural programming. OOP features. Data Hiding, Encapsulation, Reusability. |  |
| 2 | Classes. Data as characteristics. Functions as behaviour. Class definition, prototype, Access Specifiers. Private, Public. Classes and their objects. | Assignment |
| 3 | Functions in classes. Parameterized functions and parameter- less functions. Constructors and their properties. Function Overloading. Function Overriding. |  |
| 4 | Constructors & their properties. Parameter-less constructor. Parameterized constructor. Sequence of execution, Default Constructor. Copy constructor. Destructors. | Quiz |
| 5 | Inheritance, reusability, extensibility. Base class/Parent class, Inherited class / Child class / Derived class. |  |
| 6 | Inheritance modes. Types of Inheritance, Multilevel Inheritance, Multiple Inheritance. Diamond Problem. Virtual Multiple Inheritance. |  |
| 7 | Polymorphism, Virtual functions, Pointer to class objects. Dynamic memory allocation. | Reading Assignment |
| 8 | Abstract classes/ Concrete classes, Pure virtual functions. |  |

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| **Week** | **Topic** | **Learning Activities** (Assignments, Quizzes, Presentations, etc.) |
| 9 | Composition. Composition Vs. Inheritance. Composition examples. |  |
| 10 | Multiple Composition, Multilevel Composition. Indirect composition. |  |
| 11 | Friend functions. Friend classes. Friendship and different properties. | Presentation |
| 12 | Operator Overloading. Overloading Unary operators. Overloading Binary Operators. |  |
| 13 | Overloading stream insertion and stream extraction operators. Overloading copy constructor and assignment operator. | Quiz |
| 14 | File Handling. File Operations, create, read, write, modify, delete. |  |
| 15 | File pointers, exception handling. | Assignment |
| 16 | Project assignment and discussions |  |
| **End Term Exam** |

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| **Lab Objectives**The basic goal is to develop such programs that are clear, reliable and easily maintainable. The students should be able to implement concepts like Data Encapsulation, Classes, Objects, Constructors & Destructors, Operator and Function overloading, Virtual functions & Polymorphism, Inheritance, I/O & File handling, Templates & Exception handling. |
| **Lab Outcomes**Upon completion of the practical work the student should be able to implement object-oriented programming concepts like- classes, instance variables, instance methods, constructors, advanced object-oriented programming concepts - inheritance, polymorphism, principle of composition. |
| **Textbooks / Lab Manual*** How to Program C++ by Deitel&Deitel
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| **Reference Books / Material*** How to Program C++ by Deitel&Deitel
* Object Oriented by Robert Lafore
* C++ Programming by Satish Jain
* Object Oriented Programming with C++ David Parsons
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| **Technology Involved** (Multimedia, Overhead Projector, Web, etc.)**Multimedia, Web** |
| **Practiced Techniques** (Lab Lecture, Presentation, Workshop, Group Discussion, Survey, etc.)Lab Lecture, Presentation, Programming Assignments, Group Discussion. |

**Lab**

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| **Week** | **Topic** | **Learning Activities** (Practical, Case Study, etc.) |
| 1 | Revision of structured programming, comparison of structured and Object Oriented concepts. | Lab |
| 2 | Classes. Class definition, prototype, Access Specifiers. Private, Public. Classes. Class objects. | Lab |
| 3 | Parameterized functions and parameter- less functions. Constructors. Function Overloading. Function Overriding. | Lab |
| 4 | Constructors, Parameter-less constructor, Parameterized constructor. Default Constructor. Copy constructor. Destructors. | Lab |
| 5 | Inheritance, Base class/Parent class, Inherited class / Child class / Derived class. | Lab |
| 6 | Inheritance modes. Multilevel Inheritance, Multiple Inheritance. | Lab |
| 7 | Polymorphism, Virtual functions. Pointer to class objects. | Lab |
| 8 | Abstract classes/ Concrete classes, Pure virtual functions. | Lab |
| 9 | Composition. | Lab |
| 10 | Multiple Composition, Multilevel Composition. Indirect composition. | Lab |
| 11 | Friend functions. Friend classes. | Lab |
| 12 | Operator Overloading. Overloading Unary operators. Overloading Binary Operators. | Lab |
| 13 | Overloading stream insertion and stream extraction operators. | Lab |
| 14 | Overloading copy constructor and assignment operator. | Lab |
| 15 | File Operations, create, read, write, modify, delete. | Lab |
| 16 | File pointers. | Lab |
| **End Term Exam** |